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Investor's Behaviour towards Divestitures in the Oil & Gas Industry

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PREFACE AND ACKNOWLEDGEMENTS

In this thesis everything from my studies comes together; all my knowledge gained, the hard work that went into it, but also the fun of studying what I like, Finance. First of all, I would like to thank my supervisor Jan Lemmen for his supportive and constructive guidance during the writing process. Secondly, I want to thank my grandpa for always believing in me. Next, I want to thank my mom, dad, brother and sister for supporting me throughout my entire student life. Last but certainly not least, I want to thank my girlfriend for her unconditional support and encouragement.

ABSTRACT

In recent years, there has been a significant shift in the energy industry towards clean energy sources because of climate concerns. Oil and gas companies can alternate their portfolio or free up some funds for investments towards cleaner energy by divesting some assets. To investigate whether a divestiture creates value for shareholders, this study examines 618 voluntary divestiture announcements in Europe over the period 2002-2022 by means of an event study. Additionally, multiple regressions are performed to capture the effect of oil and gas prices and some other variables on the cumulative abnormal returns. The results of this study indicate that divestiture announcements have a positive effect on share prices within the oil and gas industry. Moreover, a negative relationship between firm size and CAR was found. The results imply that the larger the firm size, so the larger the book value of assets a company holds, the less the impact of a divestiture would be. Lastly, even though the evidence points into the direction that oil and gas prices influence the amount of divestitures conducted and the average deal value, the evidence is not conclusive enough to state that high oil or gas prices influence the cumulative abnormal returns.

Keywords: Divestiture, Oil and Gas industry, Event study, Europe

JEL Classification: G14, G34

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CHAPTER 1 Introduction

1.1 Global warming

The Paris Climate Agreement was signed more than seven and a half years ago. The agreement aims to respond to global warming by setting concrete goals. One of these concrete goals is to limit the rise in temperature on earth to two degrees Celsius in comparison with pre-industrial values. A significant measure to reach that goal is limiting greenhouse gasses, particularly CO2. Specifically, the emission of greenhouse gasses must be reduced by at least 80% by 2050 compared to 1990. The first steps to achieve this goal are already being taken.

In 2023 the oil, gas and energy prices in Europe rose to exceptionally high levels due to the ongoing war between Russia and Ukraine, the question could arise what impact the high prices will have on the decisions firms make towards the energy transition and how shareholders react to this.

1.2 Divestitures

One of the steps towards a more sustainable future for companies could be divestitures. A firm's asset portfolio can be alternated by either spinning-off or selling-off unwanted assets. A spin-off occurs when all of the common stock a firm owns of a controlled subsidiary is distributed to its existing shareholders. This process creates a new publicly traded company. When the divested assets are sold for 100% and become part of another firm, the transaction is called a sell-off.

The concept of Environmental, Social, and Governance (ESG) factors has become increasingly relevant in investment decision-making in recent years. The ESG refers to a set of standards for a company's behaviour used by socially conscious investors to screen potential investments. This is due to growing concerns around sustainability and the ethical implications of investment activities. One important way in which ESG factors are being incorporated into investment decisions is through divestments.

In particular, a divestiture could be relevant for oil and gas companies to gain share value as it is an excellent way to alternate their portfolio or free up some funds for investments towards cleaner energy. High oil and gas, but also carbon prices could incentivize firms to invest money into innovative techniques and reduce the carbon footprint rather than investing in the current expensive permits.

1.3 Social and academic relevance

The oil and gas industry is a vital sector of the global economy, providing energy to power homes, businesses, and transportation. However, the industry has also been under increasing pressure to reduce its environmental impact and to transition to cleaner energy sources. As a result, the divestiture of fossil fuel assets by European firms has become a growing trend in recent years.

The findings of this research could provide valuable insights for policymakers, investors, and industry stakeholders on the financial implications of divestiture decisions in the oil and gas industry. Additionally, this research could contribute to the academic literature on divestiture, corporate strategy and performance, and the transition to cleaner energy sources. Furthermore, the study could help the industry players to make better-informed decisions regarding divestitures and to reduce the negative impact of the fossil fuel industry on the environment. Lastly, this research will answer whether one should consider energy prices as an essential factor in their calculations.

Despite the ongoing concerns about the oil and gas industry and the relatively high number of divestitures within the oil and gas industry, especially in Europe, little research has been done for the past few years.

This research will answer the question:

What is the effect of divestiture announcements by European firms in the oil and gas industry on their share value, and is there a difference to be discovered when the price of oil and/or gas is high?

So, the focus will be on the European market. A dataset that contains the years 2002 – 2022 will be used. Furthermore, the oil and gas industry will be investigated from three perspectives within the vertical supply chain. The study is therefore done in a new research field. Lastly, the study dives into the question of whether the effect differs when the price of oil and gas is high.

1.4 Main findings

This study shows that divestiture announcements have a positive effect on share prices, with significant positive abnormal returns on the announcement day and for the CAR[-1,+1] event window. The study also examines the impact of divestitures on different segments of the industry and finds that divestitures in the upstream oil and gas industry have the most positive effect on share prices compared to the mid- and downstream submarkets. Furthermore the study shows that there is a negative relationship between the amount of divestitures conducted and the average deal value. Additionally, the results of this study imply that oil and gas prices have little to no effect on cumulative abnormal returns. On the other hand, we find a negative significant relationship between the firm size -the book value of assets a company holds- and the CARs. Overall, the study concludes that divestiture announcements by European companies in the oil and gas industry have a positive effect on share prices.

1.5 Design of the study

In this study, the relevant literature will be reviewed first. Then it will be outlined how the data is collected and which criteria are used in the process. Hereafter, the methodology will be described in detail. Once this is completed, the research can begin, and the chapter results will provide answers to the stated hypotheses. Finally, the discussion and conclusion as well as the answer to the main question will be described.

CHAPTER 2 Literature Review

In this chapter, the underlying theories will be discussed. First, the basic assumptions will be explained. Thereafter, the existing literature on divestitures will be reviewed. Then, the event study model will be examined, and lastly the literature on oil and gas prices will be overlooked.

2.1 Basic theories

2.1.1 Efficient market theory

The efficient market hypothesis posits that all publicly available information and expectations for the future are incorporated into the prices of securities, such as stocks. The theory was first published in 1970 by Eugene Fama (Fama, 1970). One of the key conclusions drawn from his research is that it is impossible to consistently achieve returns above average, except by chance. Jensen and Ruback (1983) also found that this holds true in the case of an announcement of a merger or acquisition. Once the information is made public, the impact of the announcement should be immediately reflected in the stock price. Shareholders predict the future economic impacts of a publicly declared corporate event, such as a divestiture, by exhibiting their opinions through their buying and selling behaviours (Bergh and Gibbons 2011).

2.1.2 Diversification theory

The diversification theory identifies a motivation for companies to engage in mergers and acquisitions, and divestitures. The theory states that a firm may purchase another company operating in a different sector than its own operations. This could be driven by the belief that there are greater growth opportunities in the new industry or to reduce overall risk exposure. Igor Ansoff (1957), who has conducted research on strategies for diversification, said it as follows;

'Sometimes you have to change the path you're running on to be able to run twice as hard.'

If risk reduction is the primary objective, it may not result in value creation. Risk has two components - systematic and unsystematic risk. Systematic risk affects the entire market, whereas unsystematic risk is specific to a particular industry or company. Diversification of investments can mitigate unsystematic risk. Investors can achieve this by investing in various segments and risk categories. Thus, a company's acquisition with the intention of spreading risk will not necessarily bring any added value (Statman, 2004).

2.1.3 Attention theory

The attention theory can be interpreted in multiple ways. From a divesting firm's perspective, firms can strategically capture the attention of potential investors and stakeholders through effective communication strategies. By highlighting the environmental and social considerations associated with divestments, divesting firms can direct attention towards the positive impact their actions can have on sustainability and corporate social responsibility. This could lead to a positive effect on the share price of the firm.

On the other hand, Xue et al. (2022) discusses the diminishing effectiveness of hot news communication in the era of financial media. With the rapid development of communication technology and media convergence, news information is disseminated quickly through various platforms. However, there is a phenomenon where the effectiveness -level of attention- of hot news dissemination decreases over time. The study analyzes the reasons for this phenomenon and the transformation of news media. As there is a lot of information available today through all the media sources, the effect of an announcement could diminish if a firm releases more divestiture announcements in a shorter period.

2.2 Literature review on divestiture announcements

Table 1 presents an overview of related literature regarding divestiture announcements. One could observe a certain development. More and more detailed factors that influence the results of an event study are found and improved. Most of these findings are therefore implemented in this study.

Table 1

Overview of Related Literature Regarding Divestiture Announcements

Author(s) (Publication year)	**Time period**	**Region**	**Method**	**Results**
Fama, Fisher, Jensen and Roll (1969)	1927 – 1959	US	Event Study	Positive abnormal returns.
Rosenfield (1984)	1963 – 1982	US	Event Study Mean adjusted return model	Divestitures have a positive influence on stock prices. Spin-offs outperform sell-offs on the day of the event.
Klein (1986)	1970 – 1979	US	Event Study Market model	Divestitures where no transaction price is announced experience no statistically significant effect on their share price.
Hite, Owers and Rogers (1987)	1963 – 1978	US	Event study Market Model	Divestments are associated with movement of resources to higher valued uses.

Armitage (1995)	1926 – 1960	US	Index Model Avg. Return Model Market Model CAPM Model Fama-Macbeth Model Control Portfolio Model	Market Model is the most commonly used and no better model has been found.
MacKinlay (1997)	1990 – 1996	US	Event Study Market model	CAR (-1,1) = 0.34
Harford (1999)	1950 – 1994	US	Normal Cash model	Acquisitions by cash rich firms are value decreasing.
Zuckerman (2000)	1985 – 1994	US	Regression analysis	De-diversification is more likely when a firm's stock price is low and there is a significant mismatch between its corporate strategy and the identity attributed to the firm by analysts.
Moeller, Schlingemann and Stulz (2004)	1980 – 2001	US	Event Study	Financing announcements matter for the effect on share price.
Sorecu, Nooshin and Warren (2017)	2000 – 2013	US	Different Event Study models	Excluding confounding events not necessary.
Sabet, Agha & Heaney (2018)	1989 – 2011	US	Event Study Market model	Unconventional greater than conventional divestiture.

2.2.1 Divestitures

The Merger and Acquisition market (M&A market) has been soaring to an all-time peak in 2021. Reasons for companies to conduct a merger or acquisition vary widely. In general, firms expect to benefit from a merger or acquisition, and so should their shareholders (Rosenfield, 1984). However, Harford (1999) and Moeller et al. (2004) show that this is not always the case. Instead of acquiring or selling, firms could also choose to divest some assets. For example, to free up some funds to alter their portfolio. Firms that are mainly focused on one sector are at risk when the sector performs poorly. With the proceeds of a divestiture, firms could make investments in other sectors and diversify their business in that way. Contrary, an already highly diversified firm could proceed a divestiture in order to regain focus in a sector. Zuckerman (2000) studied this behaviour and found that this de-diversification is more likely when a firm's stock price is low and there is a significant mismatch between its corporate strategy and the identity attributed to the firm by analysts. Rosenfield (1984) has done research on the relation between divestiture announcements and shareholder wealth. He finds that divestiture announcements tend to have a positive effect on the stock price of the parent firm on the day of the event. He also finds that spin-off divestitures outperform sell-off divestitures in terms of impact.

Very few studies on divestitures have found that these transactions do not so much affect or even negatively affect a firm's share value. However, details in the announcement of a divestiture can make a difference. A study by Klein (1986) shows that firms that engage in divestitures where no transaction price is announced, experience no statistically significant effect on their share price in the short term. Nevertheless, the majority of the studies suggested that divestitures have a positive effect on a firm's share value. This idea is supported by Sabet et al. (2018). They find that the shareholders' reaction to a divestiture announcement between 1989 and 2011 by US firms in the oil and gas industry is positive and significant. They state that information asymmetry is expected to be less severe for resource divestiture than resource acquisition. As investors are more aware of the nature of resources a firm might divest, one could expect an increase in share price after the announcement of a divestiture. This is also supported by the model of Hite et al. (1987).

Looking at the recent developments towards clean energy, a divestiture could be relevant for oil and gas companies to gain share value. As the oil and gas industry is cyclical and capital-intensive, companies may have to divest non-core assets to free up capital for more valuable investments. Companies could also choose to reduce their exposure to regulatory and environmental risks, allowing them to focus on assets that are more in line with their strategic objectives. Second, a divestiture can also be a way for oil and gas companies to adapt to the changing energy landscape. With the increasing adoption of renewable energy sources and the growing concerns about climate change, oil and gas companies may choose to divest fossil fuel-based assets and invest in cleaner energy alternatives. This can help them to reduce their carbon footprint and better align themselves with the global trend towards sustainability. Additionally, financially troubled firms who are highly leveraged are believed to be more likely to divest due to their pressing need to address financial distress and reduce debt burdens. Extensive research in corporate finance and strategic management has shown that firms facing financial difficulties often resort to divestment as a strategic response to their challenging financial situation. (Pashley et al., 1990) High leverage levels, characterized by substantial debt obligations, can create financial constraints and hinder a firm's ability to invest in growth opportunities or meet financial obligations. From an investor's perspective, the divestment of non-core or distressed assets may signal a commitment by the firm to prioritize financial stability and enhance shareholder value. On the other hand, it could also be a signal to investors that the company is performing poorly and that it not really has other options than to divest a part of its assets.

To examine whether divestitures within the oil and gas industry in Europe have a positive effect on the share price, the following hypothesis is stated:

$H1_0$: Divestitures by European firms in the oil and gas industry have no effect on their share price.

$H1_a$: Divestitures by European firms in the oil and gas industry have a positive effect on their share price.

2.2.2 The oil & gas industry

The oil and gas industry is a complex and multifaceted sector that encompasses a wide range of activities, from exploration and production to refining and marketing. One way to understand the industry is by dividing it into three main segments: upstream, midstream, and downstream.

Upstream refers to the exploration and production of oil and gas, including activities such as drilling and extracting crude oil and natural gas. This segment of the industry is often referred to as the "wellhead" and is the starting point of the oil and gas value chain. Midstream refers to the transportation and storage of oil and gas, including activities such as pipeline transportation, wholesale distribution, and storage of natural gas liquids (NGLs). This segment of the industry is responsible for moving oil and gas from the wellhead to the downstream segment and is also known as the "pipeline" segment of the industry. Downstream refers to the refining and marketing of oil and gas products, including activities such as refining crude oil into gasoline, diesel, and other products, as well as the distribution and sale of these products to consumers. This segment of the industry is often referred to as the "consumer end" of the oil and gas value chain.

Each of these segments of the oil and gas industry has its own unique characteristics and challenges, and they are often subject to different market conditions and regulations. Furman et al. (2017) provides an overview of the important problems and the relevant technologies that are critical to the oil and gas industry. Understanding the differences between the upstream, midstream, and downstream segments is crucial for analysing the industry as a whole and for understanding the impact of specific events, such as divestitures, on different parts of the industry.

Looking at the different characteristics of the up-, mid- and downstream oil and gas companies, one could wonder whether the effects of a divestiture announcement are the same for the different classifications. The arguments that support a positive outcome could theoretically apply for all three classifications but, whether these arguments really apply has to be investigated.

Therefore three additional hypotheses are stated to examine the effect of a divestiture on the share price within the submarkets of the industry:
$H2_0$: Divestitures by European firms in the upstream oil and gas industry have no effect on their share price.
$H2_a$: Divestitures by European firms in the upstream oil and gas industry have a positive effect on their share price.

$H3_0$: Divestitures by European firms in the midstream oil and gas industry have no effect on their share price.
$H3_a$: Divestitures by European firms in the midstream oil and gas industry have a positive effect on their share price.

$H4_0$: Divestitures by European firms in the downstream oil and gas industry have no effect on their share price.
$H4_a$: Divestitures by European firms in the downstream oil and gas industry have a positive effect on their share price.

Divestitures within the upstream, midstream, and downstream sectors of the oil and gas industry are likely to have varying effects on share prices. This expectation arises from the distinct dynamics and characteristics of each sector. The upstream sector, with its higher risks and capital-intensive nature, is more prone to commodity price fluctuations. The midstream sector's performance is influenced by factors such as transportation capacity and infrastructure. Additionally, the downstream sector is subject to unique market trends and consumer demand.

To investigate whether there is a difference in effect between the submarkets hypothesis five is stated:
$H5_0$: There is no difference in the effect of divestitures on the share price by European firms in the upstream oil and gas industry compared to the mid- and downstream submarkets.
$H5_a$: Divestitures by European firms in the upstream oil and gas industry have the most positive effect on their share price compared to the mid- and downstream submarkets.

