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VALUE CREATION IN MERGERS AND ACQUISITIONS

– AN EMPIRICAL STUDY OF THE UPSTREAM OIL AND GAS INDUSTRY FROM 2002-2016

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Abstract

This paper examines value creation and value drivers for upstream oil and gas producers acquiring or merging with industry-related targets over the time period 2002-2016. We find that upstream oil and gas acquirers earn a significant average cumulative abnormal return of 0.92% upon the announcement of the M&A, while significant negative average abnormal returns are observed one, two and three years respectively succeeding the announcement date. The discrepancies between the short-term and long-term event results can be explained by either methodological problems of isolating the effect for the long-term study, systematic misinterpretation of M&A value potential by investors, or destruction of value by practitioners throughout the post-integration process. We seek to uncover specific M&A value drivers and find supportive evidence that the acquisition of unlisted targets is more valuable relative to listed targets. Additionally, we find weaker support for acquirer size effects, and suggest that there may be greater value attributed to acquisitions occurring in upsurge periods of merger waves. There is no evidence of statistical significant differences of cross-border relative to domestic deals, cash-payment relative to other payment methods and geographic origin of acquirers in driving abnormal performance.

Key words: mergers and acquisitions, value creation, value drivers, oil and gas industry, event study

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List of abbreviations

ABHAR = average buy-and-hold abnormal return
AR = abnormal return
bbl = barrel of oil; typical measurement unit of oil production
BH = buy-and-hold (return)
BHAR = buy-and-hold abnormal return
btu = British thermal units; typical measurement unit of gas production
CAAR = cumulative average abnormal return
CAR = cumulative abnormal return
GDP = Gross domestic product
GNOC = Global national oil companies
IOC = International oil companies (sometimes referred to as 'Integrated Oil Companies')
M&A = Mergers and acquisitions
NOC = National oil companies
NPV = Net present value
O&G = Oil and gas
OPEC = Organization of Petroleum Exporting Countries
PSA = Production sharing agreement

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CHAPTER 1 | **Introduction**

Companies increasingly engage in mergers and acquisitions (M&A) as strategic tools for growth. In fact, 2015 was an all-time record year for global M&A activity measured on deal value (JP Morgan 2017). Nevertheless, scholars suggest that the failure rates of M&A range between 70 and 90% (Christensen et al. 2011) and have for decades been unable to find consistent evidence of value creation for acquirers involved in M&A. A paradox therefore exists, where scholars cannot seem to empirically justify practitioners' continued pursuance of growth through mergers and acquisitions despite them being seemingly value destroying, or at best insignificant, for acquirers. To solve this relentless puzzle, Lubatkin (1983) framed two opposing propositions, that either 1) M&A *do not* provide real benefits but behavioral aspects, such as overconfidence and self-interest, nevertheless cause managers to employ M&A, or 2) M&A *do* provide real benefits, which are either undiscovered or eroded the post-integration process. While each proposition has been investigated heavily for decades in a wide variety of configurations but not yet come to reach a consolidated conclusion, recent studies have called for a methodological rejuvenation of the field. Specifically the notion that all mergers and acquisitions can be considered alike, have been challenged (Meglio & Risberg 2010). Regardless of the general acknowledgement that each M&A is unique, previous research on value creation from M&A have mainly treated samples of mergers and acquisitions as homogeneous events that arguably trivialize the context within which the event is configured and thereby *"over-generalizes and oversimplifies the acquisitions"* (Meglio & Risberg 2010, p.90; Bower 2001; Lubatkin 1987). Rather, Meglio and Risberg (2010) suggest that M&A are complex processes whose *context* need to be considered in order for researchers to reveal the true value creating or -destroying impact they may have for acquirers.

Intrigued by practitioners' continuous use of M&A, as well as the weakly investigated notion that uniqueness of M&A matters, this paper seeks to investigate whether yet unproven benefits could possibly be revealed by controlling for the context in which the M&A occur. Specifically, by testing upon as homogeneous a sample as possible, defined by a particular context, we hope to provide subtle insights to the specific value creating- or destroying mechanisms for acquirers' shareholders following their involvement in M&A. Ideally it is our hope that such approach can help shed light on the paradox of the extent to which M&A provide real benefits and what specific factors may be explanatory for such.

As mentioned above, previous research has mostly investigated M&A performance effects on an aggregate M&A level not confined to any specific context or industry. In situations where previous literature *have* controlled for the context in which the M&A occur, the dominant approach has been to distinguish their samples based on the geographical locations or sizes of the parties involved (e.g. studies of financial impact from M&A for the 50 largest European or American acquirers)(Healy et al. 1992). However, apprehending M&A as strategic tools for growth rather than merely static events occurring in different locations, we believe that the more relevant *context* from which to choose a more *homogeneous* sample should be strategically rather than e.g. geographically related.

One of the most widespread classifications of strategic relatedness is *industry*, whose overall profitability is arguably determined by the collective strength of competitive forces[1] (Porter 1980). How a company appropriates a share of the profits from the industry it belongs to depend on the strategic choices it makes, which to a large extent is shaped by the same competitive forces as those of its industry peers. Thus, we operate on the assumption that within a narrowly defined industry, companies are subject to highly similar underlying strategic forces, which arguably would result in more similar M&A processes, than had the companies not been industry-related. By choosing such homogeneous sample we intend to avoid over-generalization across different industries following highly different dynamics, which tend to result in inconclusive findings. To the best of our knowledge few M&A studies have considered the industry-context in isolation, with the exception of more commonly researched financial institutions (Fraser & Zhang 2009) as well as few premature studies within the overall O&G industry (Ng & Donker 2013a). Whereas several studies have considered the overall difference in value creation from M&A *between* different industries, no studies seem to have accurately investigated whether specific dynamics and characteristics of firms *within* a defined industry could be impacting the value created through engagement in M&A. By choosing a sample with sufficient level of homogeneity we intend to reduce the level of noise factors, which possibly have caused prior findings to be inconclusive. Instead, from the choice of an industry-specific sample, we believe there is an increased likelihood of identifying specific circumstances and deal characteristics driving abnormal performance of acquirers involved in M&A, which thus would improve the validity of findings. Therefore, our thesis focuses on a single industry, namely the Oil and Gas Industry.

[1] The five competitive forces, which define industry profitability based on their collective strength, are 1) rivalry among existing competitors, 2) threat of new entrants, 3) threat of substitution, 4) bargaining power of buyers, and 5) bargaining power of suppliers (Porter 1980).

The Oil and Gas (O&G) industry is one of the world's biggest industries in terms of dollar value, and have a prominent history of merger activity. Being the source of delivery of O&G, which is the lifeblood of our global industrialized world, the impact of the O&G industry is immense. The industry engages hundreds of thousands of participants ranging from O&G companies, governments, cartels, and to end consumers having to fuel their cars and heat their homes. Altogether this makes the O&G industry one of the most complex, yet interesting, industries. With billion-dollar equipment and a profound reliance on the Earth's scarce natural resources, high fixed costs and strong barriers to entry are core characteristics of the O&G Industry. Simultaneously, the competitive environment is increasingly difficult to navigate within, as competition is intensifying due to rapid technological advancements, pressures from alternative sources of energy, and increased competitive threats from the resource-rich National Oil Companies. For such accumulate reasons, international and independent O&G companies often use M&A as a strategic tool for growth, as it can seem superior to organic growth due to the speed with which it can be implemented and the scale with which it brings along. As a truly global, unique and complex industry with an impressive history of M&A activity, the O&G industry is therefore the focal focus of our thesis. However, with the aim of identifying a homogeneous sample one needs to acknowledge the inherent differences that prevail even *within* a single industry. The O&G industry can be divided into three rather distinct segments (upstream, midstream and downstream). The upstream segment, which covers the exploration and production of crude oil and natural gas, is often considered the most profitable segment with the highest level of M&A activity and industry restructuring, which makes it particularly interesting to examine. Therefore, to ensure homogeneity throughout our sample our study is confined to a single segment, namely the upstream oil and gas segment, for both acquirers and targets.

It is our hope that this thesis can add to the M&A literature's yet inconclusive evidence with respect to value creation from M&A by zooming in on a specific industry – the Oil and Gas industry – which is one of the most complex, far-reaching and largest industries worldwide with a strong history of restructuring through M&A (Inkpen & Moffett 2011; Dale et al. 2014). We therefore aim to investigate whether M&A throughout the O&G industry have created financial value, measured as abnormal stock return, for acquirers and whether any specific firm- and deal-specific characteristics have been better at driving value than others.

1.1 Research question

All of the above leads us to the overall research question we seek to explore, analyze and discuss in this paper:

> *What is the financial impact, measured as shareholder value added, for Oil and Gas upstream producers acquiring or merging with industry-related targets from 2002 to 2016, and to what extent can firm- and deal-specific characteristics explain such effect?*

In order to answer our research question, it has been necessary to inquire into the following sub-questions, which consequently will guide the structure of this thesis:

1. *How has M&A activity evolved historically, and what are the empirical findings on the topic of M&A value creation?*
2. *What are the dynamics of the Oil and Gas industry and related M&A activity?*
3. *Measured as shareholder value added, what is the financial impact for Upstream Oil & Gas acquirers involved in M&A with industry-related targets from 2002 to 2016?*
4. *Which firm- and deal-specific characteristics, if any, influence value creation for acquirers following a merger or acquisition?*

Existing literature have predominantly examined M&A value creation through short-term and long-term event studies, measuring 'value creation' as the abnormal stock return resulting from the M&A event. According to Fama (1991), event studies represent the cleanest available evidence on the efficiency of markets in adjusting to public announcements such as takeovers. We intend to add to the M&A literature by providing a novel and narrowly defined context within which value creation and value drivers are investigated. To enable for comparability with existing literature we do not intend to invent a new methodology but will rather apply the commonly used event study approach within this new context. Hence, we will analyze the research question through the use of short-term and long-term market-based event studies.

1.2 Delimitation

M&A is a widely popular topic among scholars in various fields of research such as finance, economics, strategic management, and industrial organization theory. While all aspects are vital for the complete understanding of the highly complex M&A topic, no novelty can be expected to be discovered if the researcher attempts to grasp over the entire concept.

We will only investigate the M&A impact for acquirers from a financial perspective. In accordance with most literature, we therefore measure the value impact as abnormal stock return. Accordingly, the thesis is limited to market-based event studies and will not consider other aspects such as operating performance and more qualitative approaches (e.g. surveys and case studies) that as well can be important for understanding the full concept of value creation. Furthermore, the investigated time period is limited to deals conducted from 2002 to 2016, due to data availability constraints.

This thesis does not intend to challenge existing mathematical and statistical methodological approaches. Rather we *apply* the predominant and best available methodology as mere instruments enabling us to seek new insights to the literature from the choice of a specific industry context. While not inventing new methodology it is however still important to elaborate and justify the specific methodological choices that are considered the best fit to our sample. Therefore, considerable effort has been put into describing such choices in Chapter 6.

Lastly, the very choice of focusing on a narrowly defined industry naturally delimits the scope of our thesis to the strategic investment decisions made by practitioners *within* this industry. While the strategic actions of firms can expand beyond the boundaries of a single industry, we believe it is the best available construct to measure effects of a concept (i.e. M&A) that has proven difficult to generalize.

1.3 Structure of thesis

This thesis is structured into ten chapters, where this introduction serves as the first. In the following chapter, we will present our research methodology. Chapter 3 encompasses a literature review on M&A historical activity and existing empirical evidence on value creation, while Chapter 4 comprises a review of the oil and gas industry including its associated unique dynamics and history of M&A. Chapter 5 presents the hypotheses of this thesis, which are built upon the evidence from M&A literature and industry review, respectively. In Chapter 6, the event study methodology is presented and the framework for which the hypothesis testing is built upon is put forward. Chapter 7 guides the reader

through the data sampling process resulting in our final samples of 550 and 375 deals for the short-term and long-term studies respectively. The chapter ends with a descriptive section of the final data sample and sub-samples, which are tested upon in the analysis. Chapter 8 presents the empirical findings of overall value creation and drivers of value creation. Throughout the chapter it is indicated whether we find support for the stated hypotheses. Chapter 9 comprises a two-fold discussion. The first part discusses and makes inferences on the overall short-term and long-term value creation, as well as the individual firm and deal specific characteristics that possibly drive value creation accruing to acquirers. The latter section discusses the strategic and managerial implications our findings may have for practitioners within the O&G industry. Lastly, Chapter 10 comprises the conclusion of this thesis along with suggestions for future research.

CHAPTER 2 | Research Methodology

Inspired by Wilson's (2014) guide for the conduction of business research, this chapter will present our research methodology, which is defined as *"the approach and strategy used to conduct research"* (Wilson 2014, p.7). The key concepts of research include (1) research philosophy, (2) research approach and (3) research strategy. The choices in each of these areas are highly interlinked and are ultimately based on our research question that forms the glue of our project. The remaining elements of our research methodology – research design, data collection, and data analysis techniques – will be covered in Chapter 6 and Chapter 7 after the forming of our hypotheses (Wilson 2014).

2.1 Research philosophy

Research philosophy requires the researcher to consciously consider how knowledge is developed. We take a positivist approach to our role as researchers, as we aim to remain objective throughout our study by avoiding interference with the analyzed subjects. Consequently, we as researchers remain independent of our research to avoid personal biases that may distort the validity of the results. The positivist approach matches well with the highly systematic and pre-specified methodological event study approach that our research will follow. Positivists seek to apply theory of observable data and will likely use quantitative data to remain as objective as possible in analyzing a sample. This is in broad terms what we intend to accomplish in analyzing M&A performance in the oil and gas industry by taking an outside-in perspective. The discussion and interpretation of our findings will be more comprehensive than most related M&A studies in the sense that a focus on an industry allows us to interpret our quantitative findings a more qualitative perspective. When adding a qualitative element to the research, the researcher should however be aware that risks of not remaining objective will increase (Wilson 2014).

2.2 Research approach

Research methods are frequently associated with the choice of an approach that is either inductive or deductive. The choice depends on the relationship between theory and research; that is, whether the paper's research origins from existing theory, or if theory is produced as the outcome of research. While induction is largely the building of new theories based on own data collection and analysis; deduction is "*concerned with developing a hypothesis (or hypotheses) based on existing theory, and then designing a*

research strategy to test the hypothesis" (Wilson 2014, p.13). Our overall research question originates from empirical findings within the M&A literature that seem to contradict the reality of M&A practitioners. To best explore this inconsistency, our analysis of the research question is grounded on existing theory of M&A in combination with an interpretation of the oil and gas industry dynamics. Based on this theory we develop a number of hypotheses, which will be tested through statistical analyses. Therefore, we follow a highly structured deductive approach in moving from theory to hypotheses-building and further to analysis of our data sample.

2.3 Research strategy

A research strategy is either quantitative, qualitative or a mixture of both (Wilson 2014). In order to best investigate and answer our research question in an objective manner, this study will primarily use a quantitative research strategy. However, qualitative methods will be added as such arguably will enable an advancement of our hypotheses to the specific industry context and furthermore enhance our ability to discuss and interpret our empirical findings. Wilson (2014) expresses the quantitative strategy to *"draw a large and representative sample from the population of interest, measure the behavior and characteristics of that sample, and attempt to construct generalizations regarding the population as a whole"* (Wilson 2014, p.15). This is to a large extent what our analysis encompasses, as we draw from an overall sample of upstream oil and gas acquisitions in the period from 2002 to 2016, measure the aggregate and average financial impact acquisitions may have had for acquirers and ultimately attempt to make generalizations to the broader industry. From this, the study further aims to uncover possible firm and deal specific characteristics that potentially drive M&A value creation. It should be noted that our choice of a deductive research approach also greatly influences our choice of a quantitative approach, as these are often strongly linked. Specifically, our hypotheses, which have been developed from existing theory, will be tested through statistical analyses. The choice of a quantitative strategy further enables the comparison of our results with existing academic research on M&A performance (Wilson 2014). We argue that the combination of the quantitative strategy with the qualitative elements constructs a more comprehensive and in-depth study, as qualitative data can help clarify the quantitative findings (Wilson 2014).

CHAPTER 3 | Literature Review

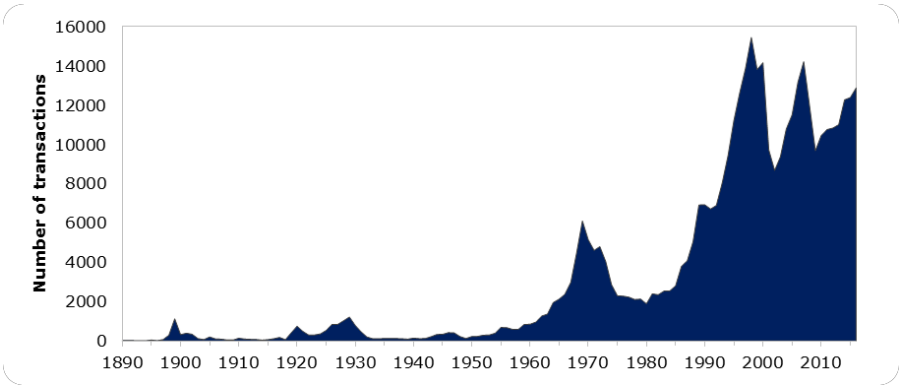
3.1 Introduction to M&A

As a concept, mergers and acquisitions (M&A) is a general term that refers to the combination of two companies to achieve certain strategic or financial objectives. In a *merger,* the two companies come together to achieve some common objectives by combining and sharing resources. A new entity may be formed that includes both merging firms. An *acquisition* refers to the situation where the acquiring firm purchases the assets or shares of another firm, known as the target firm. The shareholders of the target firm cease to be the owners of that firm, as the firm will often be absorbed by the acquiring firm. The terms *buyout* and *takeover* are different types of acquisitions, where a buyout generally implies that the acquirer is a group of investors, and a takeover indicates that the acquiring firm is much larger than the target firm. While such distinctions within M&A terms are important in certain contexts (e.g. accounting rules), existing M&A literature rarely differentiates between the terms when examining value creation (Sudarsanam 2010). Therefore, this thesis will use the terms (M&A, takeover, transaction, deal, merger, acquisition) interchangeably.