2.3 Event study

When a company makes an announcement, its share price will almost immediately react to it; a certain expectation is incorporated into the price. As we assume the efficient market hypothesis to be true, the effect should be immediately noticeable in the stock price. An event study is a statistical method of assessing the impact of an announcement on a firm’s share price. Fama, Fisher, Jensen and Roll were the first to write a paper on this in 1969. They analysed stock prices from 29 months before the announcement to 30 months after the announcement. With this data, they calculated the abnormal return. By cumulating all the abnormal returns inside the event window, they find the Cumulative abnormal return. This process and the windows used in this study will be described in more detail in the chapter methodology. The majority of the studies that conduct an event study use the market model to calculate the normal returns. Armitage (1995) studied six different models to calculate the normal returns and concluded that the market model is the most accurate. Sorescu et al. (2017) found that excluding confounding events in short-term studies may be unnecessary. By testing with a long and short event period, this study will investigate whether there is noise around the divestiture event.

2.4 Crude oil and natural gas prices

Life without gasoline, diesel and kerosine, not to mention plastic and asphalt would be very different compared to the current course of action. We have become highly dependent on the energy sources. Besides, oil has a significant impact on our economy. Think of consumer prices and exchange rates, but also of transportation costs. When price shocks happen in markets, shareholders will overreact most of the time (Lalwani et al., 2019). Additionally, Shell presented their largest quarterly revenue in the second quarter of 2022 and its second-largest revenue in the third quarter of 2022 because of the high oil prices in that year. One can assume that the shareholder's attention is on a high level.

As Shell, but many more oil companies, had a high free cash flow that year, it's a logical consequence that the need for divestment is less present. Moreover, as these firms are still earning plenty with oil and gas products, the consideration to diversify their business towards cleaner energy is also likely to be less present. This results in firms delaying divestments. On the other hand, when oil and gas prices are high and assets are highly priced, it could be smart to divest some assets and gain a relatively high amount of free funds which can be used to diversify the company's asset portfolio towards cleaner energy.

To examine this trade-off and see if high oil prices have an effect on the divestitures by oil and gas firms, two additional hypotheses are stated:

$H6_0$: In periods when the oil prices are high, the number of divestitures within the oil and gas industry are equal compared to periods when the oil prices are low.

$H6_a$: In periods when the oil prices are high, the number of divestitures within the oil and gas industry is lower than in periods when the oil prices are low.

$H7_0$: A high oil price has no effect on the Cumulative Abnormal Return of divestitures within the oil and gas industry.

$H7_a$: A high oil price has a effect on the Cumulative Abnormal Return of divestitures within the oil and gas industry.

Another global energy source that surged in price during 2021 and 2022, mostly because of the war in Ukraine, is natural gas. When gas prices are high, the profits of oil and gas companies can increase, leading to positive financial results and increased shareholder confidence. This creates the same scenario as for high oil prices; firms are less likely in need for divestitures to free up funds. However, with the ongoing rising urgency to become more sustainable, a firm could also use the momentum to sell assets at a relative high price and use these funds to diversify the company's asset portfolio towards cleaner energy.

To examine this trade-off the following hypotheses are stated:

$H8_0$: In periods the gas prices are high, the number of divestitures within the oil and gas industry is equal compared to periods the gas prices are low.

$H8_a$: In periods the gas prices are high, the number of divestitures within the oil and gas industry is lower than in periods the gas prices are low.

$H9_0$: A high gas price has no effect on the Cumulative Abnormal Return of divestitures within the oil and gas industry.

$H9_a$: A high gas price has a effect on the Cumulative Abnormal Return of divestitures within the oil and gas industry.

CHAPTER 3 Data

For this study, various divestiture announcements are investigated within the oil and gas industry in Europe. The sample will cover the period January 1st, 2002 to December 31st, 2022. Table 2 provides an overview of the sample selection process.

3.1 Region

Arguably, the oil and gas industry is a worldwide industry. However, the choice is made to only examine European firms. Therefore, the sample size is smaller compared to the global sample size. There are two main reasons why this selection criterion is maintained. First, Europe has been at the forefront of implementing and promoting climate-related policies, regulations, and sustainability initiatives. There is a stronger emphasis on environmental concerns and sustainability in European markets compared to some other regions. This increased climate pressure and the growing importance of responsible investing in Europe make it a compelling context for studying the impact of divestiture on share prices. Second, there is much less research done about the European oil and gas industry compared to the US or global oil and gas industry.

3.2 Deal data

The deal data is gathered from the Refinitiv Eikon database. They provide a comprehensive collection of company and deal information within all markets. In addition to that, the Refinitiv Eikon database provides a filter option for divestitures called 'the divestiture flag'. This filter function in the Refinitiv Eikon database is a feature that allows users to filter events based on whether they involve a divestiture or not. A divestiture, here, refers to the sale or spin-off of a subsidiary or division of a company. Only deals that fall under the divestiture flag are included. Also, if a firm has a second divestiture that falls within the event window, that event was removed from the sample. Further, the parent company must be publicly traded, so its securities must be available on public markets. Then, to increase the chance that shareholders notice the divestiture announcement, a minimum deal value of 5 million is maintained. The industry selection is done by looking at the target's parent company. The parent companies are selected based on the NAICS codes, and all codes within the oil and gas industry are included. The up-, mid- and downstream classifications are also based on the NAICS codes (see Table 3). Lastly, it was examined whether the deal attitude was friendly or hostile. It turned out that all observations were friendly except for two, which were classified as 'neutral' and therefore not removed from the sample.

From the DataStream database, the share price information of the corresponding companies is distilled. Also, the market index returns are gathered from this database. The MSCI AC Europe Mid Cap Index is used as the market index. As the firms within the sample are based in Europe, an European market index is used as a benchmark. Using the 28th of April 2023 as a reference point, the median market capitalization of the index is approximately €6,000,000,000 and the largest market capitalisation within the index is approximately €23,000,000,000. The median market capitalization of the full sample is €10,500,000,000. Therefore the use of the mid cap index was chosen over the standard MSCI AC Europe Index. Due to some outliers the distribution was a little skewed to the right, therefore the median is used to compare instead of the average.

There was a gap in the market index data between 2000 and 2001. Therefore, the choice was made to analyse the data starting from the 1st of January 2002.

After filtering for all the criteria mentioned above, 801 divestiture announcements remain from 166 different parent companies. The last step is to remove the deals with a missing DataStream code or where the stock data is missing. Ultimately, a sample of 618 Divestiture announcements from 127 different parent companies remain.

Table 2

Breakdown of the Sample Selection Process

Process	**Number of divestitures**
Refinitiv Eikon deals under the divestiture flag	417.819
Exclude deals outside the timeframe 2000-2022	-102.794
Subtotal	315.025
The target's ultimate parent headquarters should be based in Europe	-200.295
Subtotal	114.730
The target's ultimate parent needs to be publicly traded	-68.248
Subtotal	46.482
Exclude deals with a deal value below 5 million	-31.318
Subtotal	15.164
Constrain deals to the up- mid- and downstream oil and gas industry	-14.363
Subtotal	801
Exclude deals where the DataStream code is missing or where the stock data is missing	-183
Final sample for analysis	*618*

This table provides a breakdown of the sample selection process for the full sample.

As analysing the industry as a whole is crucial for understanding the impact of specific events, the industry is divided into upstream, midstream, and downstream segments. In Table 3, one can find the classification based on NAICS Codes.

Table 3

Breakdown of the Industry Classification

Classification	Target Ultimate Parent NAICS Code	Amount of Divestitures
	211111	
	211112	
	211130	
	211140	
	213111	
Upstream		336
	486110	
	486910	
	486210	
	486310	
	237120	
Midstream		71
	324100	
	447110	
	447190	
	447990	
	324191	
	424470	
Downstream		211
Total		*618*

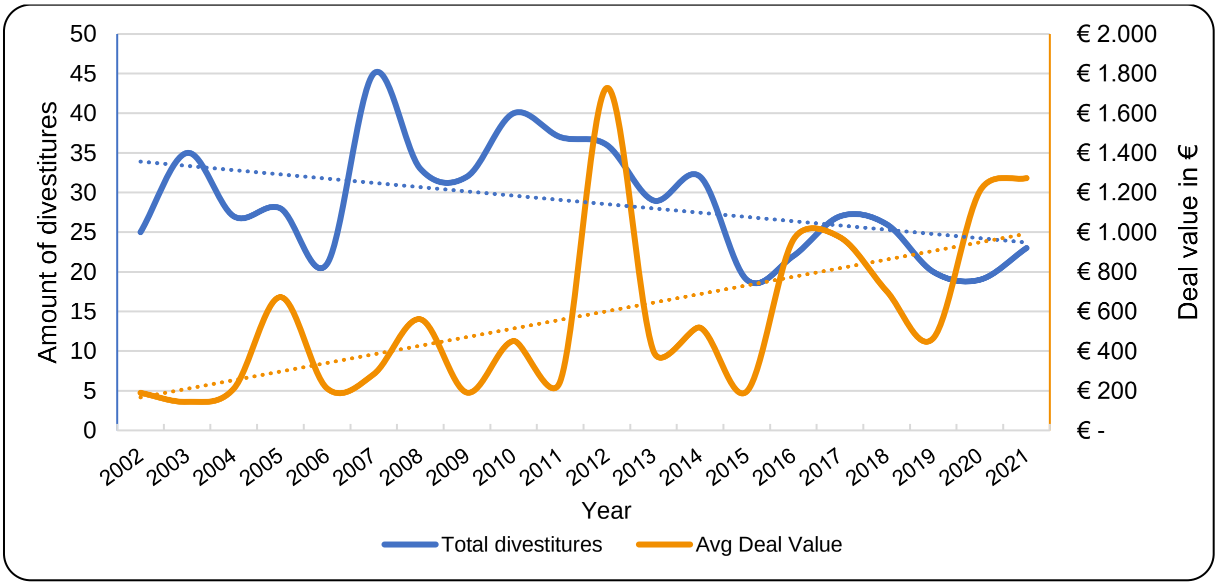
This table provides an overview of NAICS codes of target's ultimate parent per classification.

Looking at Figures 1 to 4, one can observe a negative relationship over time between the amount of the divestitures and the average value of the divestitures in all classifications. As the total amount of divestitures per year decreases in the period 2002 – 2021, the average deal value of the divestitures increases. The Cumulative Average Growth Rate (CAGR) over the period 2002 – 2021 of the average deal value is the highest within the downstream submarket, 10.4%. The upstream submarket has a CAGR of 9.3% and the midstream submarket has a CAGR of 7.4%[1].

[1] The CAGR of the midstream submarket is calculated over the period 2002 – 2020 as the last value was 0.

Figure 1

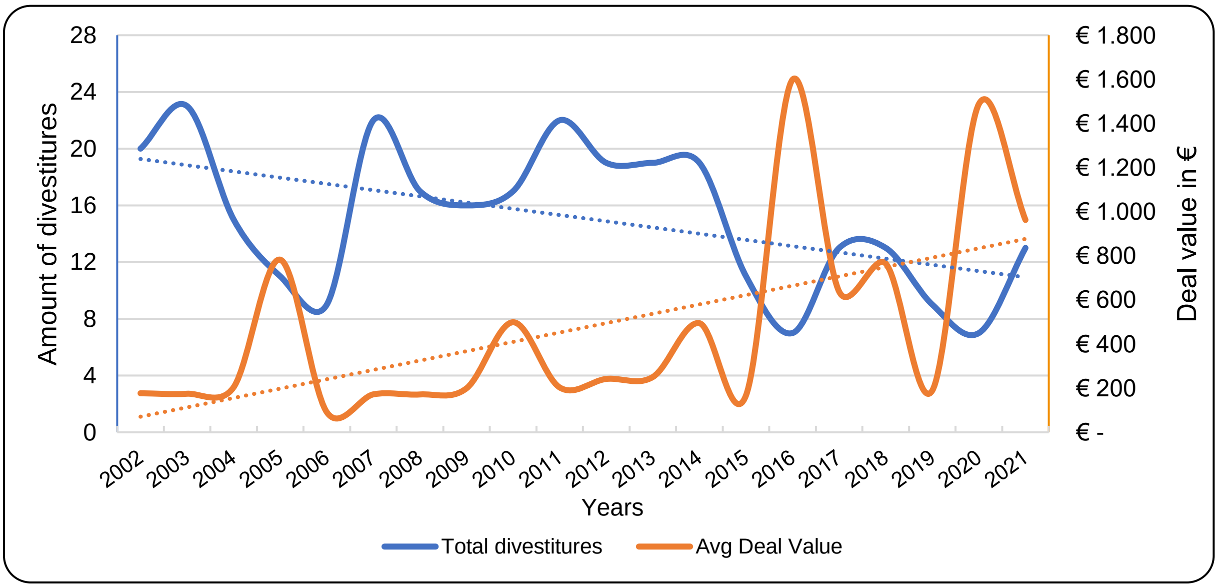
Amount of Divestitures and Average Deal Value – Total Sample



This figure provides an overview of the total amount of divestitures per year and the average deal value for the total sample within the oil and gas industry including the corresponding trend lines.

Figure 2

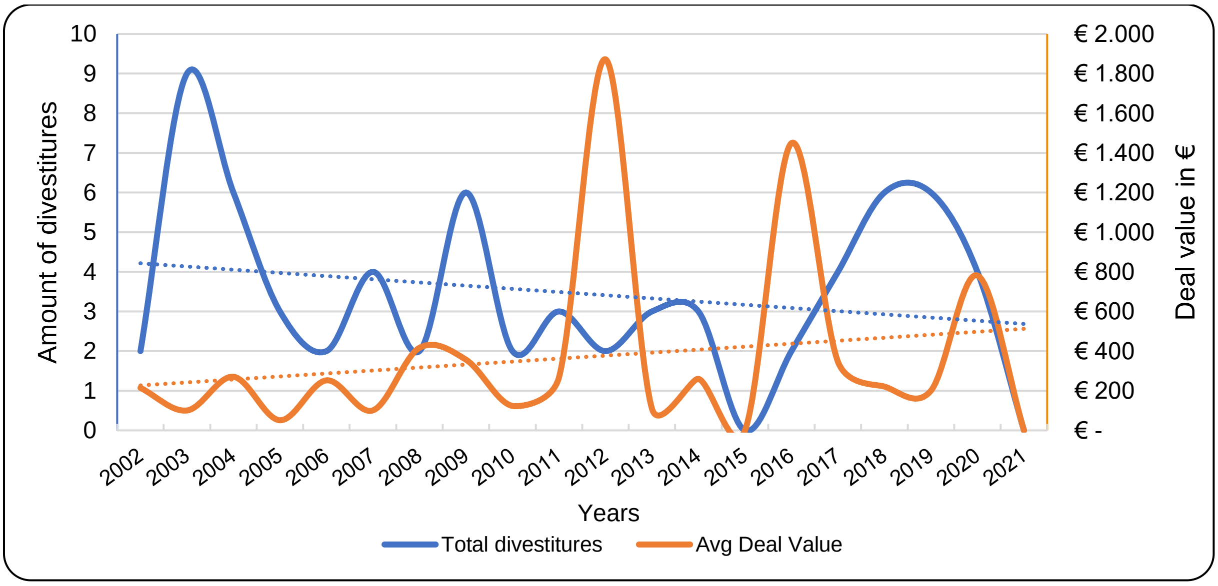
Amount of Divestitures and Average Deal Value - Upstream



This figure provides an overview of the total amount of divestitures per year and the average deal value for the upstream submarket within the oil and gas industry including the corresponding trend lines.

Figure 3

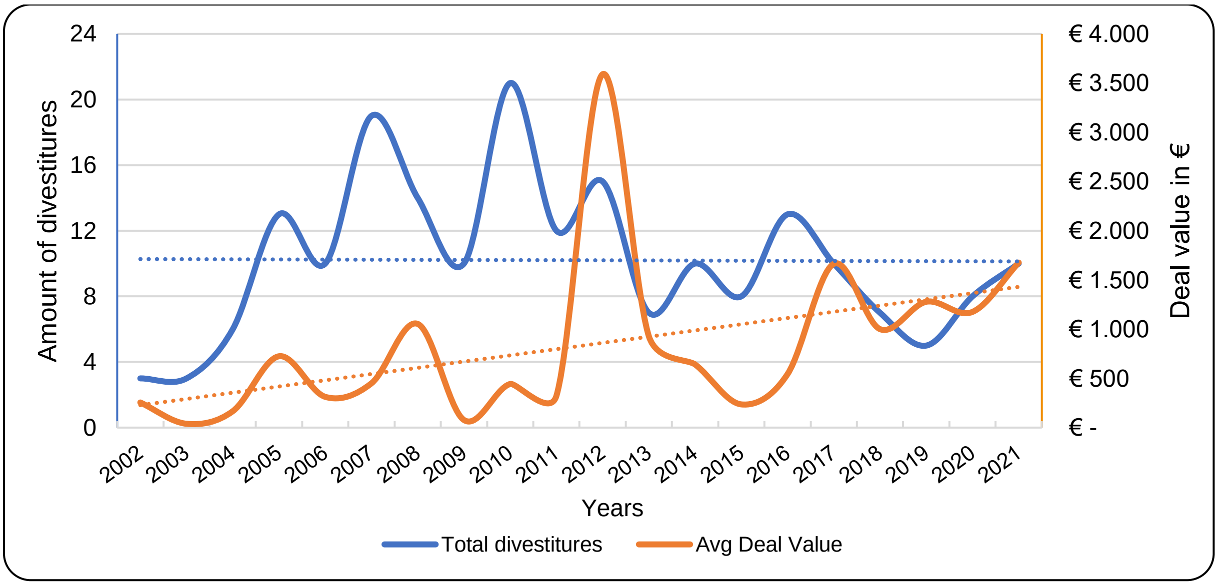
Amount of Divestitures and Average Deal Value - Midstream



This figure provides an overview of the total amount of divestitures per year and the average deal value for the midstream submarket within the oil and gas industry including the corresponding trend lines.

Figure 4

Amount of Divestitures and Average Deal Value - Downstream



This figure provides an overview of the total amount of divestitures per year and the average deal value for the downstream submarket within the oil and gas industry including the corresponding trend lines.

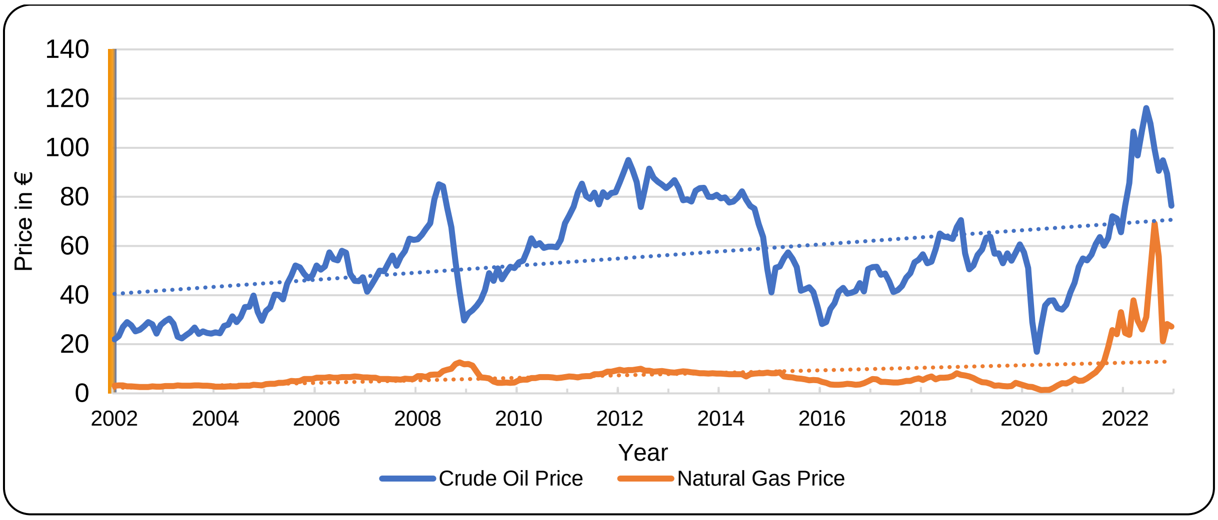
3.3 Oil and Gas prices

The European oil and gas prices are gathered from the database of the Economic Research Division of the Federal Reserve Bank of St. Louis. They provide daily crude oil prices for Europe in dollars. Using the daily usd/eur exchange rates, the crude oil prices in euros are calculated. Additionally, the monthly global price of natural gas in U.S. Dollars per Million Metric British Thermal Unit were gathered. The daily data was not available, and because the other control variables are also gathered in a broader timeframe, the decision was made to use the monthly data. The prices are also in dollars, so the exchange rate was also used here to transform the gas prices into euros.

In Figure 5, with on the left y-axis the historical Brent Europe Crude oil price and on the right y-axis the European price of natural gas in euros, are shown. We can see that oil and gas prices surged significantly in the last two years. We also see a rise in prices in the periods 2007 to 2008, 2009 to 2012, 2017 to 2019 and 2021 to halfway 2023. Furthermore, we see that the latest surge in the gas price is relatively the biggest ever for the gas price.

Figure 5

Historical Trend of Crude Oil and Natural Gas Prices



This figure provides an overview of the Oil and Gas Price History including the corresponding trendlines.

3.4 Control Variables

In this study, the control variables are created using the yearly accounting data from Refinitiv Eikon. The control variables include company size, deal value, leverage and return on assets (ROA). Larger firms with more business units are believed to be more inclined to divest, as they simply have more assets to divest and possibilities to refocus their organization.

Thus, the size of the firm is used as a control variable and is represented by the book value of total assets in millions of euros. Besides that, size can also be seen as a proxy for value versus growth firms. Analysis of the data reveals that the distribution of size is skewed to the right, indicating that most firms have a lower book value, but a few have a significantly higher value. As the model assumes that the variable has a normal distribution a transformation is needed. Therefore, the natural logarithm of size is used in the regression analysis. Deal value, measured in millions of euros, is also a control variable. The expectation is that larger deals should have a greater impact on abnormal returns. However, like the size control variable, the data shows that the variable deal value is not normally distributed. To account for this, the natural logarithm of deal value, which is more normally distributed, is used in the regressions. Leverage is another control variable, as financially troubled firms with higher leverage are thought to be more likely to divest, using the generated cash to repay debt. This variable is calculated using the total debt-to-assets ratio. Lastly, return on assets (ROA) is used as a measure of financial performance, as it reflects operating income before depreciation divided by total assets. As mentioned in the literature review, it is expected that a better financial performance results in less need to perform a divestiture. All the distribution charts can be found in Appendix A.

Tables 4 to 7 provide the descriptive statistics for the different variables examined. The data shows that on average the biggest firms are found in the downstream category. A logical result is that the highest deal values also belong to the downstream category as trading and transaction multiples for big firms are higher than for smaller firms. The midstream category is the highest leveraged on average.

Table 4

Descriptive Statistics – Full Sample

Variable	Obs.	Mean	Std. dev	Median	Q1	Q3	Min	Max
CAR [-1,+1]	618	0.01	0.09	0.00	-0.01	0.02	-0.72	0.90
CAR [-10,+10]	618	0.01	0.15	0.00	-0.04	0.05	-1.12	1.28
Size[2]	576	97.20	106.00	46.50	3.70	180.00	0.00	425.00
DealValue[1]	576	563.00	1,680	118.00	33.30	407.00	5.00	21,600.00
Leverage	576	0.23	0.20	0.19	0.13	0.28	0.00	2.70
Return on Assets	576	0.11	0.19	0.13	0.09	0.17	-3.43	0.54
Oil Price	576	71.83	29.08	68.39	51.33	100.10	17.90	143.92
Gas Price	576	6.10	2.90	6.00	4.26	7.65	1.34	33.05
Carbon Price	481	1,442.69	1,202.18	1,256.50	580.00	2,050.00	3.00	8,094.00

This table provides an overview of the descriptive statistics for the full sample.

[2] In millions €

Table 5

Descriptive Statistics – Upstream

Variable	Obs.	Mean	Std. dev	Median	Q1	Q3	Min	Max
CAR [-1,+1]	336	0.01	0.11	0.00	-0.01	0.03	-0.72	0.90
CAR [-10,+10]	336	0.01	0.19	0.00	-0.06	0.06	-1.12	1.28
Size[1]	302	57.10	83.90	7.96	0.70	104.00	0.00	343.00
DealValue[1]	302	389.00	1,060.00	90.90	27.10	285.00	0.53	9,750.00
Leverage	302	0.25	0.25	0.20	0.13	0.30	0.00	2.70
Return on Assets	302	0.10	0.25	0.13	0.07	0.18	-3.43	0.54
Oil Price	302	71.43	30.42	69.99	48.72	102.60	17.90	143.92
Gas Price	302	6.24	3.41	6.21	4.21	7.83	1.43	33.05
Carbon Price	241	1,414.78	1,281.90	1,090.00	594.00	1,909.00	3.00	8,094.00

This table provides an overview of the descriptive statistics for the upstream submarket.

Table 6

Descriptive Statistics – Midstream

Variable	Obs.	Mean	Std. dev	Median	Q1	Q3	Min	Max
CAR [-1,+1]	71	0.01	0.06	0.01	-0.01	0.02	-0.09	0.41
CAR [-10,+10]	71	0.03	0.09	0.02	-0.03	0.08	-0.16	0.51
Size[1]	69	51.70	53.00	42.80	8.40	48.80	0.43	184.00
DealValue[1]	69	331.00	617.00	120.00	35.00	359.00	5.00	3,520.00
Leverage	69	0.28	0.17	0.23	0.12	0.45	0.01	0.65
Return on Assets	69	0.12	0.05	0.01	0.08	0.15	0.03	0.22
Oil Price	69	64.53	26.47	66.14	42.92	76.31	25.56	117.00
Gas Price	69	5.18	2.02	4.82	3.22	6.64	2.52	9.80
Carbon Price	51	1,458.06	967.10	1,409.00	641.00	2,226.00	11.00	3,133.00

This table provides an overview of the descriptive statistics for the midstream submarket.

Table 7

Descriptive Statistics – Downstream

	Obs.	Mean	Std. dev	Median	Q1	Q3	Min	Max
CAR [-1,+1]	211	0.00	0.04	0.00	-0.01	0.01	-0.08	0.47
CAR [-10,+10]	211	0.00	0.08	-0.01	-0.04	0.03	-0.27	0.48
Size[1]	204	173.00	108.00	193.00	65.50	240.00	0.05	425.00
DealValue[1]	204	900.00	2,450.00	205.00	37.20	692.00	5.12	21,600.00
Leverage	204	0.18	0.07	0.17	0.13	0.23	0.00	0.40
Return on Assets	204	0.14	0.06	0.14	0.10	0.17	0.02	0.29
Oil Price	204	75.04	2.76	69.06	54.41	101.54	17.90	140.31
Gas Price	204	6.21	2.21	6.22	4.62	7.51	1.34	18.88
Carbon Price	189	1,422.28	1,180.00	1,267.00	567.00	2,050.00	7.00	6,102.00

This table provides an overview of the descriptive statistics for the downstream submarket.

Table 8 displays the Variance Inflation Factors (VIF). The VIF test is a measure of how much the variance of an estimated regression coefficient is inflated due to the correlation of the predictor variable with other predictor variables in the model. Specifically, the VIF is calculated as the ratio of the variance of the coefficient estimate in the full model to the variance of the coefficient estimate in a model with only one predictor variable. A high VIF value indicates that a predictor variable is highly correlated with other predictor variables in the model, indicating the presence of multicollinearity. As the degree of multicollinearity rises, the regression model coefficient estimates become less reliable and the standard errors for the coefficients can become significantly inflated.

Therefore the VIF test is a valuable tool for detecting multicollinearity in a regression model. VIF values greater than 5 are often considered to be problematic, which is not the case in this study. One can observe a relatively higher VIF within the midstream, but still within the accepted ranges.

Table 8

Variance Inflation Factor (VIF) – Check for Multicollinearity

Variable	**Full Sample**	**Upstream**	**Midstream**	**Downstream**
	VIF	**VIF**	**VIF**	**VIF**
Size	1.07	1.03	2.81	1.15
DealValue	1.05	1.07	1.19	1.07
Leverage	1.57	1.60	1.65	1.41
Return on Assets	1.53	1.62	2.98	1.42
Oil Price	1.50	1.43	3.51	1.78
Gas Price	1.52	1.46	3.98	1.71
Mean VIF	*1.37*	*1.37*	*2.97*	*1.43*

This table provides an overview of the results of the Variance Inflation Factors test to control for multicollinearity.

Chapter 4 Method

This chapter describes the method used to examine the nine hypotheses. The methodology used in this empirical research is a traditional event study following the method of Fama et al. (1969) and the market model for the calculation of the expected returns.

4.1 Event description and event window

To start, the event itself has to be defined as well as the control period and event window within which the event occurs. In this empirical research, the event is the announcement of a divestment. The methodology used is the traditional event study by Fama et al. (1969). The estimation period contains the days [-150; -30]. Next, two different event windows were chosen; the first window consists of the days [-1; +1] and the second window consists of the days [-10; +10].

The announcement takes place on day 0. The estimation period is kept away one month from the event window because of the possibility of information leaks in the days before the announcement which would affect the stock price. However, in order to assume the stationarity of the parameters, the control period should not be too far away from the test period. Theoretically, the [-1,+1] window should be the most accurate as this window lays closest to the actual event (Kothari & Warner, 2007). Because, the probability that the divestment event is influenced by other events is lower. Therefore, the first test period includes three days. However, in practice, we often see some uncertainty about the accuracy of the announcement date, informational leakages and slow implementation. To capture these factors, a second test period of twenty-one days [-10,+10] is added.

4.2 Calculation methodology

To examine hypotheses one to five, the methodology used is the traditional event study by Fama et al. (1969).

The hypotheses are stated as follows:

$H1_a$: Divestitures by European firms in the oil and gas industry have a positive effect on their share price.

$H2_a$: Divestitures by European firms in the upstream oil and gas industry have a positive effect on their share price.

$H3_a$: Divestitures by European firms in the midstream oil and gas industry have a positive effect on their share price.

$H4_a$: Divestitures by European firms in the downstream oil and gas industry have a positive effect on their share price.

$H5_a$: Divestitures by European firms in the upstream oil and gas industry have the most positive effect on their share price compared to the mid- and downstream.

4.2.1 Stock price return

First, the stock price return for each day in the event window has to be calculated. The return is calculated as the change in stock price from the previous day, expressed as a percentage.
Return on day t:

$$R_{it} = \left(\frac{P_{it}}{P_{it-1}}\right) - 1$$

Where R_{it} is the return on day t, P_{it} is the stock price on day t, and P_{it-1} is the stock price on the previous day.

4.2.2 Expected return

Then the expected return is calculated for each day in the event window following the market model. The expected return is calculated by adding the parameter alpha to the market return times the firm's beta. This shows what the expected stock price for firm i on day t would be outside of the event window if the stock price followed the market trend.

Expected return on day t:

$$E(R_{it}) = \alpha_i + \beta_i R_{mt}$$

Where $E(R_{it})$ is the expected return on day t for firm i, parameter α_i represents the OLS parameter estimate, β_i is the firm's beta, it represents the sensitivity of the returns of the stock or portfolio to changes in the market-wide factors included in the model. It is a measure of the stock's or portfolio's systematic risk or exposure to market-wide risk factors, and R_{mt} is the return of the market index on day t.

4.2.3 Abnormal return

Subsequently, to examine whether firm i has a higher return than expected, the abnormal returns per day can be calculated. To calculate the abnormal return for each day in the event window, the expected return is subtracted from the actual return.

Abnormal return on day t:

$$AR_{it} = R_{it} - E(R_{it})$$

Where AR_{it} is the abnormal return for firm i on day t, R_{it} is the return on day t for the firm i, and $E(R_{it})$ is the expected return for firm i on day t.
To see whether the abnormal return is representative for the whole sample the average abnormal return is calculated:

$$AAR_t = \frac{1}{N}\sum_{i=1}^{N} AR_{it}$$

Then the cumulative abnormal return for company i is calculated. The cumulative abnormal return is the sum of the abnormal returns for each day in the event window.

Cumulative abnormal return for firm i:

$$CAR_{i,m,n} = \sum_{t=m}^{t=n} AR_{it}$$

Where $CAR_{i,m,n}$ is the cumulative abnormal return, AR_{it} is the abnormal return for firm i on day t, and N is the number of days in the event window. The interval (m,n) refers to the interval period of use; [-10,+10] or [-1,+1].

It is essential to draw a conclusion about the sample as a whole. Therefore, the average CAR of each of the before-mentioned event windows is calculated (CAAR).

Cumulative average abnormal return:

$$CAAR_{m,n} = \frac{1}{N}\sum_{t=m}^{t=n} AAR_t$$

Where $CAAR_{m,n}$ is the cumulative average abnormal return, AAR_t is the average abnormal return on day t, and N is the number of events.

4.2.4 Test for significance

Then a test for the statistical significance of the average abnormal return and cumulative average abnormal return is needed. This is typically done using a t-test, which compares the average abnormal return to a hypothetical value of zero (indicating no impact of the event on stock price).