3.1.1 Global M&A activity and merger waves

M&A have throughout history shown to be a popular strategic tool for growing or improving the overall performance of the firm. Each year companies around the world invest billions of dollars in making such transactions, and the volume and value continues to increase steadily (Sudarsanam 2010). Despite this upward trend, it is well-known that merger activity throughout the last century has occurred in wave-patterns, commonly referred to as *merger waves*. Since the 1890s the world has experienced six completed merger waves, possibly with a seventh in progress (see Figure 1 below). Not all parts of the world were equally affected by each of these waves. Therefore, many studies differentiate between the six US merger waves, the four UK waves, and the three recent European waves. The first two waves were mostly a US phenomenon, and though a wave-like pattern may have occurred in Europe over the same periods, they were of much smaller scale and not well documented. UK merger activity began to pick up during the third wave, whereas reliable evidence of M&A in the rest of Europe starts with the fourth merger wave. The fifth and sixth merger wave were truly international phenomena, where the Asian takeover market also emerged (Martynova & Renneboog 2008).

Figure 1: M&A waves in the US



Source: IMAA 2017

The clustering of M&A activity has been widely studied, and the concept is often explained by a combination of business environment shocks and behavioral elements like self-interested and irrational managerial decisions. Martynova and Renneboog (2008) investigate the determinants of M&A activity and identify some common macroeconomic factors that precede and follow M&A waves. They find that merger waves are often driven by industrial, technological or regulatory shocks and usually occur in periods of economic recovery following for example wars, energy crises etc. This further coincides with rapid credit expansion and stock market booms. Looking at the downturn of a merger wave, they find that a period of high takeover activity is usually disrupted by a steep decline in stock markets, which is subsequently followed by a period of economic recession. Despite these common factors that recur for all merger waves, each wave is also characterized by unique features and drivers additional to the difference in geographical reach (Martynova & Renneboog 2008).

3.1.2 The six completed merger waves

This thesis will investigate M&A value creation based on the more recent part of M&A historic activity (2002-2016), and will therefore not consider value creation of the first many merger waves. Nevertheless, an introduction to the changing dynamics of M&A activity over the past century will provide the reader with a broader understanding of the context of M&A and how it has gradually come to be such an important element in business strategy today. This will further enhance the understanding of how the oil and gas industry has evolved in relation to other global dynamics. Consequently, this section will briefly present characteristics and dynamics of each wave, but with more focus attributed to the most recent and more relevant merger waves.

The first merger wave (1890s – 1903), characterized as 'merging for monopoly', was purely a US phenomenon that led to the formation of giant US firms and conglomerates through massive horizontal consolidations. The second merger wave (1920 – 1929) emerged in retaliation to these monopolies, and was largely characterized by 'merging for oligopolies', where smaller firms within various industries attempted to increase in size and achieve economies of scale (Martynova & Renneboog 2008; Sudarsanam 2010; Faulkner et al. 2012).

The Great Depression and the subsequent World War II prevented a new takeover upsurge for several decades. However, in the late 1950s the third merger wave (1950s – 1973) began to take off – this time both in the US and the UK. The wave was greatly characterized by a spree of unrelated diversifications that led to the development of large conglomerates. It collapsed in 1973 with the oil crisis induced by OPEC supply constraints and the following economic slowdown (Martynova & Renneboog 2008; Sudarsanam 2010). As the economy recovered, the fourth merger wave (1980s – 1987) took off in the US, UK and Continental Europe. This merger wave reversed the conglomerate acquisitions of the previous wave, as companies shifted back to the strategy of greater specialization and focus on the core in a strive to increase efficiencies. Specifically, acquisitions were primarily concentrated within related industries to enhance the focus of companies' business portfolios. Consequently, a high number of divestitures occurred, as companies eliminated the inefficient diversifications made throughout the third merger wave (Martynova & Renneboog 2008; Sudarsanam 2010).

The fifth merger wave (1993 – 2000) was largely characterized by a focus on core competencies as the primary source of a firm's competitive advantage. Furthermore, cross-border deals became more popular, as companies to a higher extent began to participate in the increasingly globalized markets. A striking feature of the fifth wave is its international nature; the European takeover market came close to the size of the US takeover market, and Asian takeovers increased steadily. The fifth wave ceased in 2000 with the Dotcom stock market collapse (Martynova & Renneboog 2008; Sudarsanam 2010; Faulkner et al. 2012).

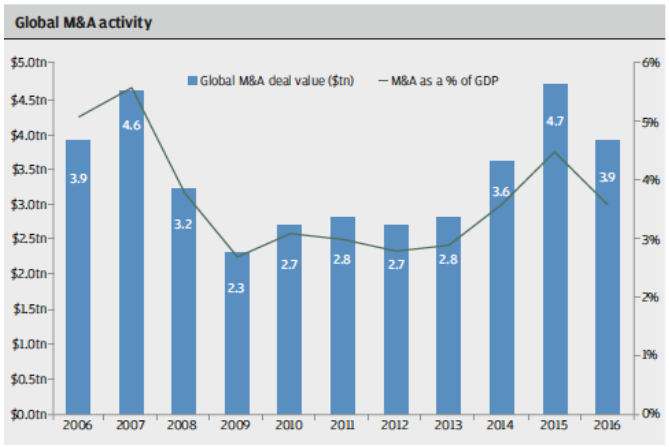
The most recent academic literature have found evidence of a sixth merger wave (2003 – 2007) starting in 2003, as the economy recovered from the burst of the Dotcom bubble (Hill & Solomon 2016). This wave continued the international industry consolidation of the fifth wave with ever more companies expanding into multinational markets. The proportion of cross-border transactions increased even further and takeover activity in general was more international in nature than before (Martynova & Renneboog 2008). Globalization also boosted the access to global capital, and companies generally had

high liquidity or cheap credit available due to low interest rates. The sixth wave was remarkably intense in terms of both value and number of deals but only lasted until late-2007. The start of the recent financial crisis brought acquisitions to a halt when credit tightened, financing became scarcer and uncertainty rose (Hill & Solomon 2016).

3.1.3 Current M&A trends and a possible seventh wave

The recent financial crisis had a dramatic impact on global M&A activity and companies remained hesitant to pursue complex M&A transactions in the subsequent years. Nevertheless, M&A activity is now on an upward course, which is increasingly being referred to as the seventh wave. The past years have seen an increase in tax inversions, where companies acquire foreign companies and re-incorporate abroad. Furthermore, it appears that this current wave will be characterized by increased consolidation on an international scale, partly attributed to emerging countries escalating their presence in the global M&A market (Hill & Solomon 2016).

Figure 2: Global M&A activity, 2006-2016



Source: JP Morgan 2017

2015 was a record year for global M&A deal value (see Figure 2 above) amounting to USD 4.7 trillion. The global M&A market experienced more resistance in 2016 reaching just USD 3.9 trillion worth of announced deals, which was greatly impacted by the substantial global uncertainty that arose during the year. Especially the political landscape with speculations about Brexit, China and the US presidential election as well as heightened regulatory scrutiny made companies more hesitant to engage in expansionary M&A strategies, and more deals were thus withdrawn or paused. Nevertheless, 2016 was still the third best year of all time for M&A in terms overall deal value with companies seeking to complement organic growth with transactions to access new regions, products or capabilities, while

benefitting from the low financing costs. In fact, cross-border deals accounted for 36% of overall deal volume in 2016 and are steadily increasing each year. These trends are expected to proceed in 2017, where companies will continue to pursue innovative and transformative acquisitions. Regulatory uncertainty will remain, but it is anticipated that deal volume for 2017 will be consistent with the performance of 2016 (JP Morgan 2017).

This section has outlined how M&A continues to be a popular strategic choice for companies and investors despite booms and busts in the economy. As M&A continues it cyclical life, deal volumes remain high and the pace of recovery has been accelerating (Hill & Solomon 2016; JP Morgan 2017). Due to the extensive impact M&A has on all markets and societies, scholars have for many decades been intrigued by the M&A as a research topic. The next section will cover motives for M&A and thereafter we turn to the empirical evidence on value creation in M&A.

3.2 Theoretical Motives and Drivers on M&A

M&A is often perceived as a credible alternative to growth, as the organic growth through internal investments can be too slow in responding to competitors and changing environments. As the volumes of acquisitions have continued to reach new heights, scholars within finance and strategic management have increasingly sought to discover why firms generally engage in M&A, and why such activity often is concentrated in waves (Martynova & Renneboog 2008; Sudarsanam 2010). 'Achieving synergies' is the most cited motive for engaging in M&A, but the concept of synergies can cover many underlying motives that seek to grow and improve the firm (DePamphilis 2015). Suggested drivers by M&A literature include economies of scale or scope, increasing market power, tax benefits, lowering cost of capital, market discipline by the removal of incompetent management, and taking advantage of diversification (Andrade et al. 2001). M&A can for example help a firm reduce costs by achieving economies of scale, but it can also be a way to gain new resources or enter new markets to increase efficiency and revenues (Anand et al. 2005). Studies have proposed several ways of grouping these into categories, but broadly there are two opposing schools of thought on the underlying drivers of acquisitions: neoclassical theory and behavioral theory. Nevertheless, M&A are driven by many complex motives and any single theory of motivations cannot fully explain all empirical findings. In reality, mergers are unique and the underlying motivations will likely be a result of both perspectives (Sudarsanam 2010; Berkovitch & Narayanan 1993).

3.2.1 Neoclassical theory

The neoclassical theory assumes that managers are driven by the objective of maximizing long-term wealth of the firm and its shareholders. A firm's objectives and strategies at either corporate- or business unit level would thus be initiated and implemented in a manner that maximizes shareholder wealth. Moreover, decisions about acquiring would be based on whether the transaction adds value by creating positive net present value (Sudarsanam 2010). This perspective therefore also regards M&A as a rational response to adapt and take advantage of changes in the business environment, e.g. as a result of industrial, economic, political and/or regulatory shocks or strategic actions of competitors. As presented in the previous section, these types of shocks have throughout history proved to trigger periods of increased M&A activity and subsequent the start of merger waves (Martynova & Renneboog 2008).

The added shareholder value as the underlying rationale for engaging in M&A is often referred to as synergies, which is obtained when the combined value of the merged firms exceeds the sum of its parts before the merger. Based on the assumption of efficient markets, value-creating acquisitions would, from a neoclassical perspective, price up fairly the shares of the involved firms. Therefore, from a neoclassical standpoint M&A value creation is expected to be positive, as managers would only conduct the acquisition if it was value adding to shareholders (Sudarsanam 2010; Berkovitch & Narayanan 1993).

3.2.2 Behavioral theory

Contrary to the neoclassical school, behavioral theory suggests that self-interested and irrational managerial decisions drive M&A activity. While managers may still seek to execute strategies to improve firm value, the objective of shareholder wealth maximization is assumed subordinated to personal incentives. Therefore, the behavioral perspective hypothesizes that M&A can be value destroying rather than value creating (Martynova & Renneboog 2008; Sudarsanam 2010).

The inclusion of agency theory into M&A literature have suggested that personal objectives of corporate managers may be part of the underlying motives and drivers for M&A activity. For example, managerial compensation, status and power may be closely related to firm size, and thus corporate managers may conduct empire-building acquisitions to increase their compensation and power even if these acquisitions destroy shareholder value. Self-interested managers could similarly engage in acquisitions to protect their job position (Martynova & Renneboog 2008).

Another behavioral consideration driving M&A activity is managerial hubris and herding. *Managerial hubris* is when managers become overconfident in their ability to select, manage, and integrate the target resulting in an overestimation of the synergetic value creation of the transaction. *Managerial herding* is the view that firms and their managers tend to mimic the actions of each other, and first and foremost the industry leader. Therefore, the first successful acquisitions within an industry would encourage other firms to engage in similar deals regardless of whether there exists a clear economic rationale behind it. The combination of hubris and herding with overconfident managers following the actions of competitors suggests that efficient value creating acquisitions may be followed by more inefficient and irrational ones (Martynova & Renneboog 2008; Harford 2005).

3.3 Empirical evidence on value creation

M&A is a very popular topic of research in the academic world, and numerous scholars have for decades tried to measure and explain the associated value creation. The primary purpose of an acquisition should be to improve overall performance of the firm. However, the measurement of performance is not definite and research have used multiple methodological approaches to measure such "success" or "value creation" (Meglio & Risberg 2010). Though many stakeholders of a firm are affected by a takeover, finance theory usually evaluates the success of M&A from the perspective of the shareholders, as they are the residual owners of the firm, whose wealth should be maximized. Value creation can then further be measured from the perspective of the target or the acquirer, or a combined effect. Empirical literature is generally consistent in concluding that takeovers result in positive value creation for the target firm's shareholders. Given that acquirers often pay high premiums to acquire targets, this conclusion is not surprising. Scholars have therefore focused more on acquirer performance, which is also the emphasis of this thesis (Haleblian et al. 2009; Martynova & Renneboog 2008).

The evidence of value creation from the perspective of the acquirer provides ambiguous results, which understandably strikes many scholars (including the authors of this thesis), since such ambiguousness as to whether M&A is value creating does not tally with the accelerating number of mergers undertaken. Generally, one would expect the level of takeover activity to be supported by empirical research confirming significant value creation. Consequently, it is a topic that continues to receive a great deal of academic attention.

The analysis of value creation within event studies is generally categorized into three methodological approaches (1) short-term market based studies, (2) long-term market based studies, and (3) long-term

operating performance studies (Tuch & O'Sullivan 2007). Fundamental for the two market studies, which are also the most prevailing, is the assumption that the market acts efficiently such that investors' expectations about the prospects of a firm are reflected in the share price (i.e. semi-strong form market efficiency). This enables the estimation of abnormal returns for shareholders. Despite the popularity of these approaches they all suffer from various limitations; e.g. the short-term study only considers investors' *expectation* of future gains but cannot per definition reflect the value realized post acquisition; the long-term studies include the years following the merger but are challenged with isolating the actual effect of the single merger event (Martynova & Renneboog 2008; Lubatkin 1983).

King et al. (2004) has conducted a meta-analysis based on the results from multiple event studies. Their findings suggest that *on average* short-term value creation is slightly positive and significant on the announcement day, but with longer event windows the analysis report either insignificant results or even value destruction. Table 1 provides an overview of these results. Arguably, the results from King et al. (2004) suggest that the short-term value creation effects are likely very close to zero. The following subsections reviews the empirical evidence on M&A value creation considering into more detail the short-term abnormal return, long-term abnormal return, and operating performance.

Table 1: Meta-analyses of Value Creation for the Acquirer

TYPE OF STUDY	EVENT WINDOW	EST. ABNORMAL PERFORMANCE	NUMBER OF STUDIES	SAMPLE SIZE
Short-term Abnormal Returns	Day 0	0.09 ***	127	28,016
Short-term Abnormal Returns	Days 1 - 5	0.01	114	19,269
Short-term Abnormal Returns	Days 6 - 21	-0.02	54	8,548
Short-term Abnormal Returns	Days 22 - 180	-0.06 ***	64	5,698
Long-term Abnormal Returns	> 180 days - 3 years	-0.10 ***	103	25,205
Long-term Abnormal Returns	> 3 years	-0.07 ***	26	5,966
Accounting study (ROA)	1 year	-0.09 ***	9	1,960
Accounting study (ROA)	3 years	0.02	20	29,050
Accounting study (ROE)	1 year or longer	-0.02	14	1,790
Accounting study (ROS)	1 year or longer	-0.03	9	14,660

Source: own contribution, based on table from King et al. (2004).

Notes: *** Significant at 1% level. Each row represents separate meta-analysis results

3.3.1 Short-term market based studies

Several scholars have in the past decade sought to review and synthesize the vast academic literature on M&A value creation, where most studies have focused on short term value creation. The short-term event studies examine the market reaction to an M&A event around the announcement date of the event. The event window (i.e. the time before and after the announcement date) varies with each study but

generally spans from a single day to a few months (Tuch & O'Sullivan 2007). There is widespread agreement that the majority of the gains in an acquisition accrue to the target shareholders while the evidence on wealth effects for acquirer shareholders are more mixed (Martynova & Renneboog 2008; Haleblian et al. 2009; Tuch & O'Sullivan 2007; Fraser & Zhang 2009). For example, Andrade et al. (2001) report significant *target* average abnormal return of +16% for almost 4,000 US mergers between 1973 and 1998 in a three-day event window.

For the short-term event study, the evidence for acquirer abnormal returns is highly ambiguous. While some studies find small positive returns (around 0.1% to 1%), others detect small negative returns (-0.1% to -2%). Most strikingly is that many of these results are statistically insignificant, and thus, not much can be inferred. Scholars of the most recent review papers disagree on the overall conclusion. On one side, Tuch & O'Sullivan (2007), Fraser & Zhang (2009) and Haleblian et al. (2009) suggest that acquisitions, in the short-term, will at best have an insignificant impact on shareholder wealth. Contrastingly, Martynova & Renneboog (2008), Bruner (2004) and King et al. (2004) argue that prior literature on average suggest that acquirers experience small significant positive abnormal returns. Consequently, overall short-term results are highly inconclusive, and though there might be a slight small positive effect (as seen in the meta-analysis by King et al (2004)), the true effect is likely very close to zero. Although this suggests that acquiring firms are not necessarily losers in M&A, they are clearly not big winners either. That title consistently seems to go to the target firm's shareholders (Andrade et al. 2001; Tuch & O'Sullivan 2007; Martynova & Renneboog 2008).