Hypotheses one to four require a one-tailed test as we look for a difference in only one direction, a positive difference, from the standard value. Consequently, the H_0 is rejected if the T-value of CAAR > 2.326 at the 1% significance level, the T-value of CAAR > 1.645 at the 5% significance level and the T-value of CAAR > 1.282 at the 10% significance level. Then the cumulative average abnormal return is considered statistically significant, indicating that the event had a measurable impact on the firm's share price.

The formula for the t-statistic for the CAAR is:

$$t = \frac{CAAR_{m,n}}{\frac{s_c}{\sqrt{N}}}$$

Where t is the t-statistic, $CAAR_{m,n}$ is the cumulative average abnormal return for the industry, s_c is the standard deviation of the CARs and N is the number of firms in the industry.

In comparison to the parametric t-test, the Wilcoxon signed-rank test is a non-parametric method that does not rely on the assumption of normality for the abnormal returns. Instead, it requires that the distribution of the stock returns is symmetrical. Furthermore, while the AAR t-test examines the average abnormal returns, the Wilcoxon signed-rank test evaluates them on each day of the event window separately. Therefore, the Wilcoxon signed-rank test is used as a robustness check to validate the statistical significance of the abnormal returns.

The formula for the z-statistic for the CAAR is:

$$Z_{Wilcoxon} = \frac{W - N(N-1)/4}{\sqrt{\frac{N(N+1)(2N+1)}{24}}}$$

Where $Z_{Wilcoxon}$ is the z-statistic, W is the sum of the ranks and N is the number of observations.

The hypotheses for the two-tailed Wilcoxon signed-rank test are:

$H_{0Wilcoxon}$: *The average abnormal return is equal 0.*

$H_{\alpha Wilcoxon}$: *The average abnormal return is not equal to 0.*

4.3 The effect of the Oil- and Gas Price on the shareholders' reaction

To estimate the effect of the oil and gas price on the shareholders' reaction, a linear regression analysis is conducted. This allows us to examine the last four hypotheses:

$H6_a$: In periods when the oil prices are high, the number of divestitures within the oil and gas industry is lower than in periods when the oil prices are low.

$H7_a$: A high oil price has a effect on the Cumulative Abnormal Return of divestitures within the oil and gas industry.

$H8_a$: In periods when the gas prices are high, the number of divestitures within the oil and gas industry is lower than in periods when the gas prices are low.

$H9_a$: A high gas price has a effect on the Cumulative Abnormal Return of divestitures within the oil and gas industry.

The following regressions are stated:

$$CAR(-1;+1) = \alpha + \beta_1 OilPrice + \beta_2 GasPrice + \beta_3 Log_{Size} + \beta_4 Log_{DealValue} + \beta_5 Leverage + \beta_6 ROA + \varepsilon_i$$

$$CAR(-10;+10) = \alpha + \beta_1 OilPrice + \beta_2 GasPrice + \beta_3 Log_{Size} + \beta_4 Log_{DealValue} + \beta_5 Leverage + \beta_6 ROA + \varepsilon_i$$

Where:

Oil Price = The Brent oil index represents the price of Brent crude oil in U.S. Dollars per barrel, which is a specific type of crude oil that is extracted from the North Sea and is widely used as a benchmark for the price of oil in Europe.

Gas Price = Global price of Natural gas in U.S. Dollars per Million Metric British Thermal Unit.

Log Size = The natural logarithm of the book value of total assets.

Log Deal Value = The natural logarithm of the divestiture deal value.

Leverage = The debt-to-assets ratio.

ROA = The return on assets; the amount of operating income before depreciation and amortization relative to the total asset.

A White test is performed to check whether the residuals of the regressions are homoscedastic. However, there is no reason to assume that (Appendix E), so all regressions are performed with robust standard errors.

4.3.1 Robustness check: Carbon Price

To test the robustness of the regression results, the carbon price is used instead of the oil and gas price. Carbon prices are often considered as an indicator of the overall impact of climate change and environmental concerns on companies. Because a higher carbon price pressures oil and gas firms into reducing CO2 by, for example, investing more in clean energy. Thus, the carbon price can be considered as a broader measure of the impact of divestitures on the environment and social responsibility, rather than solely relying on the oil and gas price, which is more focused on the specific industry.

The regression equations are stated as follows:

$$CAR(-1;+1) = \alpha + \beta_1 CarbonPrice + \beta_2 Log_{Size} + \beta_3 Log_{DealValue} + \beta_4 Leverage + \beta_5 ROA + \varepsilon_i$$

$$CAR(-10;+10) = \alpha + \beta_1 CarbonPrice + \beta_2 Log_{Size} + \beta_3 Log_{DealValue} + \beta_4 Leverage + \beta_5 ROA + \varepsilon_i$$

Where:

Carbon Price = The Carbon Emissions Futures officially called *The European Union Allowance (EUA)* is a tradable unit introduced under the European Union Emissions Trading scheme. It grants the holder the permission to emit one tonne of carbon dioxide or an equivalent amount of other greenhouse gases like perfluorocarbons (PFCs) and nitrous oxide (N2O). EUA units are used as a benchmark for the carbon price in Europe.

CHAPTER 5 Results

This chapter describes the findings of the research. First, the abnormal returns and cumulative returns within the event period for the full sample are described. Thereafter, the results for the different classifications are described. Then, the effect of the oil and gas price and the control variables on the cumulative abnormal return is shown. And lastly, the robustness checks are reviewed.

5.1 Cumulative Abnormal Returns

5.1.1 Full sample of the industry

Following the methodology described in the previous chapter, the first hypothesis is examined.
The alternative hypothesis reads as follows:

$H1_a$: Divestitures by European firms in the oil and gas industry have a positive effect on their share price.

Table 9 and Figure 6 show the results of the average abnormal returns within the event period. The corresponding t-values from the one-tailed AAR t-test can be found in the third column. During the entire event period from day -10 to day +10, small positive and negative abnormal returns are found. However, there is one event day that stands out; the day of announcement. The positive average abnormal return on the day of announcement is almost 1% and is significant at the 1% significance level. Looking at Figure 6, there are two other outcomes that stand out. First, event day eight and nine (AR-3 and AR-2) show positive abnormal returns but, only the return on day nine is statistically significant. This could be the result of information leaks before the official announcement or just a coincidence. Another notable outcome is that from the second till the fifth day after the day of announcement we see negative abnormal returns. Although these results are not statistically significant, they may indicate an overreaction of shareholders on the announcement day. On day six after the event we observe a significant positive abnormal return. This result is observed within the up- and midstream submarkets, therefore it is less likely to be a coincidence.

The cumulative abnormal returns over the two test periods are presented in Table 10. Examination of the event window [-10,+10] reveals the presence of a positive cumulative abnormal return; however, it is statistically insignificant. This result is, in line with the findings of Sabet et al. (2018), who reported positive significant cumulative abnormal returns for divestitures within the longer test interval of [-10,+10]. However, the results are insignificant and the positive return is likely not due to the divestiture announcement. Furthermore, the cumulative abnormal return within the test interval [-1,+1] is positive, and significant at the 5% significance level. This result is also in line with Sabet et al. (2018) as both studies identify a positive significant cumulative abnormal return in the oil and gas sector within the short event period.

Table 9

Average Abnormal Returns – Full Sample

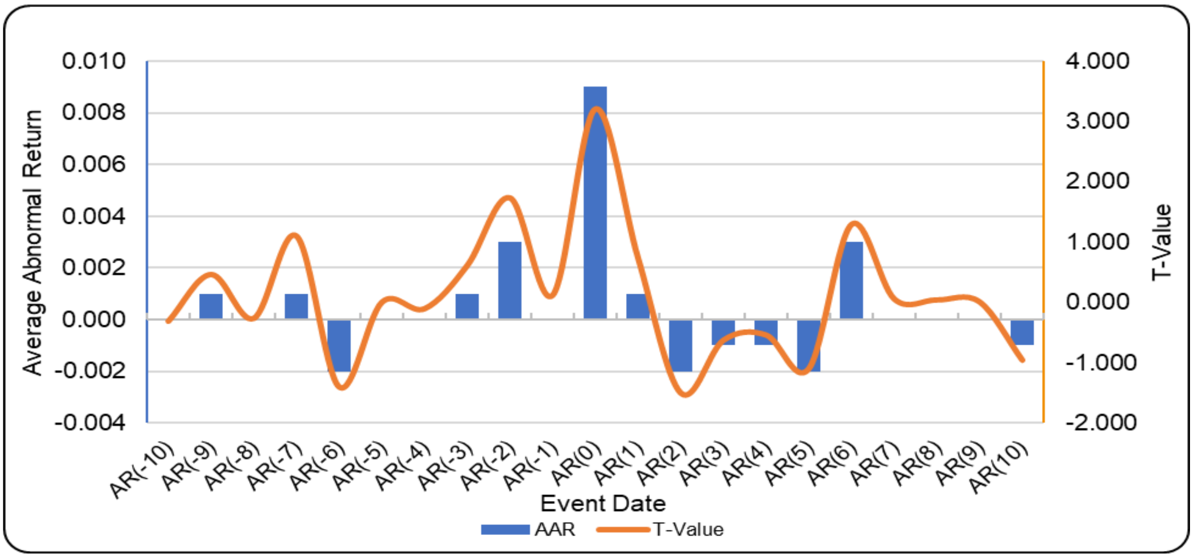
Event date	AAR		T-value
AR(-10)	0.000	(0.026)	-0.309
AR(-9)	0.001	(0.028)	0.466
AR(-8)	0.000	(0.022)	-0.261
AR(-7)	0.001	(0.025)	1.101
AR(-6)	-0.002	(0.029)	-1.395
AR(-5)	0.000	(0.025)	0.006
AR(-4)	0,000	(0.027)	-0.101
AR(-3)	0.001	(0.026)	0.613
AR(-2)	0.003	(0.044)	1.733**
AR(-1)	0.000	(0.030)	0.122
AR(0)	0.009	(0.067)	3.204***
AR(1)	0.001	(0.040)	0.739
AR(2)	-0.002	(0.031)	-1.496
AR(3)	-0.001	(0.032)	-0.622
AR(4)	-0.001	(0.035)	-0.536
AR(5)	-0.002	(0.040)	-1.094
AR(6)	0.003	(0.056)	1.293*
AR(7)	0.000	(0.019)	0.061
AR(8)	0.000	(0.025)	0.045
AR(9)	0.000	(0.020)	0.011
AR(10)	-0.001	(0.024)	-0.952
Observations: 618			

This table presents the Average Abnormal Returns of the total event window [-10,+10] (=Std. Dev.) and the corresponding t-value of the AAR one-tailed t-test for the full sample.

***** = significant with α = 0.01; ** = significant with α = 0.05 and * = significant with α = 0.10**

Figure 6

Average Abnormal Returns – Full Sample



This figure presents the Average Abnormal Returns and the corresponding t-values of the AAR one-tailed t-test of the total event window [-10,+10] for the full sample.

Table 10

Cumulative Average Abnormal Returns – Full Sample

Event window	CAAR		T-value
CAR[-10,+10]	0.010	(0.696)	0.357
CAR[-1,+1]	0.010	(0.149)	1.674**
Observations: 618			

This table presents the Cumulative Average Abnormal Returns for the event windows [-10,+10] & [-1,+1] for the full sample (=Std. Dev.) and the corresponding t-value of the CAAR one-tailed t-test.

***** = significant with α = 0.01; ** = significant with α = 0.05 and * = significant with α = 0.10**

5.1.2 Results for the three vertical supply layers

Then we look at the Average Abnormal Returns of the three different layers from the vertical supply chain. The following alternative hypotheses were stated:

$H2_a$: Divestitures by European firms in the upstream oil and gas industry have a positive effect on their share price.

$H3_a$: Divestitures by European firms in the midstream oil and gas industry have a positive effect on their share price.

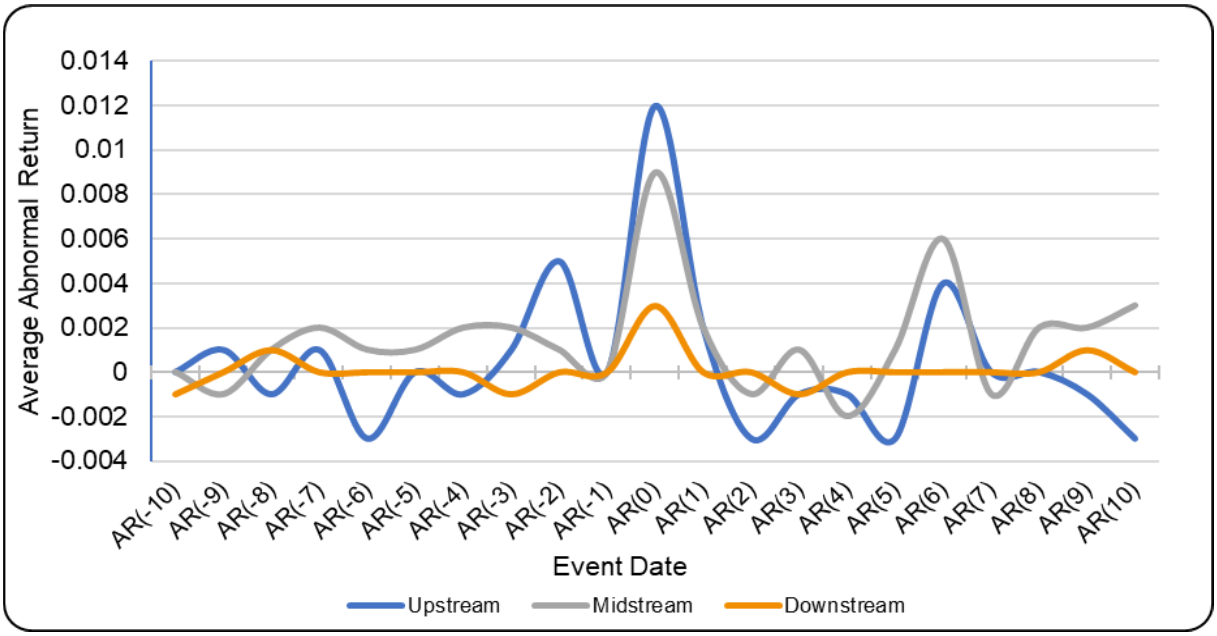
$H4_a$: Divestitures by European firms in the downstream oil and gas industry have a positive effect on their share price.

$H5_a$: Divestitures by European firms in the upstream oil and gas industry have the most positive effect on their share price compared to the mid- and downstream.

Figure 7 shows the results of the of the average abnormal returns within the event period. The average abnormal returns with their corresponding t-value on announcement day are presented in Table 11. As in the results of the full sample, within the days around the event day, the abnormal returns are small and primarily insignificant. However, the abnormal returns on the announcement day are positive and statistically significant across all classifications. The average abnormal return within the upstream submarket is higher than the average abnormal return within the other two submarkets. The abnormal returns for the full event window with corresponding t-values are also stated in tables which can be found in Appendix B.

Figure 7

Average Abnormal Returns – Per Classification



This figure presents the Average Abnormal Returns of the submarkets for the total event window [-10,+10].

Table 11

Average Abnormal Returns on Announcement Day – Per Classification

Event Date	**Full Sample**		**Upstream**		**Midstream**		**Downstream**	
	AAR	**T-value**	**AAR**	**T-value**	**AAR**	**T-value**	**AAR**	**T-value**
AR(0)	0.009	3.204***	0.012	2.654***	0.009	1.546*	0.003	1.329*
Observations:	*618*		*336*		*71*		*211*	

This table presents the Average Abnormal Returns on announcement day and the corresponding t-values of the AAR one-tailed t-test. * = significant with α = 0.01; ** = significant with α = 0.05 and * = significant with α = 0.10**

The cumulative abnormal returns over the two test periods are presented in Table 12. Examination of the event windows reveals the presence of positive cumulative abnormal returns with the biggest cumulative abnormal return in the upstream classification. However, only the full sample and the upstream classification reveals a significant CAR[-1,+1], the other results are statistically insignificant.

Table 12

Cumulative Average Abnormal Returns – Per Classification

Event Date	Full Sample		Upstream		Midstream		Downstream	
	CAAR	**T-value**	**CAAR**	**T-value**	**CAAR**	**T-value**	**CAAR**	**T-value**
CAR[-10,+10]	0.010	0.357	0.009	0.198	0.030	0.584	0.004	0.156
CAR[-1,+1]	0.010	1.674**	0.015	1.423*	0.010	0.864	0.003	0.566
Observations:	*618*		*336*		*71*		*211*	

This table presents the Cumulative Average Abnormal Returns the event windows [-10,+10] & [-1,+1] of all classifications with the corresponding t-value of the CAAR one tailed t-test.