3.3.2 Long-term market based studies

Though the most commonly used performance metric in M&A literature is the short-term abnormal market return, this approach only incorporates the *expectation* of future gains or losses from the announcement of the merger. Studies have showed evidence of stickiness in stock market pricing, which suggest that the market takes time to absorb new (e.g. M&A) information, or that investors await more information to assess the benefits and the probability of their realization through the post-integration process (Sudarsanam 2010). The measurement of performance through the study of long-term abnormal returns has therefore increasingly gained interest.

The long-term model is similar to the model examining short-term abnormal returns, with the exception that the event window is expanded to several years after the announcement of the transaction. The underling idea is to incorporate the closing and implementation (i.e. post-acquisition processes) of the acquisition, and not just the immediate investor expectation of such. These are critical factors, as

especially the post-merger integration process is an important element of the success of the merger itself. It is furthermore interesting to examine the long-term shareholder wealth effects, as many shareholders (buy and) hold their shares for several years. Nevertheless, this long-term approach comes with several shortcomings. The most critical is that it gets increasingly difficult to isolate the acquisition effect over longer time periods, since many overlapping events may have induced multiple market reactions. This issue must be taken into account when interpreting the results (Tuch & O'Sullivan 2007; Martynova & Renneboog 2008).

An overwhelming part of M&A literature find that acquiring firms experience significant negative long-term abnormal returns following a transaction. Though some studies find insignificant returns the overall consensus is that M&A transactions lead to a share price decline over the years following an announcement – at least from the current methodologies used in M&A research (Tuch & O'Sullivan 2007; Martynova & Renneboog 2008; Sudarsanam 2010). For example, Agrawal et al. (1992) study the post-merger performance in the US over the period 1955 to 1987 and find that acquiring firms suffer a statistically significant loss of around 10% over a five-year period after the merger. Likewise Sudarsanam and Mahate (2003) find significant post-merger returns of –15% on average for UK acquirers in the period 1983 to 1995. Moreover, the meta-analysis (see Table 1) of King et al. (2004) reports significant negative abnormal return as the event window is expanded to the years following the M&A announcement. Evidently, long-term market-based studies predominantly report significant – or at best insignificant – negative post-merger returns.

Despite this rather strong evidence of wealth loss for acquirers in the long term, a conclusion about value destruction in M&A may be misleading particularly due to the problem of isolating the pure acquisition effect. Andrade et al. (2001) emphasizes that though many studies are robust to common statistical problems, the statistical reliability can still be questioned. "*Given the serious methodological concerns with the long-run empirical literature (...), we are reluctant to accept the results at face value."* (Andrade et al. 2001, p.114). The evidence in existing literature is therefore likely not presenting the full picture.

3.3.3 Operating performance studies

If a merger is successful and creates value for its shareholders, the gains should eventually be reflected in the company's financial statements. Some studies therefore focus on using accounting measures to estimate the post-acquisition impact on operating performance. This usually involves a comparison of accounting measures some years prior to and after the acquisitions has been completed. Though the

important measures of performance may vary slightly from industry to industry, studies on operating performance typically use universal measures like sales, profitability, and return on assets. Studies on post-merger operating performance suffer from limitations similar to those of the long-term wealth effects; for example, it is also difficult to isolate the accounting effect of the merger from other internal or external events. Furthermore, accounting information is susceptible to manipulation through earnings management and changing accounting policies, which can decrease comparability across years. Comparability across companies in different countries is moreover questioned as they may be subject to different accounting standards. Scholars therefore emphasize that the results from the operating performance studies should be interpreted with caution (Tuch & O'Sullivan 2007; Martynova & Renneboog 2008).

Scholars use a variety of accounting measures and the overall picture of operating performance is therefore rather ambiguous. Ravenscraft and Scherer (1989) and Healy, Palepu and Ruback (1992) are both influential studies within M&A operating performance, but they reach different conclusions about post-acquisition performance; the former reporting a loss in profitability while the latter an increase in operating cash flows (Andrade et al. 2001). In response to these mixed results, Martynova and Renneboog (2008) highlight that studies, which have reported a decrease in post-merger profitability, generally have employed earnings-based measures, while studies reporting an increase are based on cash-flow performance. Consequently, the combination of mixed results from different performance measures, and that such studies suffer from data limitations, questions the generality of such findings (Andrade et al. 2001). Generally, there is no clear evidence of improved post-acquisition performance (Tuch & O'Sullivan 2007).

Although this thesis will not analyze operating performance, we found it relevant to include a small review of existing literature to enlighten the reader of this alternative approach of measuring value creation from M&A. However, as the operating performance studies suffer from even more limitations and biases than the long-term market based studies, we argue that inferences from operating performance results would be even weaker. As argued by Tuch & O'Sullivan (2007) accounting measures are very hard to compare. Given that we are investigating a global industry with acquirers of many different geographic origins, operating measures are likely subject to different accounting standards, which would significantly exaggerate this issue of comparability. Moreover, we would have experienced greater issues with isolating the true M&A effect, as many other strategic and accounting measure decisions could have impacted the operating performance measures.

3.4 Firm- and deal-specific characteristics

As much of the previous academic literature suggest that acquiring firms, on average, do not benefit from acquisitions, scholars have in recent decades focused on examining specific conditions and situations under which acquirers experience positive value creation, or similarly if some characteristics are particularly value destroying. These influencers of acquisition performance are ample and can cover everything from managerial effects like compensation schemes to firm- and deal-specific characteristics as well as external environmental factors (Haleblian et al. 2009). This section comprises a review of the most prevalent firm- and deal-specific characteristics in the research of M&A and how such may impact value creation for acquirers. More specifically, the following areas will be covered: merger waves, cross-border relative to domestic deals, size effects, unlisted relative to listed targets, method of payment, and industry relatedness. These characteristics have all received considerable attention in M&A literature (Martynova & Renneboog 2008), and will further be of relevance for the further analysis and hypothesis building.

3.4.1 Merger waves

M&A literature suggest that the timing of an acquisition potentially has an effect on value creation. Specifically, scholars have been investigating possible timing effects from the notion of merger waves. As demonstrated in Section 3.1 each merger wave is characterized by unique characteristics that could possibly suggest that different strategies and deal-specific characteristics affect value creation for acquirers. While some studies have examined whether specific merger waves proved to be more or less value creating, other studies have focused on differences within merger waves. Generally, no significant difference in acquirer abnormal performance is found *across* merger waves. Nevertheless, findings from M&A studies propose that a difference exists within the life cycle of a wave (Martynova & Renneboog 2008). Specifically, Harford (2005) and Bhagat et al. (2005) find the total value creation effect to be significantly higher in the upsurge of a merger wave compared to the corresponding wealth effects in the periods outside the upsurge. An upsurge is here broadly defined as the first years of a merger wave. Moeller et al. (2005) arrive at a similar conclusions, as their results show that acquisitions conducted in the second half of the fifth merger wave (1993 – 2000) generated larger losses relative to the acquisitions announced in the first half of a merger wave. Consequently, M&A literature seems to suggest that timing relative to a merger wave may be an influencing factor (Martynova & Renneboog 2008).

3.4.2 Cross-border relative to domestic deals

While the M&A market is increasingly being globalized and practitioners progressively pursue growth through cross-border deals, empirical conclusions on whether cross-border acquisitions are more valuable than domestic deals remains elusive. Differences in national regulations, cultures, capabilities and resources have induced researchers to believe that different value effects may be attributed to cross-border and domestic deals. However, as cross-border M&A is a fairly recent phenomenon no clear conclusions have been made and several recent M&A review papers calls for more investigation of this characteristic and its potential impact (Martynova & Renneboog 2008). To exemplify the ambiguity of the existing evidence two studies have found completely opposing results. In a sample of US and European firms, Anand, Capron & Mitchell (2005) find that cross-border transactions are more likely to create higher performance than domestic acquisitions because acquires can "*enhance their capabilities by accessing diverse resources and environments*" (Anand et al. 2005, p.191). On the contrary, Moeller & Schlingemann (2005) find that US acquirers experience greater returns when engaging in domestic relative to cross-border M&A due to advantages of familiarity and better legal protection in the home country. While the findings suggest that the relative location of the target and the acquiring firm could possibly have great influence on value creation, research in this area is still too ambiguous to suggest a clear conclusion.

3.4.3 Size effects

Size effects have been argued to potentially influence value creation. The analysis and measurement of 'size' has, however, been approached differently – while some are purely concerned with the size of the acquirer, others examine the relative size of the target to the acquirer. Furthermore, the mere measurement of 'size' have been considered through several parameters, such as market capitalization, sales, number of employees, total assets or fixed assets etc. Studies considering the size of the acquirer have usually found evidence of larger acquirers being subject to smaller abnormal returns following a merger relative to acquirers of smaller sizes. It is often argued that such an effect is caused by larger firms that may tend to pay excessive premiums and are more likely to complete a bid offer, despite the erosion of the value creation potential. Arguably this can be explained by the distance between ownership (principal) and control (agent), which tends to be positively correlated with firm size. Ceteris paribus, the greater the distance the greater the risk that the principal objective of maximizing shareholder wealth is diluted or compromised based on managerial incentives possibly pursued by the agent (see Section 3.2.2 on behavioral theory) (Faccio et al. 2006). The other aspect of size effects concerns the relative size of the target to the acquirer, where evidence is more inconclusive. On the one hand, some studies suggest that relatively small targets compared to the acquirer generate higher post-

acquisition value creation because smaller targets are easier to integrate in the business of the acquiring firm. Recall that the high failure rate of M&A often is attributed to problems in the post-integration process. On the other hand, scholars argue that the expected synergies are only minor if the target is much smaller than the acquirer, and consequently the potential wealth effects must also be smaller (Tuch & O'Sullivan 2007). Such contrasting arguments may explain why the evidence on this topic is not uniform across studies (Sudarsanam 2010).

3.4.4 Unlisted relative to listed targets

An increasing number of studies have examined the listing status of the target firm as a potential explanatory factor in value creation. Many of these have found substantially higher abnormal returns for the acquirer when the target is unlisted (Martynova & Renneboog 2008). For example, Faccio et al. (2006) found that acquirers of listed targets experienced average abnormal returns of -0.38% while acquirers of unlisted targets experienced average abnormal returns of 1.48%. Despite a lack of evidence of why this so called 'listing effect' occurs, it is argued by some scholars that the reason has its roots in unlisted firms' liquidity constraints. Others argue that unlisted firms potentially are less efficiently managed, which give rise to possible improvements when acquired by a publicly listed acquirer (Ravenscraft & Scherer 1989).

3.4.5 Method of payment

Many scholars stress the importance of making a distinction in the financing of M&A transactions, as mergers financed with stock possibly are associated with different wealth effects compared to financing without stock, e.g. cash. The theory behind this belief is that managers will more likely issue equity when they perceive their stock to be overvalued, and finance the deal with cash when undervalued. Therefore, investors observing an equity issue will likely bid down the stock price of such acquirer (Andrade et al. 2001). As with most existing evidence on M&A value creation, results are not completely clear-cut. Nevertheless, several studies have shown that cash-financed acquisitions lead to higher performance than equity-financed deals both in the short- and long-term (Haleblian et al. 2009; Agrawal & Jaffe 2000; Andrade et al. 2001). For example, Loughran & Vijh (1997) look at acquisitions in the period from 1970 to 1989 and find that firms financing transactions with equity earn significantly negative returns of –24.2% during a five-year period after the acquisition, while the abnormal return for cash financing is significantly positive with +18.5%. While not all studies are this conclusive – e.g. King et al. (2004) find no effect of method of payment – the evidence taken together is generally supportive for the hypothesis that cash as the predominant method of payment is more beneficial (Agrawal & Jaffe 2000), since it might send a signaling effect to the market that the management of the

acquiring firm expects the aggregate firm value to increase after the deal is completed (Tuch & O'Sullivan 2007).

3.4.6 Industry relatedness of target and acquirer

As outlined in section 3.1, the history of M&A activity has both showed times with diversification and the subsequent creation of large conglomerates, as well as times with highly focused M&A with divestitures and focus on the 'core' business. As the construct of industry is a highly apparent way of defining focus and core business, the industry relatedness of the target and the acquirer in explaining value creation has attracted attention from some scholars. The conventional classification of industry relatedness is based on the respective industry codes (such as SIC codes[2]) of the two firms. Tuch & O'Sullivan (2007) review the literature on whether greater industry relatedness results in greater value creation. They conclude that there is some evidence for a positive effect from a related acquisition compared to an unrelated acquisition, possibly due to a better strategic fit between the two firms. However, the causality of the diversification and performance is not completely clear. Some authors argue that it is not diversification that causes poor performance. Rather firms diversify because they already experience poor performance. Thus, the topic of relatedness and its impact on firm performance is still an ongoing debate (Tuch & O'Sullivan 2007).

3.5 M&A performance – Where we stand

Despite extensive empirical evidence over several decades on the topic of M&A performance, results are inconclusive and we still do not seem to know much about M&A and their outcomes (Meglio & Risberg 2010; Bower 2001). Targets almost always gain but findings for acquirers are ambiguous both in the short- and long term. Furthermore, all such findings are criticized for their inability to assess the full impact of both M&A announcements and post-acquisition performance (Andrade et al. 2001). For most studies no matter the choice of methodology, acquisition performance is at best insignificant or slightly positive and it remains puzzling that *"there is no consensus for explaining the apparent popularity of mergers"* (Lubatkin 1983, p.218).

As presented in the introduction of this thesis, Lubatkin (1983) is, like many other scholars, puzzled by such inconsistencies in evidence on M&A performance. M&A activity continues to rise yet empirical literature – mostly within the field of finance – suggest that acquirers are not benefitting from the engagement in M&A. Lubatkin (1983) investigates both sides of these contrasting views by presenting

[2] SIC = Standard Industrial Classification

two propositions that address the question of whether mergers benefit the acquiring firm: 1) mergers do *not* provide real benefits, and 2) mergers *do* provide real benefits. Despite it being almost 35 years since these two opposing propositions were published, they are just as relevant today as empirical evidence is still far from conclusive.

For the first proposition, Lubatkin (1983) raises the question that if mergers, on average, do not improve performance of the acquiring firm, then *why do mergers continue to be a popular strategic alternative*. Possible explanations for this first proposition are that managers make mistakes and are overconfident in selecting the right target (e.g. hubris) and pay too high a price, or that managers will generally seek to maximize their own wealth at the expense of shareholders (i.e. agency problems). For the second proposition, he asks the question that if mergers do in fact provide benefits, then *why have this not been detected by empirical studies*. Three possible explanations for the second proposition are emphasized: (1) administrative problems in the merger process may negate the possible benefits, (2) empirical studies are yet to find the right methodology, and the limitations of the current measures have prevented the detection of merger benefits, or (3) only certain types of merger strategies benefit the shareholders of the acquiring firm, and thus empirical studies cannot treat mergers as a homogenous phenomenon (Lubatkin 1983; Lubatkin 1987).

Given that none of these possible explanations have been rejected, there is room for further progress in the field. Moreover, there is still little agreement on how to measure M&A performance both across and within the different fields of research (Zollo & Meier 2008). Yet, the entire scope of these possible explanations would be impossible to cover in one study. This thesis seeks to make a modest contribution within the topic of M&A performance by focusing on just an industry, and thereby intend to avoid the over-generalization across industries that most previous studies have worked with. As the sample will be highly homogenous this can possibly reveal some interesting and more reliable conclusions about the performance of M&A within this particular industry. The following chapter will analyze the chosen industry – more specifically the oil and gas industry – to uncover and understand dynamics useful for the further analysis of value creation in M&A for acquirers operating within this industry.

CHAPTER 4 | Oil and Gas Industry Review

This chapter will provide a review of the oil and gas (O&G) industry, which is the focal focus of our M&A study. The first section will present the underlying dynamics of the O&G industry. While the industry is enormous in scale and scope, only the elements deemed most appropriate for determining the value drivers within the industry will be addressed. The second section will review the history and current literature on M&A in relation to the O&G industry. Lastly, a brief section will consider the future outlook for the O&G industry in relation to threats of renewables and oil prices that might be following new dynamics.

4.1 Industry Dynamics

The aim of our thesis is to understand whether value is created when O&G acquirers engage in M&A, and what specific characteristics mitigate or amplify such value creation. In order to truly understand how and where value is created following the engagement in M&A we find it necessary to first understand the underlying dynamics of the industry within which a company operates. How a company appropriates a share of the profits from the industry it belongs to depend on the strategic choices it makes. We operate on the assumption that companies within a narrowly defined industry are subject to highly similar underlying strategic forces, which arguably result in more similar M&A motives and processes, than had the companies not been industry-related. By understanding the dynamics of the industry we therefore believe that we are better capable of directing our attention in a more rightful direction of determining where and to what extent value is generated when such acquirers engage in M&A. Furthermore, the profound understanding of the industry enables us to better interpret the findings within the context of the industry, which we theorize could be of explanatory power in providing insight to the ambiguous M&A context.

4.1.1 Importance of the industry

With the expansion of mass manufacturing and the concurrent development of transportation systems reliant on petroleum products, the Second Industrial Revolution established a world society heavily dependent on petroleum (i.e. oil and gas) products. Throughout the 20th century, petroleum has ratified its presence in nearly all world corners. Oil is the essential input of transportation, which consumes

nearly 60% of the world's liquid fuel and constitute 19% of the world's total energy consumption (IEA 2016a; BP 2017). Natural gas is a key input to the worldwide food production in the form of fertilizers, pesticides, cultivation and transportation (Vassiliou 2009). Oil and gas products are so deeply rooted within our global infrastructure that the 20th century rightfully has come to be known the "Age of Oil" (The Economist 2005).

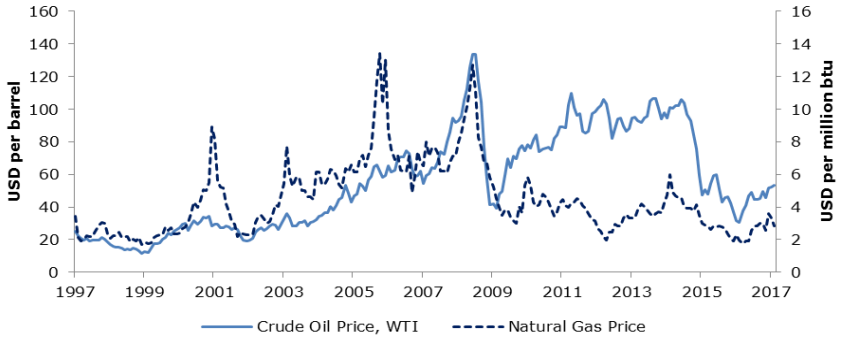
In more recent times, scholars and practitioners increasingly refer to 'the *changing* world of oil' as a consequence of rapidly advancing technologies and efficiency improvements, increased competitiveness of alternative sources of energy (i.e. solar and wind), worldwide pressures for de-carbonization and changing patterns of demand, as well as the evolvement of truly global markets for the trading of intermediate and finished goods within the industry (Dale et al. 2014; BP 2017; Davis 2006; Bagheri & Di Minin 2015). It is this changing world where the competitiveness of conventional hydrocarbons (i.e. crude oil and natural gas) is being severely challenged and only those oil and gas companies able to develop or acquire distinctive competitive advantages – whether that be in the form of technological expertise, financial robustness, organizational agility, or simply exclusive access to (national) oil reserves – can survive and avoid being swallowed through yet another corporate takeover from the industry's giants.

4.1.2 Defining the industry of oil and gas

Despite their differences, 'oil' and 'gas' are often classified within a single industry, namely the hydrocarbon industry, more commonly known as the oil and gas (O&G) industry. Several factors make oil and gas comparable in nature: (1) natural gas is often a byproduct as well as substitute of oil (Dale et al. 2014), (2) the drilling of wells often produce both oil and gas (Lieskovsky & Gorgen 2013), and (3) most O&G multinational corporations tend to operate both oil and gas segments (Dale et al. 2014). Furthermore, whereas crude oil is typically priced at far higher levels than natural gas, the two commodities tend to follow the same long-term movements (see Figure 3). Several studies have found the parallel long-term relationship between the two commodities to be statistically significant, despite the occurrence of short-term "decoupling" periods, where natural gas prices tend to temporarily deviate from the co-integrated relationship (Villar & Joutz 2006; Brown & Yücel 2008; Hartley et al. 2007; Ramberg & Parsons 2010; Brigida 2014; Nick & Thoenes 2014; Lahiani et al. 2017). Therefore, for the sake of simplicity the remainder of this thesis will consider oil and gas interchangeably within the single O&G industry. We do not intend to ignore the differences amongst the segments, such as the distinctive product distribution channels. However, keeping in mind the objective of our thesis to measure M&A performance, we do not find it relevant to distinguish between the two commodities. Investigating

performance of an acquirer engaging in M&A necessitates the measurability of a performance measure, which in this thesis is considered the acquirer stock return. As most O&G companies operate both oil and gas, their stock prices represent investor perceptions of the companies' overall performance taking into consideration all activities pursued by the firms.

Figure 3: Historical co-integrated relationship between crude oil and natural gas prices (1997-2017).



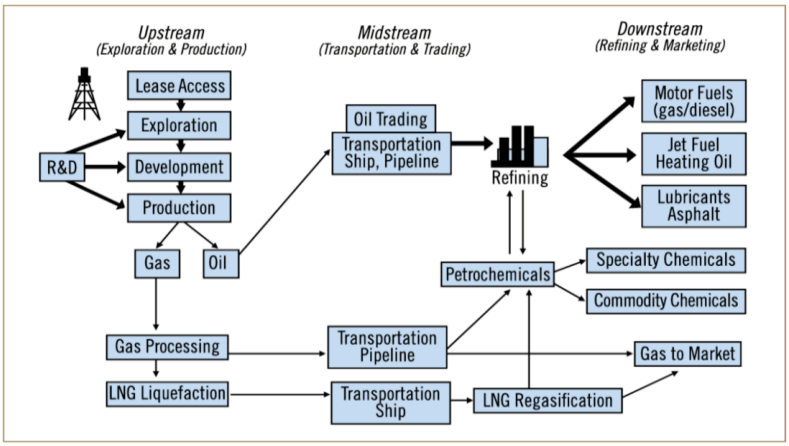
Source: own contribution with data from DataStream

Note: btu = British thermal units

4.1.3 The global oil and gas value chain

The global oil and gas value chain can be split in three segments: upstream, midstream and downstream (see Figure 3). While the three segments of the value chain all involve the processing of crude oil and natural gas in one way or the other, they induce inherently different business models and strategies of market participants following the strong level of heterogeneity in assets, operations, cost structures, and profit margins (Dale et al. 2014).

Figure 4: The global oil and gas value chain



Source: Inkpen & Moffett 2011, p.21

The upstream segment, sometimes referred to as 'Exploration and Production' (E&P), covers the exploration, development, and production of oil and gas (see Figure 4). After a lease has been obtained and enabled access to a field that possibly contains oil and/or gas, the field is explored and developed with the objective of producing hydrocarbons for commercial use. Once the produced crude oil or natural gas leaves the wellhead, the transition is made to the midstream segment. As resources are often located in challenging environments and require highly specialized and sizeable equipment to extract, the upstream segment is characterized by high risk and high capital intensity (Inkpen & Moffett 2011). A more elaborate review of the dynamics of the upstream O&G segment will be addressed throughout the remainder of the chapter.

The midstream segment involves the trading, storing, and transportation of hydrocarbons from the upstream producers to the downstream refiners. Due to its interlinking function, the midstream segment is often subsumed within the downstream segment and it is not unusual for independent O&G companies of either side of the value chain to integrate the midstream functions into their operations (Dale et al. 2014). As trading markets for oil and gas commodities has emerged the midstream segment has been highly commoditized, which has resulted in a marketplace for millions of diverse actors in the form of *"producers, traders, speculators, governments, regulators, and, ultimately, end customers"* (Inkpen & Moffett 2011, p.389). Ultimately it is the numerous transactions between such wide spans of different entities that set the prices of the commodities on a worldwide basis (Inkpen & Moffett 2011).

The downstream segment covers the refining and processing of crude oil and natural gas into end-products (such as motor and jet fuels, lubricant asphalts, chemicals, etc.), which are subsequently distributed and marketed to end-consumers. Refineries are trapped in a position between the increasingly competitive end-user markets and the highly volatile supply market of crude oil and natural gas. Being exposed to risks from two markets explains why the downstream segment has the weakest profit margins within the O&G value chain. As a consequence, integrated O&G companies have increasingly divested (and at best decoupled) their downstream business from their much more profitable upstream divisions (Dale et al. 2014; Inkpen & Moffett 2011).

Traditionally, oil companies were vertically integrated across the entire value chain, as transportation and refinery markets were highly undeveloped. In short, operational (i.e. vertical) integration was needed to ensure certainty for companies with high-risk and capital-intensive assets in a market that were not transparent. However, as oil and gas products have been commoditized through futures and forwards markets, and technological advancements have made it easier to collaborate across the value

chain, the historic benefits of being vertically integrated have slowly vanished. O&G companies could secure their products through the transparent and global trading marketplace, which due to its convenience made the prior dominating benefits of being vertically integrated obsolete. Subsequently, it became clear that fewer synergies could be achieved across the upstream, midstream and downstream segments due to their fundamental differences in business models and cost structures specifically (Dale et al. 2014; Inkpen & Moffett 2011; Stevens 2016). With such realization the traditionally large integrated O&G companies have increasingly focused their business around the more profitable upstream segment.

Due to the dissimilarities across the three segments, this thesis will be delimited to the upstream segment. Besides being the most profitable of the three segments, upstream deal-making tend to dominate the O&G M&A environment (Khartukov 2016). In our hope of making a modest contribution to the academic M&A literature we intend to add novelty through our choice of a sample, which is homogeneous enough to reveal possible drivers of post-merger performance, while also being global enough to offer applicability of findings outside the scope of the sample. We believe, the upstream segment within the O&G industry fits exactly into such characterization.

4.1.4 Key industry operators

Extracting oil and gas requires capital-intensive equipment, advanced technology and operating licenses, which underpins the advantages of realizing economies of scale, raises the barriers to entry, and ultimately limits the playing field to operators with access to wallets of a certain size. The main distinction of oil and gas operators can be made between the privately owned[3] International Oil Companies (IOCs) and fully- or partly state-owned National Oil Companies (NOCs). They share the access to the world's oil and gas reserves, are amongst some of the world's largest companies, and their entire existence are dependent on the availability of non-renewable resources, which due to their fossil nature eventually will be depleted (Dale et al. 2014; Forbes 2016). Beyond these similarities, the IOCs and NOCs differ significantly in their strategic objectives.

Integrated Oil Companies – often confused with International Oil Companies – are the largest privately owned oil and gas companies that are global in scale and vertically integrated throughout the entire value chain. This category include ExxonMobil, Royal Dutch Shell, BP, Chevron, and Total, and are often denoted 'super-majors' (Inkpen & Moffett 2011; Stevens 2016; Bagheri & Di Minin 2015).

[3] It should be noted that 'privately owned' companies refer to the distinction of companies that are *not* owned by governments. Such privately owned companies can represent both listed and unlisted firms.

Independent oil and gas firm – commonly referred to as Independents – share the same characteristics as the Integrated Oil Companies with the exception of being confined to a single segment within the value chain, i.e. upstream, midstream or downstream. Independents can be sizeable, such as Occidental, EOG and Anadarko, and are often specialized firms involved in more innovative and niche projects, geographies, technologies or products compared to the vertically integrated IOCs (Inkpen & Moffett 2011). For the sake of simplicity, the remainder paper will use 'IOC' to broadly denote all the privately owned O&G companies, whereas *super-majors* and *independents* will refer to the specific sub-groups.

Prior to the oil crisis in 1973, the global O&G market was subjugated by seven gigantic IOCs commonly referred to as the 'Seven Sisters' due to their dominant and unchallenged control of nearly *all* worldwide crude oil production and related activities (Stevens 2016). As IOC operations became successful, the resource-rich nations housing the operations of IOCs began to realize the potential of their underutilized reserves within their territories. Subsequently, OPEC (Organization of Petroleum Exporting Countries) was formed in retaliation and, to a large extent, constrained IOC access to national reserves to instead favor the national oil and gas companies (i.e. NOCs). Considering that access to reserves is the lifeblood of O&G companies, the preponderant market power has today shifted to the NOCs that control approximately 90% of world oil and gas (Stevens 2016; Inkpen & Moffett 2011; Davis 2006). Consequently, the Seven Sisters have consolidated to five super-majors.

Absent any auspicious ties to governments the survival of IOCs is therefore contingent on their ability to bargain access to reserves, which depend on their offering of a unique value proposition relative to the NOCs. Being subject to the challenges of resource nationalism since the 1970s, the IOCs have been forced to operate in challenging and complex environments that have promoted development of innovative and leading edge technologies, skilled employees and strong managerial capabilities. Contrastingly, their NOC counterparties have historically been operating in government regimes largely protected from forces of the free markets and often in environments of easy-access and conventional reserves. The competitive advantages of IOCs are therefore typically embedded in their access to capital as well as managerial, financial and technological capabilities, which their NOC counterparties historically have had trouble matching (Pirog 2007; Inkpen & Moffett 2011; Bagheri & Di Minin 2015).

As private companies, the ultimate owners of IOCs are shareholders, whose wealth needs to be maximized. Hence, IOCs are commercially driven and operate on the basis of market principles with the prime objective of maximizing profits (i.e. shareholder wealth) (EIA 2016; Inkpen & Moffett 2011; Stevens 2016). In contrast, the predominant objectives of NOCs are at large to improve their country's

economic efficiency and social welfare. Specific NOC objectives therefore include, but are not limited to, re-distribution of wealth from O&G to the domestic society and wealth creation in general, stimulation of employment, security of domestic energy supply and demand, and political negotiations with foreign entities and nations, which altogether make the NOCs inherently different from the market driven IOCs and Independents (Pirog 2007; Bagheri & Di Minin 2015). Since this thesis intends to measure the effect for acquirer shareholders following engagement in M&A we find it necessary to limit the study to the profit maximizing IOCs, as the measurement of shareholder return requires the company to be publicly listed – this is not the case for NOCs.

Since the mid-2000s, a movement of Global NOCs (GNOCs) has emerged and entrenched a powerful position within the global O&G market. GNOCs are previous state monopolies that increasingly are being privatized and internationalized to compete globally with the more advanced IOCs and Independents. Partly adapting to commercial market mechanisms, relative to the NOCs, the GNOCs take greater strategic and operational autonomy, are expanding their scope to vertically integrate across the entire value chain, and acquire or develop competencies similar to those of IOCs. The mixture of holding privileged access to national reserves while increasingly being in possession of leading edge competencies, leave the GNOCs in highly favorable competitive positions that have proven to pose a serious threat to IOCs (EIA 2016). Examples of successful and profitable GNOCs are Statoil (Norway), Petrobras (Brazil) and Petronas (Malaysia) (Bagheri & Di Minin 2015; Inkpen & Moffett 2011).

4.1.5 Uniqueness of the industry

The Oil and Gas Industry is truly global, unique and complex in nature. It is one of the world's biggest industries in terms of dollar value, constitutes approximately 10% of world, make a significant contribution to national GDPs of the resource-rich nations, and directly and indirectly employs millions of workers worldwide trade (Caiazza et al. 2013; Inkpen & Moffett 2011). Therefore, on a worldwide basis, the global O&G industry can be considered a significant contributor to society wealth creation. Nevertheless, such upsides come at the cost of complexity and rigidity, which makes the industry particularly challenging to operate within. Specifically, *"the oil and gas industry is a cyclical, high-risk, and capital-intensive business segment that requires flexibility and the ability to make difficult choices"* (Deloitte 2016, p.2). Furthermore, the competitive positions of IOCs are particularly challenged by the market power of oil nations and NOCs. The following sub-sections will briefly review each of the unique characteristics and challenges facing IOCs to enable a profound understanding of the underlying industry dynamics.

4.1.5.1 Cyclicality

Despite short-lived periods of prosperity, the average profitability of the upstream industry is trivial, as major slumps tend to absorb the upswings (Inkpen & Moffett 2011). The industry profitability is indeed volatile, which can be attributed to the fluctuating energy prices that translate directly to the bottom-line profits of O&G firms. The oil and gas prices fluctuate in highly unpredictable cycles, which necessitate a high level of organizational and financial robustness of O&G companies in order to remain profitable in times of busts. Accordingly, scale and operational diversification (e.g. through several geographical locations) has often been driving competitive advantages within the industry. Historically, the general belief has been that a slump in prices eventually would be followed by an increase. Specifically the concept of cyclicality predicts that a decrease in O&G prices will be followed by a simultaneous increase in demand and decrease in supply (i.e. excess demand), which eventually will drive up prices. While the industry is cyclical in nature, the length of each cycle has been highly fluctuating and thus nearly impossible to predict. Thus, in times of price slumps, the larger and more robust O&G firms have often exploited the opportunity to acquire the distressed and hence under-valued smaller O&G firms that could not withstand the down-cycle, with the faith of prices eventually rising and driving up the value of the acquired assets. Subsequently, triggered by the swings in energy prices, a wave-like pattern can be observed in the M&A activity of the O&G industry (Inkpen & Moffett 2011; Stevens 2016; Dale et al. 2014; Ng & Donker 2013a).

4.1.5.2 High risk

The exploration and production of O&G is a highly risky business. Physically, it involves enormous machineries, which can cause severe damage to workers and the environment if not handed cautiously. Furthermore, hydrocarbons are often located in reservoirs across countries all over the world and therefore expose upstream companies to risks such as geopolitical instability, regulatory uncertainties, exchange rate fluctuations, and resource availability (Oracle 2011; Eni 2013). Lastly, the depleting base of oil and gas reserves tends to escalate such problems. Specifically, reserves are progressively depleting in market-oriented regions such as the US, Canada, UK and Norway, which increasingly push IOCs to operate within other resource-rich nations. As these are often located in the Middle East, Latin America, and other OPEC countries the amount and types of risks faced by O&G operators intensifies as they expand operations to such countries (Mohn 2008). Furthermore, as the easy-access reserves are either being depleted or constrained access-wise due to intensified resource nationalism, companies must search for oil and gas in more challenging environments (such as offshore), which impose greater operational risks on the O&G firms (Inkpen & Moffett 2011).