***** = significant with α = 0.01; ** = significant with α = 0.05 and * = significant with α = 0.10**

To support hypotheses 1 to 4 a bit more, which state that divestiture announcements should lead to positive cumulative abnormal returns, the total amount of positive and negative returns are counted for the full sample, as well as for the three classifications. The results are shown in Table 13. It shows that (a small but still) a majority of the sample give positive cumulative abnormal returns within the short event period [-1,+1]. Within the longer event period [-10,+10] one can observe that a minority of the CARs are positive within the downstream submarket, and a majority of the CARs are positive within the up- and midstream submarkets. But overall, in the full sample, almost half of the CARs are positive.

Table 13

Positive or Negative Cumulative Average Abnormal Returns – Per Classification

Event Date	Full Sample		Upstream		Midstream		Downstream	
	Positive	**Negative**	**Positive**	**Negative**	**Positive**	**Negative**	**Positive**	**Negative**
CAR[-10,+10]	306	312	169	167	41	30	96	115
Positive rate	*49.5%*		*50.3%*		*57.7%*		*45.5%*	
CAR[-1,+1]	343	275	189	147	42	29	112	99
Positive rate	*55.5%*		*56.3%*		*59.2%*		*53.1%*	

This table shows the amount and of positive and negative Cumulative Average Abnormal Returns and the percentage of positive CARs compared to the total amount.

5.2 The effect of Oil and Gas prices on divestitures

Part of the research question is whether the oil and gas prices influence the decision making of firms regarding divestments. Hypotheses six and eight provide answers to this question:

$H6_a$: In periods the oil prices are high, the number of divestitures within the oil and gas industry is lower than in periods the oil prices are low.

$H8_a$: In periods the gas prices are high, the number of divestitures within the oil and gas industry is lower than in periods the gas prices are low.

By looking at Figures 1 to 5 and Appendix C, a possible trend is discovered. Over the last 20 years, the total divestitures per year have diminished, whereas the oil and gas prices are systematically rising. Another notable event is the fact that one can observe a substantial increase in divestitures in 2007, a year in which the oil price goes down. This is in line with the expectation. Then, one can observe that in the periods the oil and gas prices surged (the periods; 2007 to 2008, 2009 to 2012, 2017 to 2019 and 2021 to halfway 2023) the average deal value goes up. One could also observe a negative relationship between the total amount of divestitures per year and the average deal value per divestiture. These two observations combined could imply that the rising oil and gas prices result in higher deal values. This is supported by the scatterplot of the Pearson correlation that shows a positive correlation for Deal Value and the oil and gas price (Figure 5 and 6 of Appendix D). Therefore it could be that as companies gain more from are single divestment, they are less compelled to divest more which results in less divestments in that year and a delay in the transformation towards clean energy.

5.3 The effect of the Oil and Gas price on the Cumulative Abnormal Return

Table 14 and 15 present the results of the linear regression with dependent variables CAR[-1,+1] and CAR[-10,+10]. The significance levels are denoted by ***, **, and *, representing $\alpha = 0.01$, $\alpha = 0.05$, and $\alpha = 0.10$. It provides answers to hypotheses seven and nine.

$H7_a$: A high oil price has a effect on the Cumulative Abnormal Return of divestitures within the oil and gas industry.

The results of the study are insignificant, but suggest that there is no relationship between oil prices and cumulative abnormal returns resulting from a divestment announcement. This result is observed in all classifications and within both timeframes. The only exception is the [-10,+10] timeframe within the downstream submarket, here one can observe a positive significant effect. However, it looks like this is just a coincidence. Therefore based on the results of this study one cannot conclude that the oil prices have an effect on the cumulative abnormal returns within the oil and gas industry. To examine the hypothesis further, scatterplots are conducted that show the correlation between CAR[-1,+1], CAR[-

10,+10] and the oil price (Figure 1 and 2 of Appendix D). The plots show that there is little to no correlation between the CARs and the oil price.

$H9_a$: A high gas price has a effect on the Cumulative Abnormal Return of divestitures within the oil and gas industry.

On the other hand, the gas price shows a varying relationship with the CARs. Moreover, the gas price has an insignificant relationship with the CARs. Looking at the bigger timeframe one can observe a negative statistically insignificant relationship with the CAR[-10,+10] for the full sample, the upstream and midstream submarket, but a positive statistically insignificant relationship with the CAR[-10,+10] for the downstream submarket. This is contrary expectation. The three day event period shows the opposite within the full sample and upstream submarket, a positive but insignificant relationship with the CAR[-1,+1]. The results of the three day event period are more in line with the expectation. So it is likely that the CAR [-10,+10] is picking up a lot of noise not related to the divestment announcement. To examine the hypothesis further, scatterplots are conducted that show the correlation between CAR[-1,+1], CAR[-10,+10] and the gas price (Figure 3 and 4 of Appendix D). The plots show that there is little to no correlation between the CAR[-1,+1] and the gas price, but a negative correlation between CAR[-10,+10] and the gas price.

Even though there is not enough evidence to support the alternative hypothesis, the results imply that there is a sort of relationship with the CARs. A factor to consider is that the reason for the high gas prices could be more important than the high gas price it self. A follow-up study is needed to investigate that.

Then the remaining variables. The results indicate a statistically significant negative association between the variable Size and the dependent variable CAR[-1,+1] in all classifications except for the downstream submarket. The more assets a firm has, the smaller the firm's CAR when all other variables are held constant. The same negative relationship can be observed for Size and CAR[-10,+10]. However, within this timeframe the relationship is insignificant for all classifications. The results imply that the larger the firm size, so the larger the book value of assets a company holds, the less the impact of a divestiture would be.

A factor to consider is that the data suggests that the bigger the firm, the higher the number of divestitures. So, as the literature suggests regarding the attention theory, the results may indicate that the effect of divestiture announcements diminishes the more a company divests. Xue et al. (2022) found that there is a decrease in the effectiveness of hot news communication. As there is a lot of information available today through all the media sources, the effect of an announcement could diminish if a firm releases more divestiture announcements in a shorter period. An other factor that could be relevant is

the size of the divestiture versus the balance sheet size. As a relatively small divestiture compared to the balance sheet size would draw minimal attention.
The variable DealValue has a positive relationship with the CARs. This could mean that a bigger transaction draws more attention from shareholders. However, the relationships are not statistically significant with the CAR[-10,+10], and the same goes for the CAR[-1,+1]. The relationship between the debt-to-assets ratio (Leverage) and return on assets (ROA) and CARs are mostly negative and statistically insignificant. Except for the downstream classification, where strong, statistically significant, negative relationships between Leverage and ROA and the CARs were found. The results imply that investors do not believe that divestitures conducted by highly leveraged firms are leading to value creation. A reason for this could be that they believe the freed up funds are used to pay off debts instead of valuable investments. Regarding the ROA, the results imply that investors may see a company with high profitability as being in a good state with no need for divestments. They may not see an immediate value creation in the possibility of investing the freed up funds into clean energy.

There are a few other eye catchers, the first lies within the upstream classification. There the leverage and ROA have a positive, but still insignificant, relationship with the CAR[-1,+1]. Furthermore, we see that the ROA coefficient for the midstream submarket is strongly positive, however still insignificant. This is probably due to an outlier.

Moreover, the findings from the White test for heteroscedasticity support the utilization of robust standard errors that consider the presence of heteroskedasticity (Appendix E). The results indicate that all the regressions exhibit statistically significant chi-square values, which are significant at the 1% level.

Table 14

Multiple Linear Regression Results – CAR[-1,+1]

	CAR[-1; +1]			
Variable	**Full Sample**	**Upstream**	**Midstream**	**Downstream**
Oil Price	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Gas Price	0.001 (0.001)	0.001 (0.002)	-0.004 (0.007)	0.000 (0.001)
Logarithm of Size	-0.006*** (0.001)	-0.006** (0.002)	-0.015* (0.005)	-0.013 (0.002)
Logarithm of DealValue	0.002 (0.002)	0.001 (0.004)	0.007 (0.004)	0.002 (0.001)
Leverage	-0.012 (0.020)	0.008 (0.029)	-0.046 (0.048)	-0.185* (0.042)
Return on Assets	-0.010 (0.023)	0.005 (0.032)	0.146 (0.173)	-0.264** (0.050)
Constant	0.089* (0.038)	0.095 (0.069)	0.153 (0.100)	0.290* (0.044)
Observations	*575*	*302*	*69*	*204*
Adjusted R-Squared	*0.034*	*0.010*	*0.121*	*0.248*

This table presents the estimates from the linear regressions with dependent variable CAR[-1,+1] for the full sample and the other three classifications. Heteroskedasticity robust standard errors are reported in the parentheses. * = significant with α = 0.01; ** = significant with α = 0.05 and * = significant with α = 0.10**

Table 15

Multiple Linear Regression Results – CAR[-10,+10]

	CAR[-10; +10]			
Variable	**Full Sample**	**Upstream**	**Midstream**	**Downstream**
Oil Price	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.001** (0.000)
Gas Price	-0.005 (0.004)	-0.008 (0.005)	-0.018 (0.012)	0.007 (0.005)
Logarithm of Size	-0.004 (0.003)	-0.004 (0.004)	-0.020 (0.013)	-0.012 (0.009)
Logarithm of DealValue	0.003 (0.004)	0.007 (0.004)	0.002 (0.010)	0.000 (0.003)
Leverage	-0.050 (0.049)	-0.050 (0.059)	0.000 (0.090)	-0.274** (0.119)
Return on Assets	-0.026 (0.037)	-0.022 (0.043)	0.144 (0.256)	-0.400*** (0.140)
Constant	0.055 (0.085)	-0.025 (0.143)	0.355* (0.191)	0.359** (0.185)
Observations	*575*	*302*	*69*	*204*
Adjusted R-Squared	*0.010*	*0.007*	*0.045*	*0.113*

This table presents the estimates from the linear regressions with dependent variable CAR[-10,+10] for the full sample and the other three classifications. Heteroskedasticity robust standard errors are reported in the parentheses. * = significant with α = 0.01; ** = significant with α = 0.05 and * = significant with α = 0.10**

5.4 Robustness check: Wilcoxon Signed-Rank Test

Table 16 presents the results of the Wilcoxon signed-rank test on the abnormal returns. These results are used to test the robustness of the results from the standard t-test.

The following hypothesis was stated:

$H_{0Wilcoxon}$: *The average abnormal return is equal 0.*

$H_{\alpha Wilcoxon}$: *The average abnormal return is not equal to 0.*

Only on the day of the divestment announcement there was an abundance of positive abnormal returns in comparison to the negative. However, the opposite occurred on the day prior the announcement and the days following the announcement, with the majority of the abnormal returns being negative. On day 0, the Z-value holds statistical significance at the 1% level for the full sample, suggesting that the stock of the parent company produced favorable abnormal returns for its shareholders on the day of the announcement. For the up- and midstream the Z-values are positive and statistically significant and the null hypothesis can be rejected. For the downstream submarket the Z-value is positive but insignificant so the null hypothesis cannot be rejected.

The outcomes of the Wilcoxon signed-rank test further substantiate the results drawn from the AR t-test. They indicate that the divestment announcement is likely to influence the parent company's stock price on the day of the official announcement.

Table 16

Abnormal Returns – Wilcoxon Singed-Rank Test

Event Date	**Full Sample**		**Upstream**		**Midstream**		**Downstream**	
	Z-value	**Sig. (p)**	**Z-value**	**Sig. (p)**	**Z-value**	**Sig. (p)**	**Z-value**	**Sig. (p)**
- 10	-0.834	0.404	-0.795	0.427	0.825	0.406	-0.532	0.595
- 9	-1.158	0.247	-1.260	0.208	-0.636	0.525	0.262	0.793
- 8	0.033	0.974	-1.121	0.262	0.728	0.467	1.067	0.286
- 7	1.232	0.218	0.964	0.335	0.705	0.481	0.253	0.800
- 6	-1.338	0.181	-1.750	0.080*	0.768	0.443	-0.318	0.751
- 5	-1.107	0.268	-1.587	0.113	0.774	0.439	-0.180	0.857
- 4	0.233	0.8166	-0.860	0.390	1.713	0.087*	0.648	0.517
- 3	0.418	0.676	0.972	0.331	1.369	0.171	-1.549	0.122
- 2	0.279	0.780	0.457	0.648	0.871	0.384	-0.481	0.631
- 1	-0.594	0.552	-0.350	0.726	-0261	0.792	-0.270	0.870
0	3.807	0.000***	3.761	0.000***	1.862	0.063*	0.546	0.585
+ 1	0.282	0.282	0.030	0.976	1.329	0.184	-0.089	0.929
+ 2	-1.191	0.234	-1.474	0.140	-0.315	0.753	-0.070	0.944
+ 3	-1.318	0.188	-0.782	0.434	-0.120	0.904	-1.176	0.240
+ 4	-0.335	0.738	-0.004	0.997	-0.602	-0.547	-0.503	0.615
+ 5	-1.351	0.177	-1.342	0.180	-0.459	0.646	-0.500	0.617
+ 6	0.431	0.666	-0.334	0.738	1.864	0.062*	-0.014	0.989
+ 7	-0.294	0.768	-0.620	0.535	0.067	0.946	0.565	0.572
+ 8	-0.871	0.384	-1.133	0.257	0.816	0.414	-0.305	0.760
+ 9	0.246	0.806	-0.772	0.440	1.677	0.094*	0.409	0.683
+ 10	-1.376	0.169	-2.088	0.037**	1.232	0.218	-0.419	0.675
Observations:	*618*		*336*		*71*		*211*	

This table presents the z-values of the Wilcoxon Signed-Rank Test for the Cumulative Average Abnormal Returns. Next to the z-values one can find the corresponding p-values.

***** = significant with α = 0.01; ** = significant with α = 0.05 and * = significant with α = 0.10**

5.5 Robustness check: Carbon Price

Tables 17 and 18 show the results of the linear regression of the dependent variable CAR [-1,+1] and CAR[-10,+10], but with the carbon price instead of the oil and gas price. First of all, it is good to mention that the total amount of observations is less compared to the main linear regression. This is because the available data on the historical carbon price only goes as far back as 2005, so the divestitures form 2002 till 2005 are left out of this sample. Additionally, the carbon prices were very low until about the year 2020, hereafter prices rose extremely hard.

Nevertheless the regression is performed and it shows that the carbon price has little to no effect on the CAR[-1,+1] and CAR[-10,+10]. This is in line with the earlier findings regarding the oil and gas price. Therefore it implies that the price of a resource has no effect on shareholders' behavior towards divestiture announcements, at least not with the oil, gas or carbon price. Additionally, the size coefficients are still negative and significant within all classifications, except for the downstream classification. The remaining results are also in line with the main regression.

Just like the main regressions, it has been verified through the White test for heteroskedasticity (presented in Table 1 of the Appendix E) that heteroskedasticity robust standard errors are appropriate.

Table 17

Multiple Linear Regression Results Carbon Price – CAR[-1,+1]

	CAR[-1; +1]			
Variable	**Full Sample**	**Upstream**	**Midstream**	**Downstream**
Carbon Price	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Logarithm of Size	-0.006** (0.002)	-0.006** (0.003)	-0.017* (0.010)	-0.014 (0.009)
Logarithm of DealValue	0.002 (0.002)	0.001 (0.005)	0.011 (0.008)	0.002 (0.001)
Leverage	-0.018 (0.031)	0.006 (0.037)	-0.074 (0.048)	-0.210* (0.119)
Return on Assets	-0.012 (0.023)	0.006 (0.028)	0.093 (0.228)	-0.322** (0.149)
Constant	0.087* (0.053)	0.093 (0.092)	0.121 (0.10)	0.297 (0.183)
Observations	*481*	*241*	*51*	*189*
Adjusted R-Squared	*0.033*	*0.007*	*0.162*	*0.274*

This table presents the estimates from the linear regressions with dependent variable CAR[-1,+1] for the full sample and the other three classifications. Heteroskedasticity robust standard errors are reported in the parentheses. * = significant with α = 0.01; ** = significant with α = 0.05 and * = significant with α = 0.10.**

Table 18

Multiple Linear Regression Results Carbon Price – CAR[-10,+10]

	CAR[-10; +10]			
Variable	**Full Sample**	**Upstream**	**Midstream**	**Downstream**
Carbon Price	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000* (0.000)
Logarithm of Size	-0.003 (0.003)	-0.004 (0.004)	-0.022 (0.014)	-0.012 (0.009)
Logarithm of DealValue	0.003 (0.004)	0.006 (0.008)	0.003 (0.013)	0.000 (0.003)
Leverage	-0.043 (0.054)	-0.038 (0.068)	-0.029 (0.105)	-0.337** (0.134)
Return on Assets	-0.026 (0.042)	-0.018 (0.052)	0.366 (0.440)	-0.531*** (0.170)
Constant	0.023 (0.089)	-0.041 (0.148)	0.343* (0.200)	0.343** (0.185)
Observations	*481*	*241*	*51*	*189*
Adjusted R-Squared	*0.006*	*0.002*	*0.021*	*0.124*

This table presents the estimates from the linear regressions with dependent variable CAR[-10,+10] for the full sample and the other three classifications. Heteroskedasticity robust standard errors are reported in the parentheses.