4.1.5.3 Capital-intensity

The O&G industry is a highly capital-intensive industry, as the entire productive output depends on gigantic and expensive equipment, land and buildings demonstrated by particularly high fixed assets (Ng & Donker 2013a). Furthermore, as reserves depletion is increasingly prevalent and companies are forced to look to more risky and expensive operation possibilities, the need for capital becomes ever greater. To ensure uninterrupted operations and robustness to extreme industry cyclicality the availability of capital is vital. Consequently, *"oil and gas firms must continually compete for capital from global markets"* (Inkpen & Moffett 2011, p.299) and are therefore often financed by high degrees of debt and equity capital. Arguably, *"large-scale capital-intensive opportunities (...) could be more easily capitalized by a large merged entity than any stand-alone company"*(Caiazza et al. 2013, p.229).

4.1.5.4 Increasing state power, market domination by NOCs and fiscal regimes

Housing the majority of the world's oil and gas reserves, the resource-rich nations and their NOCs have transitioned to becoming the industry dominants. The dominance of operators that do not conform strictly to market principles but rather are being privileged with access to the scarce resources (i.e. NOCs) makes it ever harder for the IOCs to appropriate a share of the worldwide oil profits. Furthermore, to even explore a field for oil and gas reserves, IOCs have to obtain licenses through negotiations and bidding rounds with the host country governments. The contractual arrangements through which all licenses are granted are called fiscal regimes, and specify how the oil profits are split among government and operator. As the government typically owns and controls the reserves located in their respective reservoirs, the government appropriates a sufficient share of the oil profits through royalties, income and oil taxes, and signature bonuses. Typically this is at the expense of sharing risks, such that IOCs can recover their capital expenditures. While the fiscal regimes can provide a stable source of income to IOCs, due the mitigation of risk, the regimes have in recent years become more progressive and restrictive, as the resource depletion work in favor of the bargaining power of the states. With this intensified resource nationalism and foreign investment restrictions, O&G companies without roots in oil-rich countries need to focus on other key capabilities to remain competitive. A typical response of O&G companies has been to either grow organically or inorganically (i.e. through M&A) to reach a size and access certain capabilities that would provide sufficient countermeasures to the large national players. Without access to oil and gas reserves an upstream company cannot survive (Inkpen & Moffett 2011).

To summarize, the O&G industry is a challenging market place that despite accommodating some of the world's most valuable companies is characterized by only mediocre average profitability and tough market conditions. As mentioned above, specific features of the industry make it a very difficult arena to succeed in and require organizational, financial and operational robustness. One way of achieving such resilience is to grow larger through consolidation, which enables a company to spread the high-risk operations over a wider base of assets.

4.1.6 Value drivers and energy prices

It is commonly known and widely accepted among scholars and practitioners that energy prices, to a large extent, drive the value of O&G firms (Boyer & Filion 2007; Sadorsky 2001). High oil prices increase the profits from current production and the amount of proven reserves O&G firms can record on their books[4], which thereby improves the value of the firm. Boyer & Filion (2007) investigate the sensitivity of Canadian O&G acquirers' financial performance (measured as stock return) relative to five common factors, including commodity prices (oil and natural gas). They find statistical significant evidence for a positive correlation between the excess[5] stock return of Canadian O&G firms and the crude oil and natural gas prices respectively (Boyer & Filion 2007). Therefore, energy prices can be said to drive the value of O&G firms. Interestingly, energy prices must be considered an exogenous factor that cannot be controlled; "*A particularity of the oil and gas firms is that most of their value is driven by the price of the commodity they produce, a price upon which no firm has any impact"* (Boyer & Filion 2007, p.449). The profitability equation therefore leaves it to the increase in quantity or reduction in costs for O&G companies to drive forward value and enable the achievement of a competitive advantage. The following sub-sections will review the main drivers of O&G companies' value and competitive advantages.

4.1.6.1 Costs

As upstream O&G companies have little control of the commodity prices (i.e. price takers), a key to achieving a competitive advantage in the industry is through efficient cost management. Some reserves are more easily accessible and hence cheaper to produce than others, which have resulted in fragmented markets with very different production costs (see Figure 5) and break-even prices (i.e. the minimum price of crude oil or natural gas required to reach a NPV of zero). Whereas companies in Saudi Arabia with conventional on-shore reserves face production costs of approximately USD 2/bbl[6] and break even at approximately USD 10/bbl, Canadian oil sands producers produce at a cost of more than USD 25/bbl

[4] Reserves can only be recorded on the books if the production revenue can cover the costs.
[5] Excess return over the risk free rate, measured as the 1-month T-bill rate (Boyer & Filion 2007)
[6] bbl = barrel of oil

and require a price of USD 50/bbl to make a profit (Inkpen & Moffett 2011). Consequently, the competition and market mechanisms within the upstream sector are skewed and signify a challenging environment for privately owned upstream O&G companies.

Figure 5: Production costs by producing region

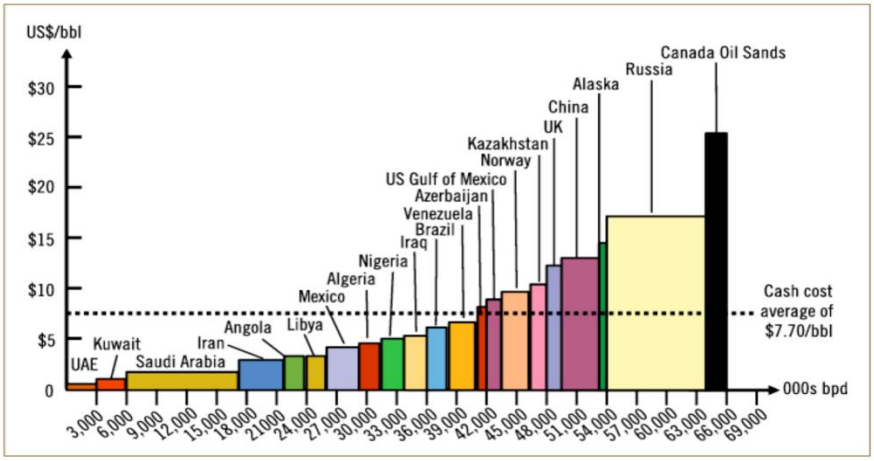


Figure 5–2. Production costs by producing region
Source: Constructed by authors using estimated cash costs per barrel from Deutsche Bank (2009) and region production levels for 2008 (BP Statistical Review). Cash costs = operating costs + royalties.

Source: Inkpen & Moffett 2011, p.177

To attain efficient cost management, O&G firms can drive downs costs either through economies of scale, economies of scope or outsourcing. In terms of cost management, *scale* economies can (1) enable an O&G firm to acquire more advanced equipment, which could reduce production and labor costs, and (2) when exploited within an existing basin, allow for the sharing of fixed costs required to operate and maintain the assets within such basin. The most noteworthy scope economies achievable to upstream O&G firms are the geographic expansion of operations, which enables for spreading of costs, risk (operational and political), people and resources. Furthermore, scope economies enables knowledge transfer and faster movement along the learning curve, which can increase the efficiency of the company's portfolio of assets (Inkpen & Moffett 2011). While cost advantages can be achieved organically, the same advantages can often be reached quicker and just as efficiently through M&A or joint ventures. Accordingly, several takeovers within the industry have been driven by the pursuit of obtaining scale and scope advantages (Baaij et al. 2011).

4.1.6.2 Production and reserves

A distinction can be made between *production* and *reserves*, the latter which is considered the 'lifeblood' of the O&G industry (Inkpen & Moffett 2011). Whereas production is a tangible amount that

is *currently* being produced, reserves are the *expected* volumes of hydrocarbons to be recovered from a defined oil and/or gas field (Wood Mackenzie 2017a). Current production drives current revenues and proved reserves are indicating the future profitability of the upstream O&G firm. However, only by replacing existing reserves with new ones – a skill which is termed *reservoir management* – can the upstream business grow. Reservoir management is therefore one of the key value drivers within the upstream segment. Unfortunately, the volumes and quality of proved reserves are extremely difficult to determine and audit, as it requires technical expertise and tons of information about resources hidden several thousands of feet below ground. Furthermore, reserves can only be recorded on the books if the production revenues – which are determined directly by oil and gas prices – can cover the costs (i.e. if it is economically feasible to produce). Therefore, with highly fluctuating and unpredictable commodity prices, the future profitability of upstream businesses is extremely difficult to determine and possess a high degree of uncertainty (Inkpen & Moffett 2011). The more complex the conditions the harder it is to estimate the reserves correctly (i.e. more difficult to estimate proven reserves for offshore- than onshore projects).

With the conventional and easy-access reserves being increasingly depleted and progressively subject to national expropriation, the global playing field for IOCs is becoming ever more uncertain, costly and difficult to navigate. The fact that most IOCs do not hold exclusive (or privileged) access to such easy-access reserves implies that they are facing different competitive pressures than that of NOCs. Specifically, the IOCs have to develop innovative methods for extracting and utilizing the few resources available, which is costly. Therefore, it can be argued that indeed technology, efficiency of processes, and organizational excellence are some of the capabilities that enable one IOC to distinguish itself from other non-NOC competitors and thereby achieve a competitive advantage. *"One possible solution would be to seek a merger or takeover of service companies that have already developed that (technological advantage) competitive edge"* (Stevens 2016, p.36). The obtainment of advanced and innovative technologies would provide room for efficiency improvements, which could both increase production and reserve recoveries as well as allow for cost reductions (Inkpen & Moffett 2011).

4.2 M&A in the global upstream oil and gas industry

The O&G industry has a long history of intense M&A activity. Consolidations have to a large extent enabled the industry to survive intensified competitive pressures from resource-rich governments and their NOCs, oil price shocks and the evolution of innovative and disruptive

technologies such as fracking. This section will review the M&A history of the O&G industry and briefly touch upon the limited existing M&A research applicable to the industry.

4.2.1 M&A through the history of oil and gas

The super-majors have been criticized of having a 'tendency to consensus', where the oligopoly-like market with domination of a few large companies tends to set the agenda through the pursuance of similar strategies and investment decisions (Stevens 2016). This is evident through the history of the industry's merger waves, where companies (perhaps irrationally) have responded with similar strategic actions to industry shocks. Baaij et al. (2011) and Dale et al. (2014) build models that show the chronological development of the O&G industry through what is denoted industry *regimes*. Each regime is more or less initiated by an industry shock, which causes industry restructuring. M&A has been a main driver in enabling such restructuring, and the regimes can therefore be considered proxies for identifying the timing of O&G merger waves. The following sub-sections will review each of the industry regimes from 1986 till present time. As a highly global industry, the characteristics of the O&G regimes closely follow that of the global merger waves (Section 3.1).

4.2.1.1 Diversification and the reserves access regime

The real power of OPEC was first realized in 1973, when the cartel dramatically reduced supplies of its producer nations, and oil prices as a consequence skyrocketed (Dale et al. 2014). For IOCs this meant an enormous increase in oil profits, but similarly it was realized that the hasty nationalization of reserves would be problematic. To maintain satisfactory growth rates, oil companies pursued investment opportunities in non-OPEC reserves as well as beyond their industry borders. Subsequently, O&G companies followed each other's footsteps and evolved into diversified conglomerates through a spree of acquisitions reaching into neighboring energy sources, such as coal and nuclear, mining, and even highly uncorrelated industries such as hotels, where the managerial capabilities and understanding of markets were few (Stevens 2016; Cibin & Grant 1996).

4.2.1.2 The efficiency focus regime

In 1986, oil prices plummeted as a consequence of economic recession and excess oil production, which brought an end to the conglomeration wave. With greater reliance on capital markets, the pressure to deliver sufficient shareholder returns was leading the direction of oil companies. Subsequent to efficiency pressures, a major wave of divestments occurred to dilute unprofitable assets and re-focus on the core O&G business, where distinctive competences could be exploited (Cibin & Grant 1996). For the vertically integrated IOCs, the divestment of assets included the release of the unprofitable downstream assets (Dale et al. 2014). Furthermore, the drop in energy prices led to an M&A wave as

companies pursued cost reductions, operating synergies and organizational efficiencies through economies of scale (Caiazza et al. 2013). Some of the most noteworthy takeovers ("mega-mergers") of the second M&A include: Exxon-Mobil, Chevron-Texaco, Phillips-Tosco, Conoco-Phillips, and several major BP acquisitions (Caiazza et al. 2013; Evans et al. 2016).

4.2.1.3 The production focus regime

With increasing demand from emerging markets and reserves that became ever more difficult to access, oil prices started to rise around year 2002, which triggered a new M&A wave (Dale et al. 2014). As little room was left for O&G companies to reduce costs, growth was instead sought through the expansion of reserves and production. As prices rose to exorbitant levels there was a general belief that high prices and demand were considered as given, which strengthened confidence in O&G deal-making and resulted in large-scale expansions across reserves and geographies. Through M&A, the industry largely consolidated to create even higher barriers to entry for competitors and increase industry profitability (Caiazza et al. 2013; Dale et al. 2014; Stevens 2016).

4.2.1.4 Post-2008 and revolutionizing technologies

The production focus regime was brought to a halt in 2008 with the occurrence of the worldwide financial crisis, which put a damper on energy prices and demand. Meanwhile, the discovery of fracking technologies and commercial development of new and unconventional hydrocarbons (i.e. shale oil and gas) radically changed the conventional playing field by introducing new and more specialized actors. O&G companies increasingly re-focused on efficiencies demonstrated through further cost reductions, divestment of unprofitable assets (many IOCs subsequently de-internationalized), and focus on capabilities that would allow for distinction from the increasingly powerful and competitive (G)NOCs. Subsequently, oil prices and M&A activity picked up in 2010-2011.

4.2.1.5 The rise of a new merger wave?

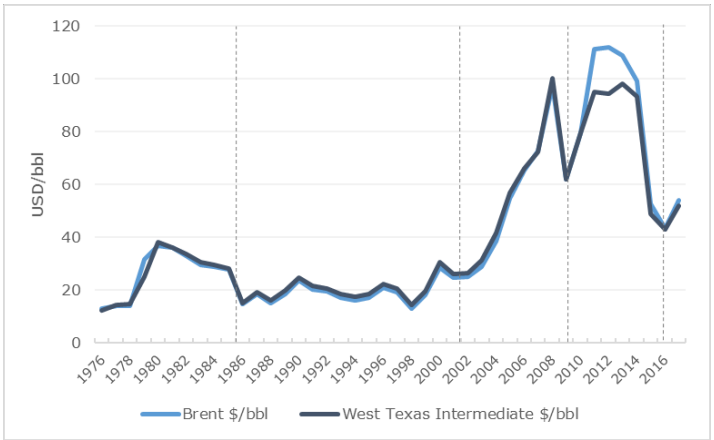
When oil prices dropped in 2014 it was by many expected that deal activity would intensify, as acquirers would look to buy cheap and distressed targets. However, the instability of the price environment with prices that continued to drift, OPEC that could not seem to reach internal consensus, and the unwillingness of the world's oil and gas producers to cut production, left investors and managers in a limbo: acquirers were afraid of buying too high if prices were to fall further and targets were reluctant to sell at the prices offered by acquirers, if the prices were to rise. Subsequently, merger activity hesitated. In 2015, Shell acquired BG in the first mega-merger (deal value of approximately USD 50 billion) seen in a decade, which possibly can be perceived as an indicator of revitalized confidence in upstream deal making. Increasingly, as oil prices appear to have leveled, there seems to be

consensus that the oil price will remain 'lower for longer' (Evans et al. 2016; A.T. Kearney 2016; Deloitte Market Point 2016; IEA 2015). As argued by industry experts; *"Spend on M&A has soared back close to all-time highs in the last six months. Self-help by companies in adapting to lower oil prices has been a big factor in restoring confidence and access to capital markets - and putting business development back in the front line"* (Wood Mackenzie 2017b). Subsequently, M&A activity in the upstream O&G sector seems to be picking up its pace and might be indicating the beginning of a new merger wave (Evans et al. 2016; Fortune 2015; DiChristopher & Schoen 2016).

4.2.2 Triggering O&G M&A activity

As evident through the takeover history of the O&G industry, the movement in oil and gas prices seems to have been the major trigger of industry-related M&A activity (see Figure 6). Indeed a recent study by Ng & Donker (2013a) has evidenced a statistical significant relationship between energy prices and M&A activity within the O&G industry. Subsequently, it becomes prevalent to raise the question of whether heightened M&A activity is followed by an increase in performance of the engaged entities or whether it is merely representing irrationally driven behavior by the arguably consensus-seeking O&G firms (Stevens 2016). Thus far, while M&A research within the O&G industry is limited, scholars have been unable to identify a link between energy prices and takeover performance of acquirers (Ng & Donker 2013a; Ng & Cox 2016). While much research has investigated the drivers of M&A *activity*, more investigation is necessary to reveal whether *value* is indeed created from highly active takeover market within the O&G industry, and which factors are driving such potential value.

Figure 6: Crude oil price development and M&A regimes



Source: own contribution with data from DataStream; model inspired by Baaij et al. (2011) and Dale et al. (2014))

Notes: the figure shows the oil price development for the two most commonly traded crude oil benchmarks, Brent and West Texas Intermediate (WTI). The dotted vertical lines indicate the *approximate* timing of industry regimes and subsequent increases in M&A activity. Evidently, oil price shocks seem to trigger M&A activity in the O&G industry.

4.3 The future of the O&G industry

In recent times the O&G industry has received much attention from non-practitioners concerning its environmental impact, sustainability of O&G production and consequences of the changes in the O&G price behavior.