***** = significant with α = 0.01; ** = significant with α = 0.05 and * = significant with α = 0.10**

CHAPTER 6 Conclusion

6.1 Conclusion

This thesis investigates companies within the oil and gas industry in Europe between 2002 and 2022. By answering the main question, the goal was to determine whether the announcement of a divestiture positively affects stock prices within a certain period. Additionally, an effort was made to indicate the difference in effect between the vertical supply chain layers and the effect of the oil and gas price was examined.

The research question was stated as follows:

What is the effect of divestiture announcements by European firms in the oil and gas industry on their share value and is there a difference to be discovered when the price of oil and/or gas is high?

The majority of the prior studies have shown positive effects of a divestiture announcement. The results of this study are in line with these findings as we find that; The average abnormal returns on the day of announcement are positive and statistically significant across all classifications. The cumulative average abnormal return is positive and significant within the [-1,+1] event window for the full sample and the upstream submarket. For the mid- and downstream submarkets positive but insignificant cumulative average abnormal returns are found. Within the [-1,+1] event period of the full sample, 55.5% of the divestiture announcements lead to positive CARs. Also, within the sub samples of the vertical supply chain, the majority of the CARs are positive. Furthermore, we find positive CARs within the [-10,+10] event window, but these results are not significant. In this timeframe the rate of positive CARs versus negative CARs is nearly fifty percent. Lastly, we find significant positive abnormal returns on announcement day with the Wilcoxon signed-rank test.

An answer to the main question is formed based on nine hypotheses. The first hypothesis is as follows:
$H1_0$: Divestitures by European firms in the oil and gas industry have no effect on their share price.
$H1_a$: Divestitures by European firms in the oil and gas industry have a positive effect on their share price.

The results of this research show that primarily small insignificant positive and negative abnormal returns are realized within the test period [-10,+10]. However, the average abnormal return on the announcement day was substantial and significant at the 1% significance level. The cumulative average abnormal return on the announcement day in the [-1,+1] test period is also found to be positive and statistically significant. Additionally, the cumulative average abnormal return of the [-10,+10] test period turned out to be positive, but insignificant.

Therefore, there is enough evidence to claim that divestiture announcements of European firms within the oil and gas industry have a positive effect on their share price, so the null hypothesis can be rejected.

Next, the second, third and fourth hypotheses are examined:
$H2_0$: Divestitures by European firms in the upstream oil and gas industry have no effect on their share price.
$H2_a$: Divestitures by European firms in the upstream oil and gas industry have a positive effect on their share price.

$H3_0$: Divestitures by European firms in the midstream oil and gas industry have no effect on their share price.
$H3_a$: Divestitures by European firms in the midstream oil and gas industry have a positive effect on their share price.

$H4_0$: Divestitures by European firms in the downstream oil and gas industry have no effect on their share price.
$H4_a$: Divestitures by European firms in the downstream oil and gas industry have a positive effect on their share price.

The results of this research show that all classifications are generally in line with the industry as a whole. The abnormal returns around the announcement day are primarily small and insignificant, whereas the abnormal returns on the event day are substantial, positive and statistically significant across all classifications. Looking at the cumulative abnormal returns, we see that all the classifications show a positive but insignificant effect. The exception lies within the [-1,+1] event window where the upstream submarket shows a positive significant cumulative average abnormal return.

Although, some of the results are found to be insignificant, they all show positive average abnormal returns and cumulative average abnormal returns. Therefore, there is enough evidence to reject the $H2_0$ hypothesis and claim that divestitures by European firms in the upstream oil and gas industry have a positive effect on their share price. For the mid- and downstream submarket the evidence is not conclusive enough to state that divestitures by European firms in the mid – and downstream oil and gas industry have a positive effect on their share price, so the $H3_0$ and $H4_0$ cannot be rejected. However, even though one can not fully claim the alternative hypothesis to be true, the evidence points into the right direction.

Afterwards the fifth hypothesis can be examined:
$H5_0$: There is no difference in the effect of divestitures on the share price by European firms in the upstream oil and gas industry compared to the mid- and downstream submarkets.
$H5_a$: Divestitures by European firms in the upstream oil and gas industry have the most positive effect on their share price compared to the mid- and downstream.

This study showed that the cumulative average abnormal return was the biggest and only statistically significant within the upstream submarket. Based on the results of this research, there is enough evidence to claim that the announcement of a divestiture by a firm in the upstream oil and gas sector has the most positive effect on their share price compared to the mid- and downstream oil and gas industry.

Then the research moves on to the influence of oil and gas prices on divestments and the cumulative abnormal returns. It was examined whether the rising oil and gas prices would influence the total amount of divestitures. The following hypotheses were stated:
$H6_0$: In periods when the oil prices are high, the number of divestitures within the oil and gas industry are equal compared to periods when the oil prices are low.
$H6_a$: In periods the oil prices are high, the number of divestitures within the oil and gas industry is lower than in periods the oil prices are low.

$H8_0$: In periods the gas prices are high, the number of divestitures within the oil and gas industry is equal compared to periods the gas prices are low.
$H8_a$: In periods the gas prices are high, the number of divestitures within the oil and gas industry is lower than in periods the gas prices are low.

Even though this research did not test the relationship with a statistical method, the trend analysis indicates that it could be possible that there is a negative relationship between the oil and gas prices and the total amount of divestitures. Additionally, the trend analysis indicates that there is a negative relationship between the total amount of divestitures conducted and the average deal value. These two observations combined could imply that the rising oil and gas prices result in higher deal values. This is supported by the scatterplot of the Pearson correlation that shows a positive correlation between Deal Value and the oil and gas price. Therefore, the evidence points into the direction -so with no statistical evidence- that as companies gain more from are single divestment, they are less compelled to divest more which results in less divestments in that year and that hypothesis six and eight might be rejected. However, further investigation is required.

Then the effect of the oil and gas price among with some other control variables was examined. Hypotheses seven and nine stated the following:

$H7_0$: A high oil price has no effect on the Cumulative Abnormal Return of divestitures within the oil and gas industry.
$H7_a$: A high oil price has a effect on the Cumulative Abnormal Return of divestitures within the oil and gas industry.

$H9_0$: A high gas price has no effect on the Cumulative Abnormal Return of divestitures within the oil and gas industry.
$H9_a$: A high gas price has a effect on the Cumulative Abnormal Return of divestitures within the oil and gas industry.

The results of this research show a little to no effect of the oil prices on the cumulative abnormal returns. Therefore the null hypothesis $H7_0$ cannot be rejected.

On the other hand, the gas price shows a varying relationship with the CARs. For the [-1,+1] and [-10,+10] event period, no statistically significant results are found. For the [-10,+10] event period one can observe a negative insignificant relationship with the CAR for the full sample and for the upstream submarket, but a positive insignificant relationship with the CAR [-1,+1] event period. The evidence is not conclusive enough to state that gas prices have a effect on the cumulative abnormal return within the oil and gas sector. Therefore the null hypotheses cannot be rejected. However, the evidence points to the direction that gas prices, or the reason for high gas prices, could influence CARs.

The analysis of the other control variables in relation to the CAR[-1,+1] and CAR[-10,+10] provide valuable insights. The findings reveal a statistically significant negative association between the Size variable and both CARs across all classifications. This implies that larger firms experience smaller cumulative abnormal returns from divestitures, holding other variables constant.

Regarding the DealValue variable, positive relationships with the CARs are found, but they were not statistically significant. Although the results are not significant, this could mean that a bigger transaction draws more attention from shareholders.

The analysis of Leverage and Return on Assets (ROA) reveals mostly negative and statistically insignificant relationships with the CARs. However, in the downstream classification, a notable and statistically significant negative relationship is observed. This implies that investors may not perceive divestitures conducted by highly leveraged firms as leading to value creation. It is possible that they believe the freed-up funds are primarily used to pay off debts rather than invest in valuable projects or to support the shift towards the use of clean energy and thereby diminishing the expected positive impact on returns. Additionally, a high profitability level may lead investors to perceive a company as being in a favourable state, thus reducing the perceived need for divestments. This supports the results regarding hypothesis 6 and 8, where a negative relationship between the oil and gas price and the total amount of divestitures was suggested.

These findings provide valuable insights into the relationship between various variables and the cumulative abnormal returns of divestitures within the oil and gas industry. However, further research and analysis is needed to deepen our understanding of the underlying mechanisms and potential moderating factors influencing these relationships.

Finally, an answer is provided to the research question.

What is the effect of divestiture announcements by European firms in the oil and gas industry on their share value and is there a difference to be discovered when the price of oil and/or gas is high?

Looking at the overall results there is enough evidence to claim that a divestiture announcement for firms within the oil and gas industry results in a positive effect on their share price. This is in line with the majority of the existing studies (Sabet et al., 2018; Hite et al., 1987; Rosenfield, 1984) on the topic. Moreover, the results imply that the larger the firm size, so the larger the book value of assets a company holds, the less the impact of a divestiture would be. Furthermore, based on the results of this research there is not enough evidence to claim that oil and gas prices influence shareholders' behaviour towards a divestiture announcement. The results only points in the direction, so with no statistical evidence, that there could be a negative correlation between the oil and gas price and the total amount of divestitures and the average deal value, but a follow-up study is needed to prove that. Lastly, the evidence is not conclusive enough to state that high oil or gas prices have an effect on the cumulative abnormal return within the oil and gas sector.

6.2 Discussion

This research aims to provide a comprehensive explanation for the cumulative abnormal returns. However, there are some aspects that may merit further examination in future studies.

First, this study looked at some explanatory variables of the cumulative abnormal returns within the oil and gas industry. However, one can think of many more variables (such as dividend payments) that could influence shareholders' behaviour. Other factors that could be relevant are; the size of the divestiture versus the balance sheet size. As a relatively small divestiture compared to the balance sheet size would draw minimal attention. Additionally, the negotiation power could be of importance. If a firm has to sell a part of their business, due to lack of cash, distress situations or regulation, it will lead to lower prices being obtained for the divested asset. Possibly the reason for high oil & gas prices matters too. Is the reason fundamental (demand > supply) or non fundamental (driven by sentiment or fear for gas shortages during winter). By considering both fundamental and non-fundamental factors, a more comprehensive understanding of the drivers behind high oil and gas prices can be obtained. In a subsequent study one could add more control variables in order to explain the relationship in more detail. Another control variable that could be useful is the Market-to-Book ratio. Lastly, the market value of assets could be used as a robustness test for the book value of assets.

Second, the Eikon database does not tell you much about the exact type of asset that is being divested. However, the divestment of an oil platform could have a different impact on shareholders than when an office building is sold. Hypothetically, revenue-generating and strategic assets tend to have a larger effect than unnecessary operating assets. Market perception of the asset and its implications for future performance are crucial considerations, which could be taken into account in a follow-up study.

Third, in this research only one event study method was used, the market model. There could be different results when a different calculation method is used. Follow-up studies could investigate this matter.

Lastly, as mentioned before, this study only looks at the historical trend of the trade-off between oil and gas prices and the total amount of divestitures. It points into the direction that the oil and gas prices influence divestments, just not regarding the CARs. To gain a more comprehensive understanding of this relationship, future research could utilize a different regression model to test the statistical significance of this trend and discover the variables that affect the trade-off. By controlling for potential confounding variables, such as changes in market conditions or regulatory policies, a regression analysis could provide a more robust assessment of the relationship between oil and gas prices and divestitures over time. Moreover, a regression model could also help to identify the key factors that drive the trade-off between oil and gas prices and divestitures, which could have important implications for policymakers and industry stakeholders.

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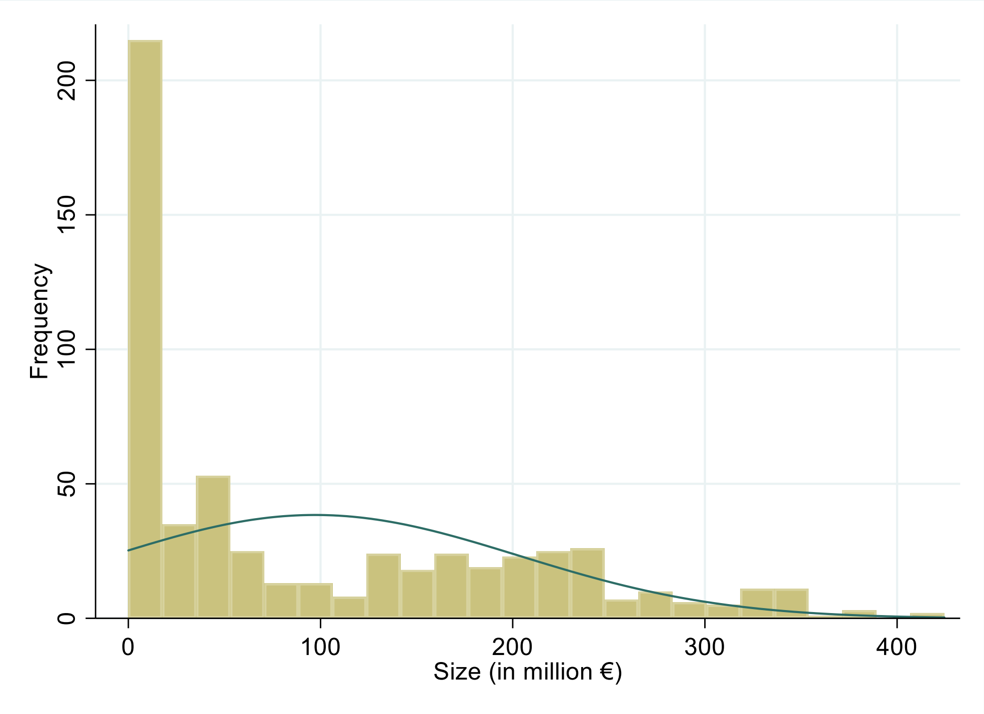
APPENDIX A Detailed Distribution

Figure 1

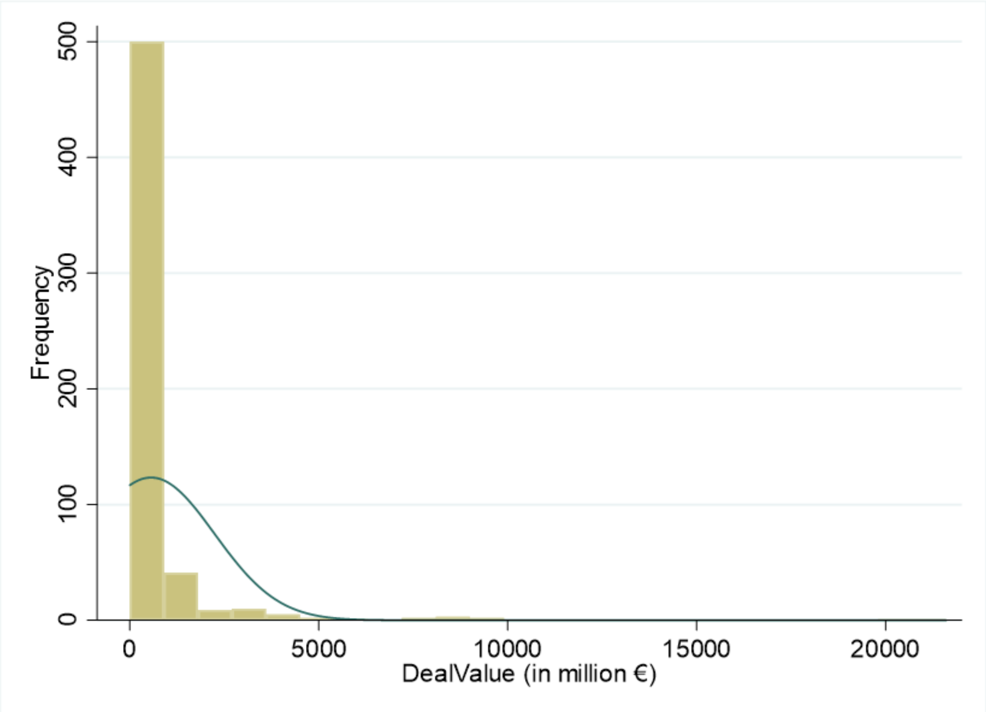
Frequency Distribution and Normal Density Curve of Size



This figure shows the frequency distribution and normal density curve of the variable Size.

Figure 2

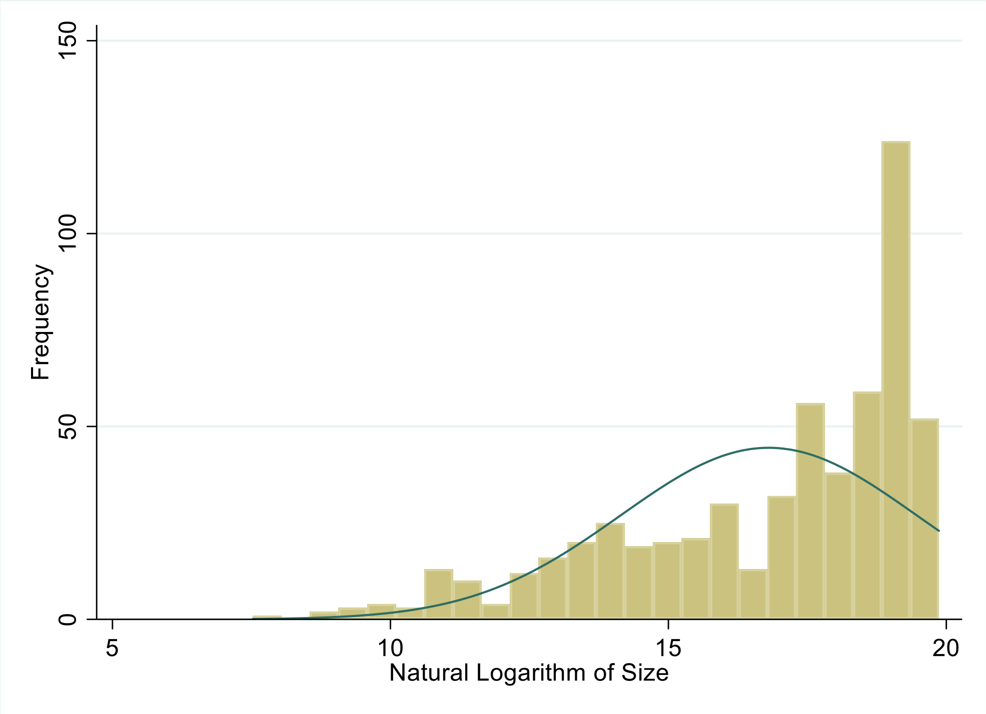
Frequency Distribution and Normal Density Curve of DealValue



This figure shows the frequency distribution and normal density curve of the variable DealValue.

Figure 3

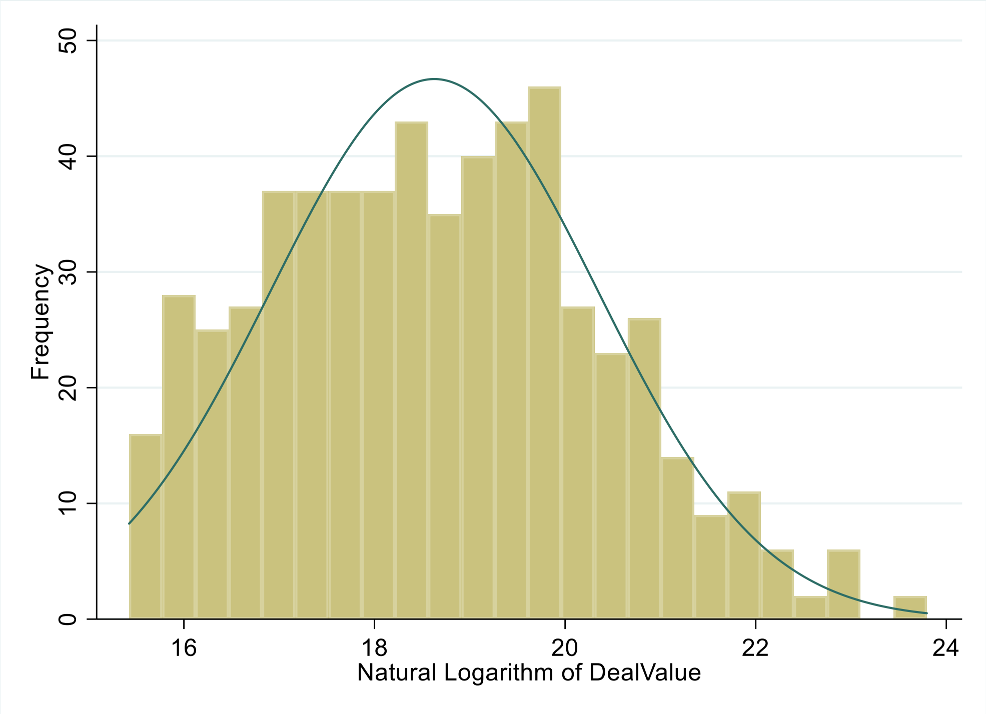
Frequency Distribution and Normal Density Curve of the Natural Logarithm of Size



This figure shows the frequency distribution and normal density curve of the natural logarithm from the variable Size.

Figure 4

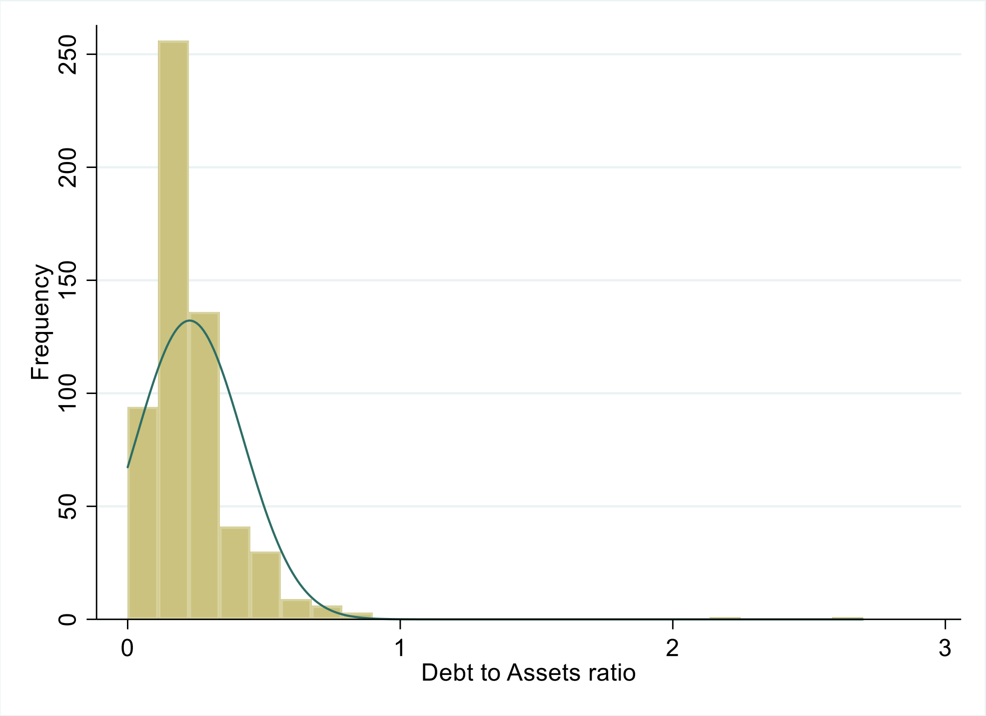
Frequency Distribution and Normal Density Curve of the Natural Logarithm of DealValue



This figure shows the frequency distribution and normal density curve of the natural logarithm from the variable DealValue.

Figure 5

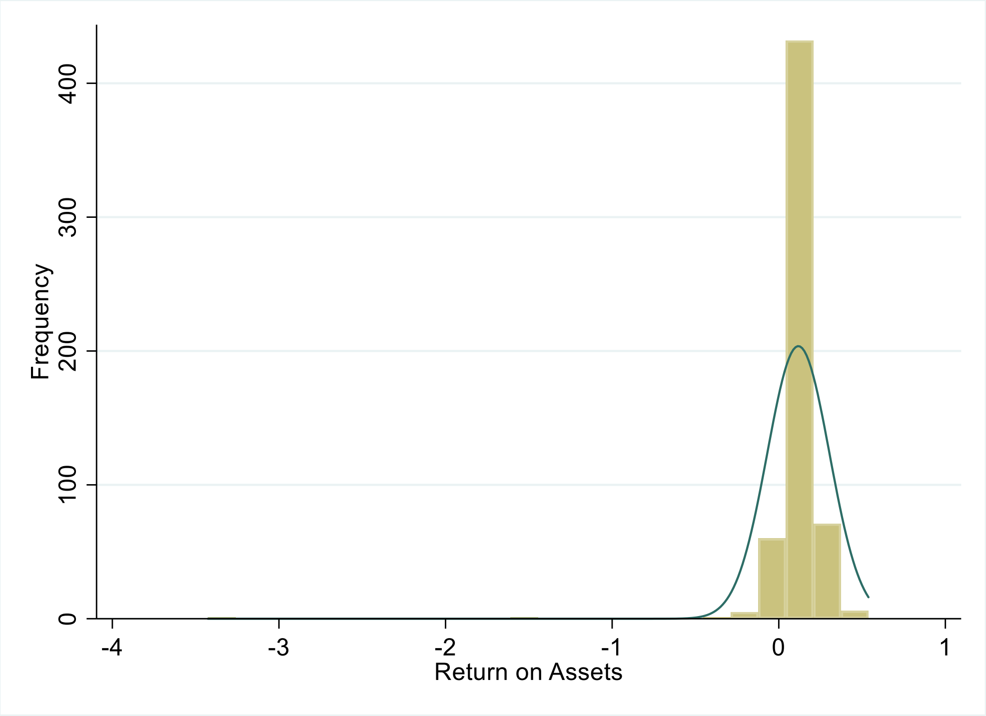
Frequency Distribution and Normal Density Curve of Leverage (Debt-to-Assets ratio)



This figure shows the frequency distribution and normal density curve of the variable Leverage.

Figure 6

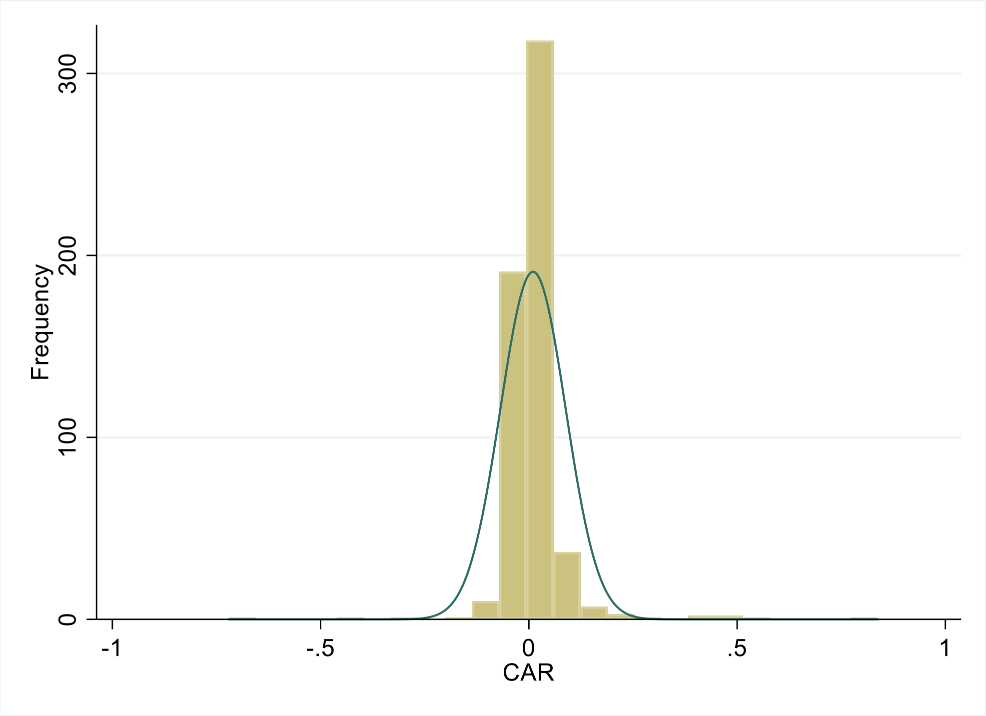
Frequency Distribution and Normal Density Curve of the Return on Assets



This figure shows the frequency distribution and normal density curve of the variable Return on Assets.

Figure 7

Frequency Distribution and Normal Density Curve of the Cumulative Abnormal Returns



This figure shows the frequency distribution and normal density curve of the variable CAR.

APPENDIX B Average Abnormal Returns

Table 1

Average Abnormal Returns – Upstream

Event date	AAR		T-value
AR(-10)	0.000	(0.032)	-0.134
AR(-9)	0.001	(0.035)	0.743
AR(-8)	-0.001	(0.026)	-0.907
AR(-7)	0.001	(0.033)	0.821
AR(-6)	-0.003	(0.038)	-1.591
AR(-5)	0.000	(0.030)	-0.262
AR(-4)	-0.001	(0.033)	-0.544
AR(-3)	0.001	(0.033)	0.738
AR(-2)	0.005	(0.058)	1.694**
AR(-1)	0.000	(0.039)	0.150
AR(0)	0.012	(0.085)	2.654***
AR(1)	0.002	(0.052)	0.698
AR(2)	-0.003	(0.041)	-1.569
AR(3)	-0.001	(0.041)	-0.397
AR(4)	-0.001	(0.045)	-0.458
AR(5)	-0.003	(0.052)	-1.201
AR(6)	0.004	(0.074)	1.006
AR(7)	0.000	(0.023)	0.103
AR(8)	0.000	(0.032)	-0.240
AR(9)	-0.001	(0.024)	-0.580
AR(10)	-0.003	(0.028)	-1.662
Observations: 336			

This table presents the Average Abnormal Returns of the total event window [-10,+10] (=Std. Dev.) and the corresponding t-value of the AAR one-tailed t-test for the full sample.

***** = significant with α = 0.01; ** = significant with α = 0.05 and * = significant with α = 0.10**

Table 2

Average Abnormal Returns – Midstream

Event date	AAR		T-value
AR(-10)	0.000	(0.013)	0.323
AR(-9)	-0.001	(0.017)	-0.503
AR(-8)	0.001	(0.014)	0.734
AR(-7)	0.002	(0.013)	0.992
AR(-6)	0.001	(0.013)	0.523
AR(-5)	0.001	(0.017)	0.469
AR(-4)	0.002	(0.018)	1.008
AR(-3)	0.002	(0.018)	1.012
AR(-2)	0.001	(0.015)	0.404
AR(-1)	0.000	(0.017)	-0.245
AR(0)	0.009	(0.047)	1.546*
AR(1)	0.002	(0.015)	1.034
AR(2)	-0.001	(0.013)	-0.670
AR(3)	0.001	(0.013)	0.511
AR(4)	-0.002	(0.016)	-0.881
AR(5)	0.001	(0.018)	0.421
AR(6)	0.006	(0.022)	2.155**
AR(7)	-0.001	(0.017)	-0.328
AR(8)	0.002	(0.018)	0.752
AR(9)	0.002	(0.018)	0.956
AR(10)	0.003	(0.018)	1.616*
Observations: 71			

This table presents the Average Abnormal Returns of the total event window [-10,+10] (=Std. Dev.) and the corresponding t-value of the AAR one-tailed t-test for the full sample.

***** = significant with α = 0.01; ** = significant with α = 0.05 and * = significant with α = 0.10**

Table 3

Average Abnormal Returns – Downstream

Event date	AAR		T-value
AR(-10)	-0.001	(0.015)	-0.601
AR(-9)	0.000	(0.015)	-0.269
AR(-8)	0.001	(0.013)	1.040
AR(-7)	0.000	(0.012)	0.591
AR(-6)	0.000	(0.013)	0.189
AR(-5)	0.000	(0.015)	0.298
AR(-4)	0.000	(0.014)	0.464
AR(-3)	-0.001	(0.015)	-0.895
AR(-2)	0.000	(0.017)	0.244
AR(-1)	0.000	(0.013)	0.137
AR(0)	0.003	(0.032)	1.329*
AR(1)	0.000	(0.016)	-0.249
AR(2)	0.000	(0.014)	0.334
AR(3)	-0.001	(0.015)	-1.115
AR(4)	0.000	(0.013)	0.175
AR(5)	0.000	(0.015)	-0.039
AR(6)	0.000	(0.017)	-0.160
AR(7)	0.000	(0.013)	0.273
AR(8)	0.000	(0.014)	0.346
AR(9)	0.001	(0.015)	0.563
AR(10)	0.000	(0.019)	0.028
Observations: 211			

This table presents the Average Abnormal Returns of the total event window [-10,+10] (=Std. Dev.) and the corresponding t-value of the AAR one-tailed t-test for the full sample.