4.3.1 Threat of substitutes

When speaking O&G these days one cannot avoid addressing the concerns of seemingly intensifying threats from the substitute renewable sources of energy. Although renewables (including wind, solar, geothermal, biomass and biofuels) are gaining popularity and experiencing impressive growth rates, they are expected to constitute just 4-10% of the world's energy consumption by 2035-2040 (BP 2017; ExxonMobil 2017). Rather, the world's current prevailing sources of energy are unequivocally oil, coal and gas. As a consequence of the general, and in particular China's (the world's largest coal consumer) shift in fuel mix from coal towards renewables and natural gas, the coal industry is facing sharply slowing demand, represented by the coal industry's lowest market share (29.2%) of world primary energy consumption to date since 2005 (BP 2016). In fact, gas is expected to take over coal to become the second-largest source of fuel by 2035 (BP 2017). Contrastingly to coal, oil has increased its global market share to 32.9% in 2016, which is the first gain for the industry since 1999 and enables oil to maintain its current position as the world's single most dominant source of energy (BP 2016). Considering current and projected future market share of primary energy consumption, studies show that the embeddedness of oil and gas in the world's energy consumption will continue to persist through at least the next 15-20 years, making oil and gas the most dominant sources of energy to power our modern societies for the foreseeable future (BP 2017; ExxonMobil 2017; IEA 2016b). With that being said *"the fossil-fuel industry cannot afford to ignore the risks that might arise from a sharper transition"* (IEA 2016b).

4.3.2 Oil prices - 'Lower for longer'?

> *"The current low oil price environment is not an 'oil bust' that will be followed by an 'oil boom' in the near future. Instead, it looks as if we have entered a new normal of lower oil prices that will impact not just oil and gas producers but also every nation, company, and person depending on it"* (Hartmann & Sam 2016)

Since the drop in oil prices in June 2014, many scholars and practitioners have debated whether the price behavior merely reflects an expectable down cycle or instead represents a fundamental change in

the industry's underlying dynamics resulting in a new perpetual level of low oil prices – a scenario which has come to be known as 'lower for longer' (Evans et al. 2016; A.T. Kearney 2016; Deloitte Market Point 2016; IEA 2015). Stevens (2016) propose three underlying reasons why new price dynamics might reflect a break with the historic notion of industry cyclicality. Recall that cyclicality is characterized as a decrease (increase) in oil prices that would cause a parallel increase (decrease) in demand and decrease (increase) in supply, which eventually would result in excess demand (supply) and cause prices to increase (decrease). Firstly, the discovery of fracking technologies to commercialize shale oil and gas has arguably changed the price elasticity of supply. Whereas conventional O&G producers require several years to redirect or re-scale production, the shale O&G producers can do so within a couple of months. Consequently, as O&G demand starts to increase in reaction to a price decrease, the shale O&G producers can quickly respond by increasing supply and thereby satiate the supply-demand imbalance much faster than previously. As a result, the volatility in oil prices would stabilize. Secondly, due to imbalances within OPEC and an oil price that has been low for long, the resource-rich nations are currently particularly distressed, as oil profits often constitute a large proportion of the GDP of these nations. Following the price slump in 1986, some nations (e.g. Mexico) opened up their reserves regimes to IOCs in an attempt to attract investments and subsequent oil profits. If the low oil prices remain, some resource-rich nations might be prone to pursue such strategies yet again. Doing so would attract IOCs, increase supply and consequently contribute to a downward pressure on oil prices due to even further excess supply. Lastly, with pressures to de-carbonize the world economy, several countries are reducing subsidies and increasing sales taxes on oil products. Therefore, the current low level of *crude oil* prices might not translate into lower oil *product* prices and therefore not cause the same increase in demand as typically seen throughout the industry's cyclicality. Altogether, the three arguments could suggest that the O&G industry is transitioning into a new era of 'lower for longer' oil prices, where cyclicality might not be as extreme as what has been prevalent throughout history.

CHAPTER 5 | **Hypotheses**

Our research question, as presented in the introduction, seeks to examine whether overall value creation can be detected for acquirers following the engagement in an acquisition, and to what extent certain firm- and deal-specific characteristics drive and influence such value. To best answer such a question, this chapter will develop a set of hypotheses that directly guides the consequent empirical research. All hypotheses are constructed based on the prior empirical M&A research and O&G industry dynamics. While many firm- and deal-specific characteristics remain interesting to explore in the context of M&A, we have narrowed it down to six specific characteristics that are hypothesized to influence value creation in the O&G sector. Some of the variables we have excluded are: relative size of acquirer and target, deal values, number of reserves, M&A strategies, the oil price. As argued by Lubatkin (1987, p.50): *"No study however is both generalizable and totally accurate; trade-offs must be recognized between the representativeness of the results and the confidence in them"*. Therefore, we have narrowed down our hypotheses to include the characteristics assumed to (1) have the highest relevance for the chosen industry and (2) encompass those variables identified by scholars to have a clearly evidenced impact on value creation.

Special consideration was given into the oil price as a potential driver of M&A value creation given its enormous importance for the industry as such. Specifically, it is widely known that energy prices to a large extent drive the value of O&G firms (see Section 4.1.6) (Boyer & Filion 2007; Sadorsky 2001). Nevertheless, as will be explained in the regression methodology section, we measure value creation as a firm's stock return relative to an industry benchmark. Therefore, as the entire industry arguably is affected by the energy prices, the behavior of these prices can be expected priced into the calculation of expected normal returns constructed exactly from this industry index. Furthermore, as energy prices are publicly known for all entities prior to and upon announcement of a takeover, their effect is likely already priced into the valuation of the target. This limits the effect the level of the energy prices would have on acquirers' abnormal performance. Additionally, Ng & Donker (2013a) and Ng & Cox (2016) investigate exactly these effects energy prices may have on acquirer abnormal performance for O&G firms and find no significant correlation. Consequently, the above discussion leads us to exclude the hypothesis that the oil price is an influencing variable on acquirer M&A value creation.

The following sections will present the stated hypotheses.

5.1 Overall value creation

As mentioned in the literature review, overall findings on value creation for acquirers are mixed. On *average* shareholders of acquiring firms seem to experience a slightly significant positive return in the short-term, whereas long-term effects on average are predominantly negative or at best insignificantly different from zero (Bruner 2004; Martynova & Renneboog 2008; King et al. 2004). The inconclusive findings contrast the apparent popularity of M&A over the past merger waves. Scholars argue that studies examining overall value creation across countries, industries, sample periods, takeover types, and value measures arguably suffers from biases of over-generalization and fails to recognize the level of uniqueness assigned to each merger (Lubatkin 1987; Bower 2001; Meglio & Risberg 2010). The mere action of compiling findings and reporting 'overall' value generalizable for all deals conducted at any time in any country and industry can hence be the very reason that scholars in the M&A literature are challenged in reaching viable conclusions. There seems to be no one average M&A and we therefore believe it remains relevant to (re)consider the value impact M&A may have for acquirers in the upstream O&G industry. Arguably, the commonalities shared among companies within an industry provide a contingency from which findings more reasonably can be 'averaged'.

For the O&G industry specifically, empirical findings are limited and those that exist are rather recent and unchallenged. Two recent studies of O&G firms found cumulative abnormal return for Canadian and American acquirers respectively to be significantly negative for several short-term event windows within the time period 1990-2008 (Ng & Donker 2013a; Ng & Cox 2016). The findings are justified based on the assumption that O&G firms engage in M&A activity with the primary reason of expanding their reserves, which arguably *"amounts to lower post-M&A risk for acquirers to justify negative takeover performance"* (Ng & Donker 2013a, p.171). However, based on our industry review, we contend that the argumentation of these studies are too one-sided and believe a more elaborate consideration of the underlying value of reserves expansion is necessitated. Furthermore, we argue that other essential M&A drivers exist for O&G firms.

In general, we believe O&G practitioners engage in M&A in the pursuit of some underlying value, which arguably is driven by synergies not limited to reserves expansion. While reserves are driving the bottom line profits of O&G firms, they are not in themselves reasons to believe that abnormal value creation will be achieved, as their value will already be reflected in the price paid for the target (i.e. cancel out the measurable benefit). Rather, abnormal value creation from M&A should be revealed from possible synergies, where the combination of two firms is greater than the sum of its parts (i.e. 1+1=3).

Such synergies *could* include scale economies and subsequent cost reductions (e.g. reduced spending on expensive exploration costs and overhead costs), tax and depreciation benefits (Ferguson & Popkin 1982), greater operational efficiencies and technologies (e.g. turnaround of less efficient targets with access to lucrative reserves), potential operational synergies if plants of merging firms are closely located, greater value of combined capabilities, and relationship exploitation with relevant external stakeholders.

The increasing market power of NOCs, which is strengthened by the increasingly depleted base of world reserves, creates a tougher market place for IOCs to operate in. The fact that new reserves are more inaccessible and oil and gas more expensive to extract, places even higher competitive pressures on IOCs. We argue that IOCs can mitigate such pressures through the obtainment of increased operational scale and advanced technologies, which *can* be distinctive sources of competitive advantages in the O&G industry. Increased scale (e.g. reserves expansion), and thus a larger capital base, would by definition allow for greater robustness against the severe O&G industry cyclicality. Subsequently, it might be argued that governments could be more inclined to grant operating licenses to such companies with greater endurance and capital, as this would to a higher extent secure stable energy profits and supply to the country[7]. Furthermore, it is commonly known that a critical mass is required to operate within the O&G industry (Inkpen & Moffett 2011). M&A is an alternative that can often more quickly increase such scale and the number of proven reserves. Ever since the creation of OPEC, IOCs have responded by consolidating. This is most notably demonstrated by the move from the Seven Sisters to the five enormous super-majors, which thereby supports the notion of scale advantages for O&G firms achieved through M&A. Lastly, we want to highlight that competitive advantages can be achieved through proprietary ownership of advanced technologies, which can reduce operating costs and/or increase the ability to discover or extract resources more efficiently than competitors. However, such advanced technologies can be difficult and time-consuming to develop internally. As resource-rich nations and NOCs are known to increasingly be collaborating with IOCs with technologies highly superior to their own, the acquisition of an O&G firm with leading-edge technologies by another IOC could be value creating in allowing for a possible future collaboration with the reserve-rich nations.

We argue that M&A can be one solution to becoming a more competitive company, as it possibly enables the reinforcement or establishment of a distinct competitive advantage. Acquiring another O&G

[7] Recall that IOCs need to be granted access through licenses to operate the reserves of the resource-rich nations. Such licenses are granted through peculiar fiscal regimes, where the host government appropriates a sufficient share of the oil profits through royalties, income and oil taxes, and signature bonuses (Inkpen & Moffett 2011).

firm for the purpose of scale efficiencies, new reserves and/or advanced technologies could increase the strengths and robustness of the combined firm and better enable it to operate in the competitive and cyclical industry. Such improvements will be expected to drive value creation. As outlined in the introduction, companies should ideally use M&A as a strategic tool for growth and performance improvement. Observing a continuous increase in the amount of M&A activity within the industry in itself makes us believe this is in pursuit of some underlying value, which is yet undiscovered by scholars. With all the above arguments related to the O&G industry and general M&A evidence, we therefore hypothesize that M&A create value for shareholders of acquiring O&G firms.

With that being said, we however posit that the magnitude of the value creation accrued to acquirers might not be enormous. Being highly confined to large fixed, tangible and often locational bound assets, it can be argued that operational synergies can indeed be difficult for O&G companies to obtain. Whereas the reproduction of *intangible* assets (e.g. R&D) knows few limits, tangible assets (such as oil rigs, drilling equipment, etc.) can only produce as much and will furthermore depreciate in value over time. Therefore, we hypothesize that there is a limit to the upside of the potential operational synergies accrued to O&G acquirers compared to more knowledge-based industries.

As argued by several scholars different dynamics apply to short- and long-term investment horizons. In terms of methodology, it is indeed more difficult to isolate the effect of a single event (M&A) due to the occurrence of overlapping events. Even though we theoretically would expect to see value creation from M&A, there is strong evidence among general M&A literature that M&A effects for acquirers in long-term studies are value destroying. While this may be attributed to methodological issues, we find it relevant to test whether the same results apply to the O&G industry. Furthermore, we only expect a small abnormal return to O&G acquirers in the short-term study, which we do not consider substantial enough to cancel out the strong evidence of negative long-term returns. Consequently, the above discussion results in the following two hypotheses concerning short-term and long-term overall value creation for acquirers:

Hypothesis 1a: Short-term abnormal return from M&A is positive for the acquirer

Hypotheses 1b: Long-term abnormal return from M&A is negative for the acquirer

5.2 Upsurge in merger waves

Harford (2005) and Martynova & Renneboog (2008) argue that merger activity, and more specifically merger waves, are triggered by specific industry shocks that require large scale reallocation of assets. Mergers often facilitate change to the new industry environment. Such patterns are well documented throughout history, where the six completed merger waves, as presented in the literature review, all coincides with economic, political and regulatory changes. Harford (2005) and Bhagat et al. (2005) further investigate the total value creation effect depending on the timing of the M&A in relation to waves. Both studies find that value gains (accruing to either target and/or acquirer) from M&A during the upsurge of a merger wave are significantly higher than the corresponding gains in periods outside a wave upsurge. Moreover, the studies suggest that the highest M&A performance is realized in the beginning of takeover waves. Such timing effect is possibly related to the concepts of *hubris* and *herding*, which suggest that initial successful takeovers in waves may be followed by inefficient and irrational mere imitators.

The O&G industry has lived a strong history of industry restructuring, often initiated by oil price shocks. In order to obtain the necessary scale and financial robustness to survive the continuously reoccurring industry shocks, O&G firms have relied on M&A as important survival mechanisms – exemplified by the consolidation from the Seven Sisters to the five super-majors. Hence, history continues to confirm that O&G companies must stay agile in their strategic decisions. For O&G firms with enormous fixed asset ratios and longitudinal investments that take time to materialize, the agility requirement seems paradoxical. Furthermore, whereas cyclicality is a fact for the O&G industry, the timing of such is unknown. Therefore, only the most agile (or lucky) O&G firms are able to successfully respond in a timely manner to industry shocks. This is often pursued through M&A. Contrarily, firms wishing to engage in M&A successively might suffer from second-mover disadvantages with absence of attractive targets to acquire or simply too little time to respond to the disruptive forces of the industry shock. Consequently, M&A in the beginning of a merger wave (i.e. upsurge) can be argued – also in the O&G industry context – to perform better relative to M&A occurring outside merger wave upsurges. The combination of findings from existing M&A literature and industry dynamics thus results in the following hypothesis:

Hypothesis 2: M&A occurring in the upsurge period of a merger wave create more value for the acquirer relative to M&A occurring outside the upsurge of a merger wave

5.3 Cross-border relative to domestic deals

The proportion of cross-border transactions has increased considerably in the past few merger waves, reaching 36% of global deals in 2016 (JP Morgan 2017). However, as presented in the literature review, empirical research on cross-border acquisitions remains limited. Still, it may have a noteworthy impact on M&A performance, as the nature of cross-border M&A has different underlying strategic rationales than domestic M&A. Specifically, cross-border M&A posits special opportunities including potential for new market growth, acquisition of new capabilities or resources not available in the home country, risk reduction due to geographical diversification etc. Nevertheless, cross-border mergers also involve novel obstacles compared to domestic deals, such as differences in regulations and tax systems or higher post-deal integration difficulties due to cultural differences. Consequently, cross-border M&A can be more complicated than domestic deals to successfully integrate post-acquisition. The few existing academic studies on the topic have produced inconclusive results with some authors finding cross-border M&A to create higher performance than domestic acquisitions, and others the complete opposite. This inconclusiveness might be explained by different geographies of the studies' underlying samples, which calls for further investigation (Goergen & Renneboog 2004).

The upstream O&G industry is to a large extent shaped by the natural limit of reserves – i.e. there is only so much oil in a basin or country – and O&G firms must consequently operate where the oil is (Kang & Johansson 2000). The wealth of an O&G firm is highly dependent on revenue from extracted resources (i.e. production), extraction costs, and the remaining reserves in the portfolio of the firm. Therefore, in order for O&G companies to meet their growth and cash flow objectives a sustainable reserve replacement ratio must be achieved through continued investment in replenishment and discovery of reserves (Ng & Donker 2013a; Ng & Cox 2016). As O&G reservoirs are only located in specific regions of the world, O&G firms can often only sustain sufficient reserve replacement ratios by operating in several geographical locations, i.e. cross-border. The greater degree of firm internationalization might be perceived positively by investors, as it signals that the firm is looking for the best possible target to meet their growth objectives, rather than the closest target available for sale domestically. Additionally, Kang & Johansson (2000) note that cross-border deals will result in the spreading of political and financial risk. Therefore, we state the following hypothesis:

Hypothesis 3: Cross-border M&A create more value for the acquirer relative to domestic M&A

5.4 Size of acquirer

The size of the acquirer can possibly have an effect on the M&A value creation; and the topic is often controlled for or examined in academic literature on M&A (Lubatkin 1987; Ng & Donker 2013a). Specifically, several studies have found robust evidence of a size effect, where larger acquirers experience lower CARs (Faccio et al. 2006; Loderer & Martin 1990); or similarly, where smaller acquirers experience significant higher abnormal returns (Moeller et al. 2004). Moeller et al. (2004) provide evidence that managers of large firms pay more for acquisitions. They find that the premium paid increases with firm size after controlling for firm- and deal-specific characteristics. As argued by several scholars *"generally, the incentives of managers in small firms are better aligned with those of shareholders than in the case in large firms"* (Moeller et al. 2004, p.203). Consequently, large firms might be more prone to overpay and go through with an acquisition even if it results in shareholder value losses. Hence empirical evidence suggest that large firms could be expected to generate less value creation following M&A.