***** = significant with α = 0.01; ** = significant with α = 0.05 and * = significant with α = 0.10**

APPENDIX C Oil & Gas Price Trend

Table 1

Total Divestitures per Year – Per Classification

Year	Total Sample	Upstream	Midstream	Downstream
2002	27	21	3	3
2003	40	28	9	3
2004	31	19	6	6
2005	30	14	3	13
2006	22	10	2	10
2007	45	22	4	19
2008	35	19	2	14
2009	36	19	6	11
2010	40	17	2	21
2011	37	22	3	12
2012	36	19	2	15
2013	29	19	3	7
2014	32	19	3	10
2015	22	14	0	8
2016	22	7	2	13
2017	27	13	4	10
2018	26	13	6	7
2019	20	9	6	5
2020	19	7	4	8
2021	23	13	0	10
2022	19	12	1	6
Total	*618*	*336*	*71*	*211*

This table provides an overview of the total amount of divestitures per year specified per classification.

Table 2

Average Deal Value – Per Classification

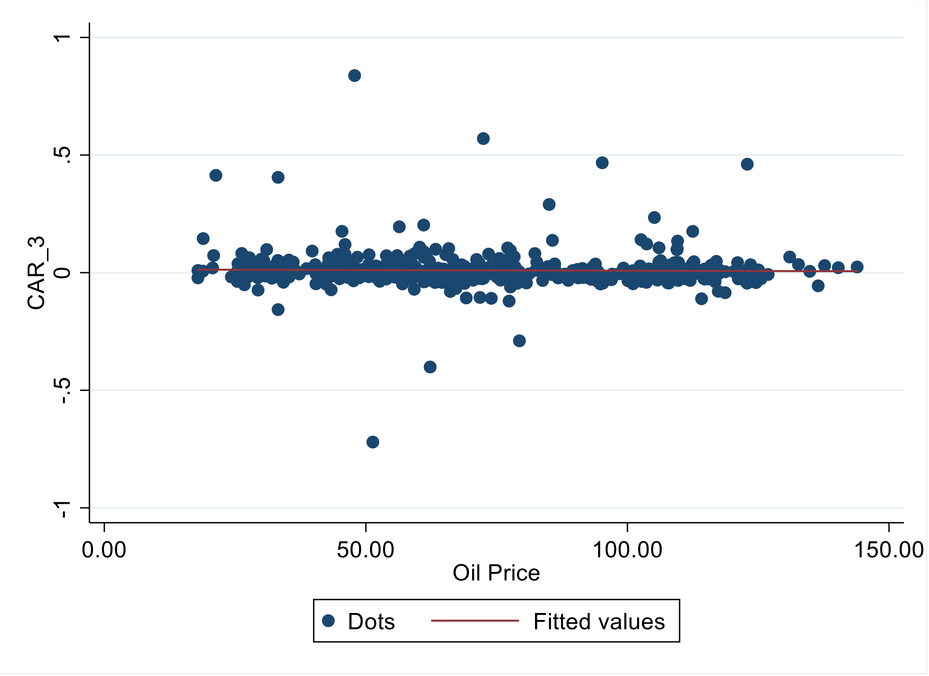
Year	Total Sample	Upstream	Midstream	Downstream
2002	€ 1.273	€ 963	€ 0	€ 1.676
2003	€ 1.208	€ 1.488	€ 781	€ 1.176
2004	€ 465	€ 190	€ 200	€ 1.279
2005	€ 703	€ 765	€ 221	€ 1.000
2006	€ 974	€ 637	€ 346	€ 1.664
2007	€ 962	€ 1.599	€ 1.449	€ 544
2008	€ 196	€ 167	€ 0	€ 236
2009	€ 518	€ 494	€ 260	€ 641
2010	€ 399	€ 251	€ 110	€ 928
2011	€ 1.728	€ 242	€ 1.872	€ 3.590
2012	€ 247	€ 203	€ 267	€ 323
2013	€ 451	€ 499	€ 123	€ 443
2014	€ 191	€ 199	€ 357	€ 77
2015	€ 560	€ 171	€ 416	€ 1.053
2016	€ 283	€ 172	€ 101	€ 450
2017	€ 212	€ 91	€ 253	€ 312
2018	€ 672	€ 782	€ 51	€ 725
2019	€ 211	€ 204	€ 270	€ 167
2020	€ 144	€ 175	€ 101	€ 39
2021	€ 189	€ 177	€ 214	€ 255

This table provides an overview of the average deal value per divestiture per year specified per classification.

APPENDIX D Pearson Correlation Coefficients

Figure 1

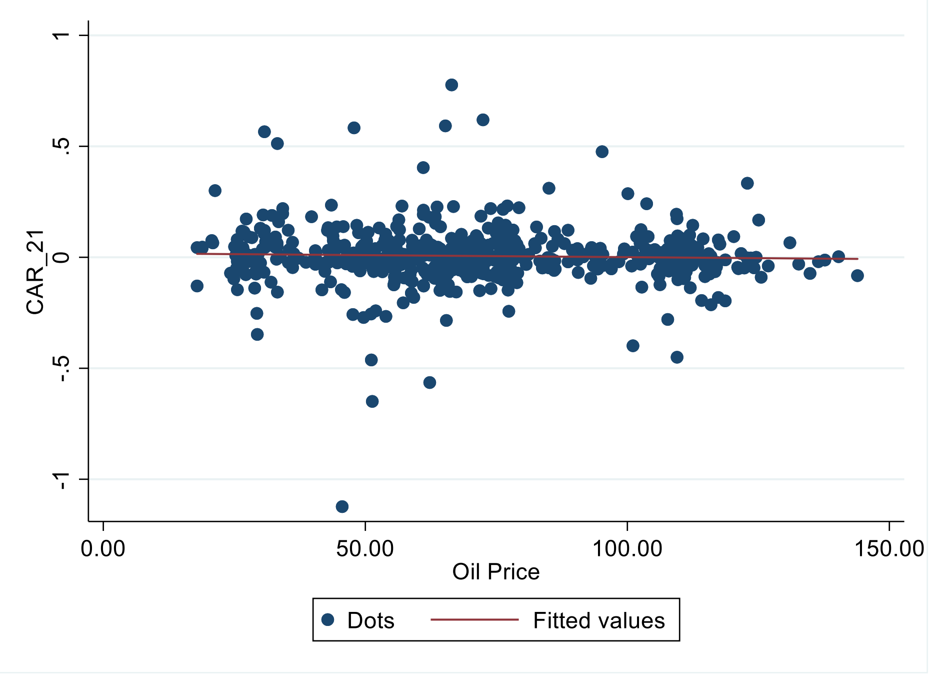
Scatter Plot of the Correlation between CAR[-1,+1] and the Oil Price



This figure shows a scatter plot of the correlation between CAR[-1,+1] and the oil price. The red line represents the trendline.

Figure 2

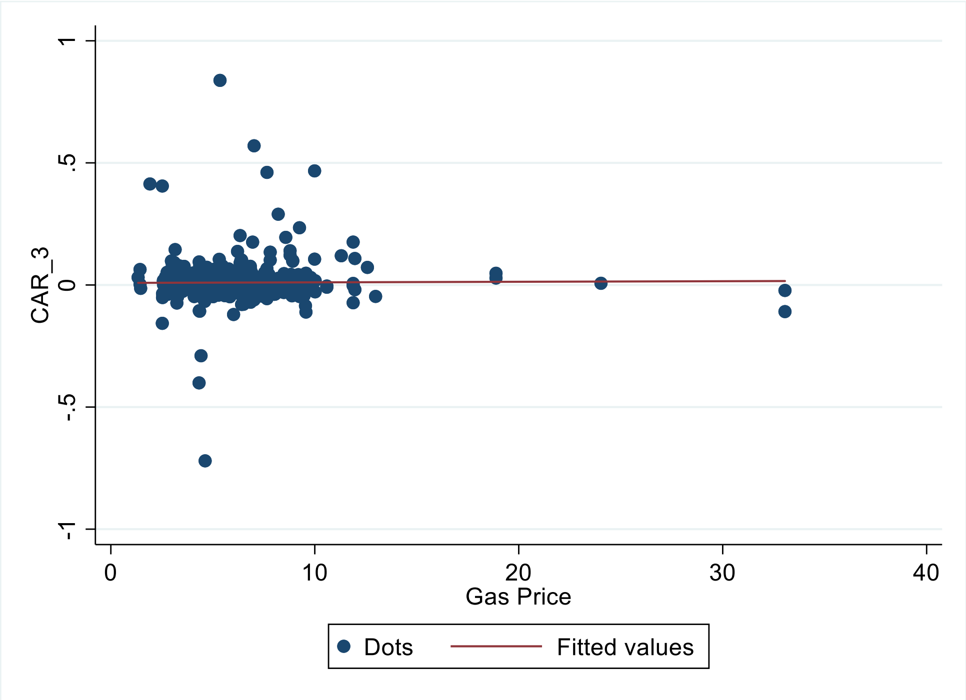
Scatter Plot of the Correlation between CAR[-10,+10] and the Oil Price



This figure shows a scatter plot of the correlation between CAR[-10,+10] and the oil price. The red line represents the trendline.

Figure 3

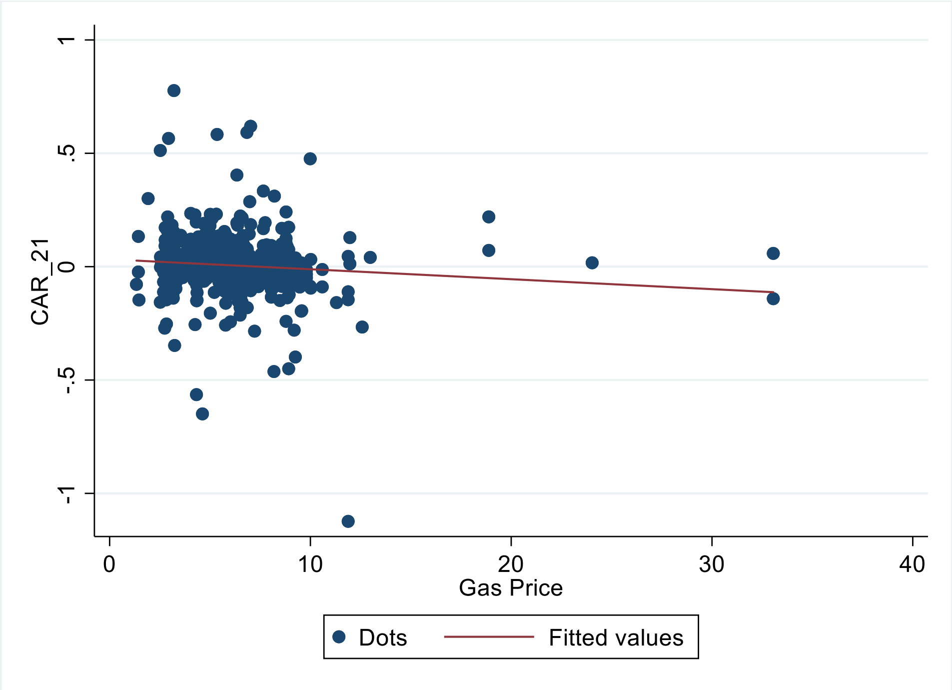
Scatter Plot of the Correlation between CAR[-1,+1] and the Gas Price



This figure shows a scatter plot of the correlation between CAR[-1,+1] and the gas price. The red line represents the trendline.

Figure 4

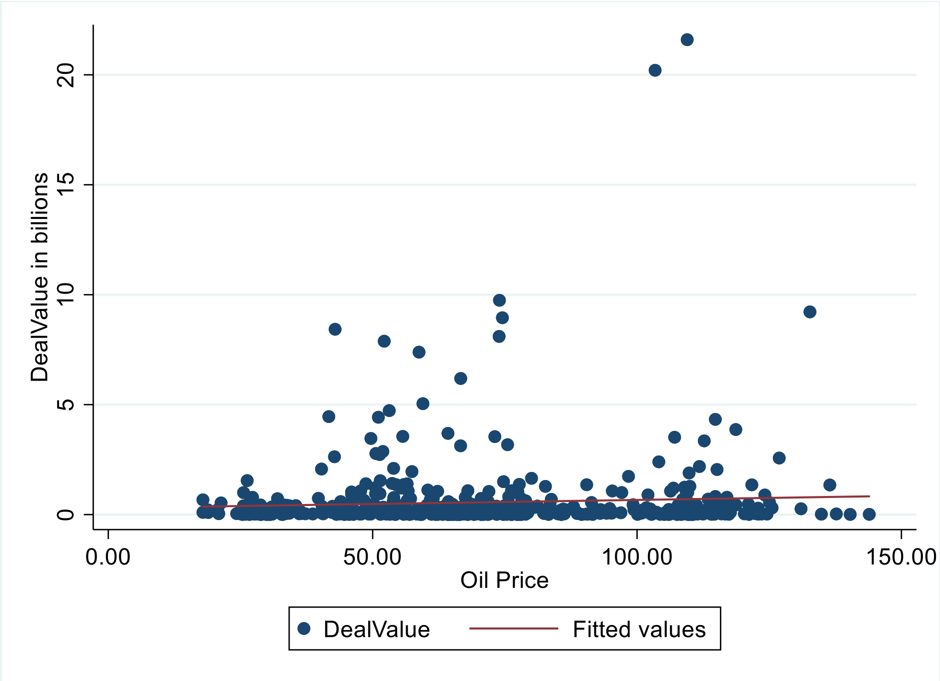
Scatter Plot of the Correlation between CAR[-10,+10] and the Gas Price



This figure shows a scatter plot of the correlation between CAR[-10,+10] and the gas price. The red line represents the trendline.

Figure 5

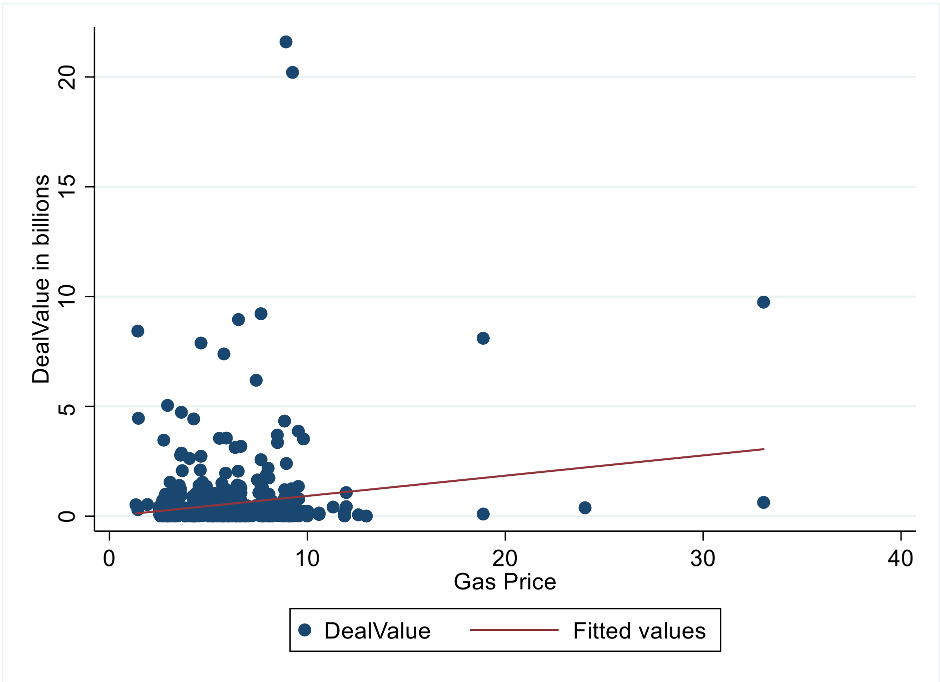
Scatter Plot of the Correlation between Deal Value and the Oil Price



This figure shows a scatter plot of the correlation between deal value and the oil price. The red line represents the trendline.

Figure 6

Scatter Plot of the Correlation between Deal Value and the Gas Price



This figure shows a scatter plot of the correlation between deal value and the gas price. The red line represents the trendline.

APPENDIX E White Test for Heteroscedasticity

Table 1

Overview of the Outcomes of the White Tests

Regression	Analysis	χ^2	Sig. (p)
Full Sample	Main	63.44	0.000***
Upstream	Main	60.22	0.000***
Midstream	Main	61.14	0.000***
Downstream	Main	141.91	0.000***
Full Sample	Robustness	46.46	0.0113**
Upstream	Robustness	39.27	0.0985*
Midstream	Robustness	42.82	0.0273**
Downstream	Robustness	151.46	0.000***

This table presents the results from the White test for heteroskedasticity of the regression specifications.

***** = significant with α = 0.01; ** = significant with α = 0.05 and * = significant with α = 0.10**