Contrarily, Kang & Johansson (2000) discuss the importance of economies of scale in the O&G industry and suggest that there may be a case for positive size effects in O&G M&A. Moreover, a large acquirer may be more experienced in acquisitions and thus better able to smoothly integrate the target firm. Nevertheless, Ng & Donker (2013a) find – using the fixed asset ratio as a proxy for amount of energy reserves – that larger O&G acquirers experience lower abnormal returns following a takeover, relative to smaller firms. Consequently, based on prior general M&A evidence and M&A evidence specific to the O&G industry we state the following hypothesis regarding the size of the acquirer:

Hypothesis 4: Large acquirers are less value creating relative to smaller acquirers

5.5 Unlisted relative to listed targets

Prior empirical evidence suggest that performance effects differ depending on whether the acquired target is unlisted or publicly listed; and most studies tend to agree on the evidence that a bid on unlisted targets results in substantially higher abnormal returns for the acquirer compared to a bid on publicly listed targets (Martynova & Renneboog 2008; Tuch & O'Sullivan 2007; Faccio et al. 2006). The efforts of existing literature to reveal underlying reasons for the persistence of a unlisted-firm effect (or listing effect) have not yet been fully successful (Faccio et al. 2006). However, a plausible reason rests in unlisted firms' inability to finance some potentially attractive investments due to liquidity constraints (Ravenscraft & Scherer 1989). This could suggest that there is more scope for a public acquirer, with

greater access to capital through equity markets, to make improvements with a unlisted target. The O&G industry requires high capital investments, and consequently unlisted companies – especially if these are also smaller in scale – may be more limited in their investment decisions. Ng & Donker (2013a) argue that targets could "*view a takeover as an attractive exit strategy to advance the next stage of the development of the oil resources they first created. They do not have the scale, market capital, or capital-raising ability to develop their oil production capacities as their acquirers do"* (Ng & Donker 2013a, p.176).

Despite the limited evidence on *why* an unlisted target firm effect exists, empirical consensus is that the acquisition of private targets *does* result in higher abnormal returns for acquirers. We therefore state the following hypothesis:

Hypothesis 5: M&A with unlisted targets create more value for the acquirer relative to M&A with listed targets

5.6 Method of payment

The literature review of this thesis presented the relatively strong evidence that method of payment influences acquirer performance. More specifically, cash-financed acquisitions have in many studies led to higher acquirer performance compared with equity-financed deals, both in the short- and long term. The hypothesized explanation for this is related to the pecking order theory, asymmetric information and the signaling value in issuing new equity; i.e. internal financing (e.g. cash) is preferred, since an equity issuance is perceived by investors as indication of over-valuation of the acquiring firm (Haleblian et al. 2009; Agrawal & Jaffe 2000; Andrade et al. 2001). Therefore, we would expect higher abnormal returns for cash-financed M&A, which leads us to the following hypothesis:

Hypothesis 6: M&A financed with cash create more value for the acquirer relative to other methods of payment

5.7 Geographic origin of acquirer

Meglio and Risberg (2010) argue that M&A are complex processes whose *context* need to be considered in order for researchers to reveal the true, if any, value creating or -destroying impact such may have for acquirers. Whereas the context of our thesis is defined by the boundaries of an industry (i.e. the upstream O&G industry) previous research within M&A value creation have often determined the

sample context by the geographic origin of the acquirer. Therefore, the mere existence of such studies suggests that a performance effect might be attributed to the geographic origin of the acquirer. For example, empirical studies have often found varying results depending on whether the sample consisted of American or European acquirers (Martynova & Renneboog 2008). Therefore, the value created from M&A might differ for different acquirer countries.

Production costs are highly sensitive to the geographical location of the reservoir[8]. The lower the production costs, ceteris paribus, the greater the competitive advantage. While many O&G companies have operations in several geographical locations, the majority of operations are often concentrated in a specific region due to the massive investments required to operate a single field. Therefore, assuming that the acquirer country acts as proxy for the predominant geographical location of the acquirer, it could be argued that differing production costs could impact the competitiveness of the acquirers, and thus leave more leeway to better drive value from M&A. Furthermore, the recent studies of corporate takeovers in the American and Canadian O&G sectors respectively, find that for both samples acquirer abnormal return is negative following the announcement of M&A (Ng & Donker 2013b). While we hypothesize the opposite for our global sample (Hypothesis 1), we believe such findings could suggest a discrepancy in value creation depending on the origin of acquirer country. This leads us to hypothesize as follows:

Hypothesis 7: Geographic origin of acquirer influence value creation for the acquirer

[8] Recall from the industry review that production costs ranges from USD 1/bbl to USD 25/bbl

5.8 Overview of hypotheses

Table 2 below provides an overview of the stated hypotheses, which will be analyzed using the methodology outlaid in the following chapter.

Table 2: Overview of hypotheses

EFFECT TESTED	HYPOTHESIS	
Overall value creation	1a	Short-term abnormal return from M&A is positive for the acquirer
	1b	Long-term abnormal return from M&A is negative for the acquirer
Merger wave upsurge	2	M&A occurring in the upsurge period of a merger wave create more value for the acquirer relative to M&A occurring outside the upsurge of a merger wave
Cross-border	3	Cross-border M&A create more value for the acquirer relative to domestic M&A
Size of acquirer	4	Large acquirers are less value creating relative to smaller acquirers
Target status	5	M&A with unlisted targets create more value for the acquirer relative to M&A with listed targets
Method of payment	6	M&A financed with cash create more value for the acquirer relative to other methods of payment
Geographic origin of acquirer	7	Geographic origin of acquirer influence value creation for the acquirer

Source: own contribution

CHAPTER 6 | Event Studies and Regression Methodology

In this section the event study methodology is discussed and reviewed in detail. According to Fama (1991), event studies represent the cleanest available evidence on the efficiency of markets; i.e. the ability of prices to adjust to public announcements such as takeovers. As this thesis intends to measure the level and specific drivers of value creation, which is measured as abnormal return on share prices, the event study is consequently considered the most suitable analysis approach. To best answer our hypotheses and overall research question, the quantitative analysis is split in three: (1) overall value creation (including statistical significance tests), (2) two-sampled t-tests to compare the means in the sub-samples that can be identified from Hypotheses 2-7, and (3) a cross-sectional regression analysis to further evaluate potential value drivers of average abnormal return. This chapter is structured accordingly.

While the popularity of event studies is unquestionable, there seems to be no dominant method in determining the statistical inferences of such. Therefore, the conclusions drawn from the single event study is highly dependent upon the choices made by the researcher (Corrado 2011). Subsequently, considerable effort has been invested into justifying and elaborating on such choices throughout the following sections.

6.1 Event study methodology – Overall value creation

An event study measures the impact of a specific event on the market value of a firm. Event studies assume that markets are rational and efficient to the point where the effect of a particular event will be reflected in stock prices within in a relatively short period of time. Since several studies have documented that stock prices respond to new information in a timely manner, this assumption of semi-strong market efficiency is perceived as being valid (Fama 1991). A specific event – e.g. the announcement of a merger – would thus be expected to impact the stock prices of the relevant firms based on the extent to which investors and the market in general believe that the merger will create (or destroy) value. Through event studies, it is determined whether there exists an abnormal stock price effect (i.e. stock return) from the unanticipated event. The abnormal return is the difference between the realized return and the expected normal return in case the acquisition had not been announced

(McWilliams & Siegel 1997; Martynova & Renneboog 2008; MacKinlay 1997). In order to isolate the effects of the specific event, the expected normal return is estimated based on the stock return prior to the event date relative to an appropriate benchmark (e.g. a market index). The event study methodology will be used for this paper to measure the short-term and long-term shareholder wealth effect from the announcement of a merger. Our analytical framework is broadly based on the popular event study review and subsequent recommendations by MacKinlay (1997).

While most studies have unique elements, the event study approach follows a fairly standardized structure beginning with the determination of the event dates and windows of measurement. As the end goal is to analyze the abnormal stock returns, expected 'normal' returns must be estimated based on a benchmark model. The abnormal returns are then calculated, and their aggregate statistical significance examined through statistical tests (MacKinlay 1997). The following subsections comprise a deeper review and discussion of the event study elements, and will furthermore guide the reader through the methodological choices made for the short- and long-term event studies of abnormal returns.

6.1.1 Limitations of the long-term event studies

Though short-term studies are prevalent in M&A literature, we will also examine long-term abnormal returns. The long-term view can potentially uncover effects overlooked by the market in the short-term – e.g. the market might take longer time to understand the true potential impact of the M&A as the post-integration of several entities is an incremental process that will evolve over time (Barber & Lyon 1997). Nevertheless, as discussed in the literature review, the long-term studies are often severely criticized for their failure to isolate the effects of a single event. Expanding the event window to several years imply a considerable exacerbation of small misspecifications or confounding events simply due to the passing of time (McWilliams & Siegel 1997). Therefore, measuring the effects of a single M&A years after the event announcement, is extremely susceptible to the risk of incorporating additional market reactions from overlapping events, such as multiple M&A occurrences. As other scholars phrases it; "*Given the serious methodological concerns with the long-run empirical literature (...), we are reluctant to accept the results at face value"* (Andrade et al. 2001, p.114). Therefore, as suggested by Kothari (2004), the discussion of findings will put greater emphasis and reliance on the 'cleaner' short-term studies. Keeping in mind such limitations and drawbacks, it remains interesting to examine the effects of the long-term studies to enable a more profound comparison with existing M&A literature.

6.1.2 Definition of event window and estimation period

The event must be isolated in order to quantify its impact, and thus the correct identification of the event day is important. We define the *event day* as the day an M&A is publicly announced to the market. One drawback of event studies is uncertainty around the *true* event date, which may arise due to rumors or insider trading (MacKinlay 1997). To increase the correctness of the event days we control for early M&A rumors in the market by requiring the rumor date to equal the announcement date in our sample[9].

The *event window* is the period in which the stock price of the acquiring firm will be examined. Although the specific event only takes place on one specific day, the event window is often expanded to multiple trading days surrounding the event day. Starting the event window a short time prior to the event day will capture potential issues of insider trading or rumors not detected in our data (MacKinlay 1997). An argument for including additional trading days after the event day is that the market might not be perfectly efficient to allow for immediate investor reactions to the announcement. Additionally, the deal may be announced near closing time of the market, which would not leave sufficient time for the market to adjust upon the event day. Therefore, the event window is expanded beyond the event date to account for delayed market adjustments. It is important to note that the event window expansion creates a tradeoff between the capturing of slow effects on the one hand and increased risks of including other events unrelated to the M&A announcement on the other (McWilliams & Siegel 1997). As recommended by McWillliams and Siegel (1997), we therefore use multiple event window lengths to test the significance of abnormal returns. For short-term studies, King et al. (2004) show that it is most common to use an event window of 21 days or less. Inspired by previous studies (King et al. 2004; Andrade et al. 2001), we therefore conduct three event windows with the lengths of three days [-1,1], eleven days [-5,5] and 21 days [-10,10] symmetrically surrounding the event day, which is defined as day 0. For the short-term study daily stock price intervals are used. Although it could be interesting to examine even shorter intervals (e.g. hourly), MacKinlay (1997) argues that the power increase of using intervals of less than one day might be small and the net benefits are unclear, as it introduces other complications. Additionally, the use of Datastream to extract financial market data places a natural constraint on the time intervals, since the shortest interval available through this database is daily stock prices.

Previous long-term studies generally measure monthly returns with event windows from one to five years (i.e. 12 to 60 months) (Barber & Lyon 1997). There is general consensus among scholars to start

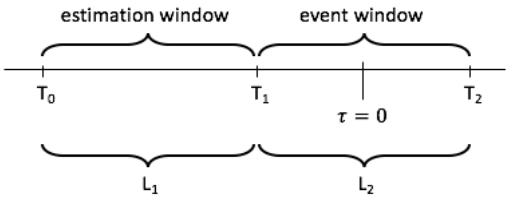
[9] See Section 7.1.2 ref. 6 & ref. 7 (Sample selection steps 6 & 7 in Excel) for further elaboration on this.

the event window in the month of the event. For the sake of consistency with the short-term study, we will again be investigating three lengths of event windows for the long-term event study: 12 months [0,12], 24 months [0,24] and 36 months [0,36].

For both the short- and long-term event studies, the estimation of *expected normal returns* is necessary to calculate abnormal returns. The *estimation window* is the foundation from which the expected normal returns are modeled, and is typically defined as a period prior to the event window. To prevent the event – M&A announcement – from influencing the normal-performance parameters the event window cannot overlap with the estimation window. The estimation window will thus end the day before the beginning of the widest event window; that is, 11 days prior to the event day. The length of the estimation window in existing literature varies but inspired by MacKinlay (1997) and Corrado (2011) we define the estimation window as 250 trading days prior to 11 days before the event day (i.e. 260 days prior to the event day), which approximately equals the number of trading days in a year.

The graphical illustration in Figure 7 displays an overview of the typical timeline used for event studies along with the notation used for this study. The event day is defined as $\tau = 0$, and the event window constitute the period from $\tau = T_1 + 1$ to $\tau = T_2$. Additionally, $\tau = T_0 + 1$ to $\tau = T_1$ represents the estimation window. Lengths, L_1 and L_2 denote the length of the estimation window and event window, respectively.

Figure 7: Event Study Time Line



Source: MacKinlay 1997 with own modifications

6.1.3 Measuring abnormal returns

Abnormal return (AR) is the central measure for event studies in assessing the impact on the acquirer following a specific event (i.e. M&A announcement). In the measurement of abnormal returns, the reliability of specific models highly depends on the length of the study; that is, some models that work for short-term studies will for long-term studies introduce too many limitations and complications (McWilliams & Siegel 1997; Barber & Lyon 1997). Therefore, this section will cover the methodology for the short-term and long-term event study separately.

6.1.3.1 Abnormal returns for the short-term event study

The abnormal returns over the event window for each acquirer is calculated as the difference between realized returns and expected normal returns:

$$AR_{i\tau} = R_{i\tau} - E(R_{i\tau})$$

where $R_{i\tau}$ is the *realized* returns on security i, and $E(R_{i\tau})$ is the *expected* normal returns, which is estimated with the use of a benchmark model.

In order to draw inferences about the announcement effect of M&A, the abnormal returns must be aggregated through time and across securities. In order to do so, abnormal returns are first accumulated for *each security* (i) over the event window, which is denoted as cumulative abnormal returns (CAR):

$$\widehat{CAR_{i\tau}} = \sum_{\tau=T_1+1}^{T_2} \widehat{AR_{i\tau}}$$

The CARs for each security are subsequently averaged across all securities, which is referred to as cumulative average abnormal returns (CAAR):

$$CAAR_{\tau} = \frac{1}{N}\sum_{i=1}^{N} \widehat{CAR_{i\tau}}$$

where N reflects the sample size. The CAAR is then used to test whether abnormal returns over the event window are significantly different from zero. Section 6.1.5 will elaborate on the statistical tests for significance of CAAR.

6.1.3.2 Abnormal returns for the long-term event study

As the event window expands to several months in the long-term event study, the modeling of CAR used for the short-term studies will not be appropriate. Barber & Lyon (1997) instead proposes the *buy-and-hold-abnormal return* (BHAR) approach, as it arguably better captures the wealth effect relevant for a security when measured over a longer period of time. Specifically, the advantage of BHAR is the inclusion of compounding effects, which can have sizeable effects when holding a stock for the long-term. Barber & Lyon (1997) define the buy-and-hold (BH) return for security i over the event window as:

$$BH_{i\tau} = \prod_{t=1}^{T_2}[1 + R_{it}]$$

where R_{it} is the simple *monthly return* for security i in month t in the event window (from $T_1 + 1$ to T_2). The abnormal buy-and-hold return (BHAR) for the individual security over the event window is thus calculated as the difference between the realized BH return and the expected normal BH return:

$$BHAR_{i\tau} = BH_{i\tau} - E(BH_{i\tau})$$

Hence, using monthly returns the BHAR over the specified event window is calculated as:

$$BHAR_{i\tau} = \prod_{\tau=T_1+1}^{T_2} [1 + R_{it}] - \prod_{\tau=T_1+1}^{T_2} [1 + E(R_{it})]$$

Additionally, the BHAR is averaged across securities to calculate the average buy-and-hold abnormal return (ABHAR):

$$ABHAR_{\tau} = \frac{1}{N} \sum_{i=1}^{N} BHAR_{i\tau}$$

Inferences of whether long-term abnormal returns are significantly different from zero are based on the estimated ABHAR. The estimation of the expected normal return will be discussed in the next sub-section.

6.1.4 Calculation of expected normal returns and construction of benchmarks

For the modeling of each acquirer's expected normal returns, a variety of approaches and models are available from academic literature. *"The normal return is defined as the expected return without conditioning on the event taking place"* (MacKinlay 1997, p.15). As with the calculation of abnormal returns, the validity of expected normal return estimations is sensitive to the length of the study (Barber & Lyon 1997). This sub-section will thus cover the estimation of expected normal return and expected normal buy-and-hold return separately.

6.1.4.1 Expected normal returns for the short-term event study

The approaches for estimating expected normal returns for short-term event studies can generally be grouped into two categories of asset pricing models: statistical and economic models. The market model – a statistical model – is the dominant method for short-term event studies (McWilliams & Siegel 1997). An example of an economic model is the capital asset pricing model (CAPM), which was commonly used for event studies in the 1970s. The use of CAPM has almost ceased, since it introduces specific

biases[10], which the market model adjusts for (MacKinlay 1997). Therefore, as argued by MacKinlay (1997), McWilliams & Siegel (1997), and Brown & Warner (1985) statistical models – in particular the market model – prove superior to economic models in event studies. Subsequently the market model will be used in this thesis to estimate the normal returns for the sample.

The market model relates the return of a specific security to the return of a benchmark (i.e. market) portfolio through a linear regression. The market model is given by:

$$R_{it} = \alpha_i + \beta_i R_{mt} + \varepsilon_{it}$$

R_{it} is the return on security i in period t, and R_{mt} is the return on the chosen market portfolio (i.e. benchmark) in the same period t. The error term, ε_{it}, has a mean of zero, $E(\varepsilon_{it}) = 0$, and a constant variance for every security i, $var(\varepsilon_{it}) = \sigma_{\epsilon_i}^2$. The market model parameters α_i and β_i will be estimated by regressing the stock returns for each acquirer relative to the market portfolio return over the estimation window. Each stock will thus have individually estimated α_i and β_i, where α_i is the intercept and β_i reflects the systematic (i.e. un-diversifiable or market) risk of stock i (MacKinlay 1997). According to MacKinlay (1997), the ordinary least squares (OLS) estimation procedure is efficient for the market model given the model's linear specification and assumption of joint normality of asset returns. Additionally, since the OLS estimation technique is widely acknowledged in academic literature, this paper will use OLS estimators for the market model parameters. There are three assumptions for the linear OLS regression model: (1) the conditional distribution of the error term (ϵ) has a mean of zero, (2) the variables are independently and identically distributed random variables, and (3) large outliers are unlikely. The applicability of these assumptions will be discussed throughout the paper where relevant.

The *expected* normal returns, $E(R_{it})$, for each security i over each day t of the event window is given by:

$$E(R_{it}) = \hat{\alpha}_i + \hat{\beta}_i R_{mt}$$

where $\hat{\alpha}_i$ and $\hat{\beta}_i$ are OLS estimators. Recalling that abnormal return (AR) is the difference between realized return and expected normal return, the estimated AR is given by the following equation:

$$\widehat{AR}_{i\tau} = R_{i\tau} - \hat{\alpha}_i - \hat{\beta}_i R_{mt}.$$

[10] As the market model evidently eliminates the anomalies of the statistical model, a discussion of the biases will not be covered by this thesis. For a detailed discussion see Fama and French (1996).

The deduction of the market return from the realized stock return intends to reduce the *variance* of the AR to include only the event (i.e. takeover) effects. Therefore, the extent to which such effects can be isolated depends on the choice of an appropriate benchmark (MacKinlay 1997). Several scholars propose the use of a broad-based stock index for the market portfolio such as the S&P 500 Index (MacKinlay 1997; McWilliams & Siegel 1997), as it covers macroeconomic factors impacting most market participants. However, since our study focuses on a single industry, namely the oil and gas industry, we argue that an index with a focus on oil and gas companies would reduce (i.e. improve) the variance of AR by better capturing non-event related effects. Specifically, the reasoning is that the industry index indirectly accounts for overall market movements (since it as well is impacted by macroeconomic factors), and it would additionally allow for the deduction of industry-specific variance not related to the overall market. Thus, we argue that choosing an industry index is superior to a market index, as the global nature of the O&G industry implies that all industry participants (i.e. our sample) are more or less subject to the same industry related factors captured by the industry index. Our reasoning is moreover consistent with Martynova and Renneboog (2008) who recommend adjusting for industry trends to isolate and thus increase the likelihood of detecting the specific takeover effect.

We choose the Morgan Stanley Capital International (MSCI) World Energy Index, which is the best available benchmark index related to O&G at our disposal. Specific requirements for the choice of index are (1) availability for the extraction of the authors, (2) coverage of the entire sample period from 2002 to 2016, and (3) consistence of predominantly upstream O&G companies. Especially the second requirement eliminated several potential indexes. The MSCI World Energy Index fulfilled all criteria and furthermore, created by the acknowledged Morgan Stanley, it is considered reliable. A more elaborative clarification of the MSCI World Energy Index can be found in Appendix A.

6.1.4.2 Expected normal returns for the long-term event study

For the long-term event study, three approaches are typically suggested for developing a benchmark from which the expected normal buy-and-hold returns are estimated. These include (1) the reference portfolio approach, which is similar to the short-term market model, (2) the control firm approach that matches sample firms to control firms based on specific firm characteristics (e.g. firm size, book-to-market ratios), and (3) the Fama-French three-factor model (Barber & Lyon 1997). Whereas the former is simple to construct but subject to several pitfalls, the latter two are rather complex in construction and, while they increase explanatory power, do not solve the problem of eliminating all non-event related variance completely.

Long-term tests conducted with a market index as a benchmark introduces three potential problems: (1) a market index from time to time include new securities after the event months resulting in a *new listing bias,* (2) a market index typically involve a periodical re-balancing of the index resulting in the *re-balancing bias*, (3) long-run abnormal returns can be positively skewed resulting in the *skewness bias*. These possible biases can result in a misspecification of the test statistic where the empirical rejection rates of the null hypothesis exceed the theoretical rejection rates (Barber & Lyon 1997). Barber & Lyon (1997) therefore prefer the control firm approach as a benchmark. Nevertheless, as our sample consists of several hundred deals, which each covers several years daily and monthly of data, we have considered it superfluous to conduct such extensive benchmarking, as even that would not eliminate all methodological uncertainties. Furthermore, our reasoning is backed by our choice of a sample within a homogeneous industry, as it mirrors the advantages of increased sample homogeneity, which is the underlying idea of using the control-firm approach. Specifically, our industry sample is defined from a narrow 2-digit SIC code, implying that participants are subject to the same market dynamics and competitive forces. Although a fairly homogeneous sample is not quite enough, we believe it is the next best alternative to the control-firm approach, which is worthwhile testing. To ensure the strictest level of comparability, for the long-term sample, we furthermore limit our sample to include only those acquirers that are matched by the chosen index based on industry coverage and geographical location of the acquirer. Doing so, we argue that constructing a benchmark based on industry and geography of acquirers approximates the explanatory power to the control-firm approach. The reasons why benchmarks are even more important in the long term (i.e. why we don't apply such strict sample criteria in the short term) are that potential biases in abnormal return tend to be exaggerated when measured over longer periods of time. Therefore, for the long-term event study our sample will be reduced to include only the acquirers listed in countries within the MSCI World Energy index.

6.1.5 Statistical tests: parametric and non-parametric

The testing of statistical significance of overall value creation (i.e. abnormal performance over the event window) can be done in multiple ways. Among others, MacKinlay (1997) recommended using a parametric test complemented by a non-parametric test. When data suffers from severe non-normality, the inclusion of a non-parametric test provides a robustness check on the inferences from the parametric tests. Inspired by previous literature (Corrado 2011; MacKinlay 1997), this thesis will conduct the parametric t-test and the non-parametric sign test for both the short-term and long-term event studies. For the non-parametric test, the Wilcoxon's signed-rank test is used, as it is regarded one of the most successful and common non-parametric tests (Corrado 2011). Although several non-parametric tests exist, the explanatory power of the individual tests is similar, and conducting numerous tests would thus

correspond to boiling the ocean. Therefore, the Wilcoxon signed-rank test is chosen as the most appropriate non-parametric test given our specific sample set of data. The statistical tests will enable the authors to assess the overall value creation from a merger announcement. The tests applies similarly to the short-term and long-term study (i.e. significance of CAR and BHAR), but in the following section CAR is used as an example.

6.1.5.1 Parametric tests

The parametric test is based on the standard t-statistic to assess whether CAAR calculated in the event study is significantly different from zero. Therefore, the null hypothesis assumes a zero mean of the test statistic; i.e. no effect on cumulative abnormal returns over the respective event windows. A rejection of the null hypothesis will indicate that an abnormal return is generated through M&A announcement. While the parametric test is conducted in the data analysis and statistical software program, Stata, we will briefly describe the underlying formulas for conducting the t-statistic.

Following MacKinlay (1997) the t-statistic, from which the null hypothesis can be tested, is defined as:

$$\theta_1 = \frac{CAAR\ (T_1 + 1, T_2)}{\sqrt{Var[CAAR(T_1 + 1, T_2)]}} \sim N(0,1)$$

where CAAR is the cumulative average abnormal return, as estimated in Section 6.1.3. Assuming no correlation across securities (i.e. independent events) the variance of CAAR is defined as:

$$Var[CAAR(T_1 + 1, T_2)] = \frac{1}{N^2} \sum_{i=1}^{N} Var_i(T_1 + 1, T_2)$$

where N is the sample size. For the parametric t-statistic, the abnormal returns (CAAR) are considered normally distributed. Stock & Watson (2015) note that the normal approximation to the distribution of the t-statistic is valid if the sample size is large. More specifically, they argue that sample sizes in the hundreds are sufficiently sizeable to justify the assumption of a standard normal distribution within the t-statistic from which inferences are tested and drawn. Nevertheless, to ensure the implications of non-normality are overcome, a non-parametric test is conducted as well.

6.1.5.2 Non-parametric tests

To support and complement inferences from the parametric t-test, we have chosen to conduct Wilcoxon's signed-rank test (Wilcoxon 1945), which is an expansion of the traditional sign test as presented in MacKinlay (1997).

The sign test is based on the sign – i.e. positive or negative – of the CARs, and assumes that the probability of observing a positive or negative abnormal return is equal, that is 0.5. The null hypothesis states that CAR will be positive or negative with equal probabilities (MacKinlay 1997). The test evaluates the number of positive signs relative to the total number of observations. Wilcoxon's signed-rank test is often argued to be more appropriate in detecting an abnormal difference than the original-sign test. The reason is that Wilcoxon's signed-rank test also incorporates the magnitude of the abnormal return via ranks, and thus not simply the sign. Furthermore, a potential issue exists for the original sign test, as it has shown to be sensitive to skewed data (Brown & Warner 1985; Corrado 1989). Wilcoxon's signed-rank test assigns each observation a rank based on the absolute value of cumulative abnormal returns – i.e. the deviation from zero abnormal return. The ranks of the observations with positive returns are then aggregated; the sum is referred to as T^+. Likewise, the ranks of the negative return observations are summed to T^-. The test statistic is performed in Stata but for a large sample it is given by the following equation (Wilcoxon 1945; Rey & Neuhäuser 2014):

$$\theta_2 = \frac{T^+ - E(T^+)}{\sigma_T} \sim N(0,1)$$

where the expected the positive rank sum and standard deviation are given as:

$$E(T^+) = \frac{N(N+1)}{4}$$

$$\sigma_T = \sqrt{\frac{N(N+1)(2N+1)}{24}}$$

As our sample is much larger than thirty, the test statistic θ_2 is evaluated against the standard normal distribution.

6.2 Two-sampled t-test for sub-sample analysis

It is hypothesized that specific firm- and deal-specific characteristics are better at driving value creation than others. For example Hypothesis 2 states that deals occurring in the upsurge of a merger wave generate higher cumulative abnormal return than deals outside the upsurge. In order to measure the relative difference of the sub-samples in driving CAR a simple two-sided t-statistic is conducted, where it is tested whether the difference between the two means of the sub-samples are statistically significant. According to Agresti & Franklin (2013) the two-sided t-test is robust even if the population distributions are not normally-distributed, although it is not an issue if the sub-sample sizes are sufficiently large.

The following notation is based on Agresti & Franklin (2013). The null hypothesis of the two-sampled t-test assumes the means of the sub-samples to be equal:

$$H_0: \mu_1 = \mu_2$$

which is tested with the t-statistic:

$$t = \frac{\overline{x_1} - \overline{x_2}}{se}$$

where $\overline{x_1}$, $\overline{x_2}$ is the sample mean for each sub-sample and the standard error (se) is expressed by:

$$se = \sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}$$

where n_1, n_2 and s_1, s_2 are the sizes and variances of each sample respectively. If the null hypothesis is rejected, there is evidence suggesting that one of the sub-samples have a greater impact on value creation (CAR or BHAR) relative to the other.

6.3 Cross-sectional regression

In addition to testing the relative difference of sub-samples in driving value creation (CAR), it remains yet to be tested how each characteristic, identified from Hypotheses 2 through 7, directly impacts the abnormal return *when* controlling for the other variables. Whereas the analysis of sub-samples allow for the comparison of the characteristics' impact on CAR relative to each other, the analysis does not account for inter-correlation of other plausible variables; i.e. where it might be revealed from the sub-sample comparison analysis that upsurge deals are more valuable than non-upsurge deals, such difference might be attributed to the presence of other variables not controlled for, such as cash acquisitions. Therefore, a cross-sectional regression analysis is performed. Through a cross-sectional multiple regression analysis it tested how the independent variables influence the dependent variable. The cross-sectional regression with k independent variables is given by:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \cdots + \beta_k X_k + \epsilon$$

where the dependent variable (Y) will be the CAR or BHAR for the event window, and the independent variables (X) represent the firm- and deal-specific characteristics, often expressed as dummy variables. The β coefficients express each independent variable's effect on Y, and will be estimated using OLS in Stata, where the β coefficients' significance on the dependent variable, CAR, will also be tested. This

allows the authors to assess whether firm- and deal-specific characteristics influence the value creation for acquirers through M&A. To account for the possible situation where standard errors are heteroskedastic, all regressions are conducted using heteroskedasticity-robust standard errors, also referred to as White standard errors (Stock & Watson 2015).

As we are interested in isolating the effects on CAR from certain firm- and deal-specific characteristics, the full regression model is as follows:

$$CAR_i = \alpha + \beta_1 X_{Upsurge} + \beta_2 X_{Cross\_border} + \beta_3 X_{Large\_Cap} + \beta_4 X_{Target\_Unlisted} + \beta_5 X_{Payment\_Cash} + \beta_6 X_{Acquirer\_NA} + \epsilon$$

The chosen control variables are based on the hypotheses presented in Chapter 5, as the authors believe these to influence CAR following the review of M&A literature and the analysis of O&G industry dynamics. The identification of the independent variables is discussed in further detail in Section 0. The cross-sectional model enables the authors to estimate the effect of one variable (e.g. cross-border) on CAR while holding the other firm- and deal-specific characteristics constant.

There are four assumptions for the multiple regression model with the first three being the same as the assumptions to the linear OLS estimator (see Section 6.1.4), and the fourth assumption is no perfect multicollinearity (i.e. no independent variable can be a perfectly linear function of another independent variable). The applicability of these assumptions will be discussed throughout the paper where relevant.

6.4 Additional methodological remarks

Either simple (i.e. arithmetic) or continuously compounded (i.e. logarithmic) returns can be used for calculating stock returns (Corrado & Truong 2008; Thompson 1988). Few scholars mention the return calculation process, as the importance for event studies seems to be minuscule (Thompson 1988). Nevertheless, evidence suggests superiority of logarithmic to arithmetic returns, as logarithmic returns improve the normality of the return distribution and thereby symmetrize the data, which is found to improve the parametric test statistics (Henderson 1990; Corrado 2011; Corrado & Truong 2008). In accordance with these findings, all returns throughout this thesis will be calculated as logarithmic returns.

A noteworthy limitation of our choice of benchmark portfolio is that the MSCI World Energy Index only covers 23 developed markets[11], and thus overlooks O&G companies from countries such as Russia, Brazil and Indonesia. Since the nature of the O&G industry is highly global and has been subject to a high degree of internationalization we argue that it is reasonable to use an O&G index as a benchmark for the entire sample. In a sample study from 1992 to 2001, Phylaktis & Xia (2006) argue that industry effects have experienced a major upward shift in explaining international equity returns particularly in Europe and North America. Since our sample starts in 2002 and the dynamics of the industry is believed to be truly global in nature, the MSCI World Energy Index is considered an appropriate benchmark.

[11] Developed Markets countries covered by MSCI World Energy Index include: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Hong Kong, Ireland, Israel, Italy, Japan, Netherlands, New Zealand, Norway, Portugal, Singapore, Spain, Sweden, Switzerland, UK, and US.

CHAPTER 7 | Data

This chapter comprises a discussion of the data selection process in reaching the final data sample, followed by an overview of the descriptive statistics. A tremendous effort has been invested into obtaining a clean, correct and non-biased sample set of data, as it is the single point of departure, from which all our statistical inferences originate. Accordingly, the first section will elaborate on the considerations and decisions made to avoid sample selection bias and to ensure the highest possible quality of our data. Section two will present the descriptive statistics of the final data sample, including identification and description of the sub-samples.

7.1 Data selection process

The data for this paper have been collected through two primary databases: Bureau van Dijk's Zephyr and Thomson Reuters' DataStream. A few databases were available for the collection of data on M&A deals but Zephyr has been chosen, as it the most comprehensive and reliable database for M&A deal information available to us. Zephyr provides worldwide deal data since 2001, and is furthermore often used by theses similar to this study (Kristensen & Lund 2015; Sørheim & Lerkerød 2015). Additionally, Zephyr contains ISIN identification numbers for each transaction, which allows for cross matching with data from DataStream, as well as Orbis. The latter, being an extensive company database, is used for cross-referencing information on acquirers, in cases where information from Zephyr and DataStream differ. DataStream was used for the collection of stock- and market prices and returns.

The following sub-sections provide an overview of the stepwise data selection process leading to the final sample. Initially, deal events were identified and collected from Zephyr based on specific criteria. Subsequently, this gross sample was organized and modified in Excel based on relevant criteria that Zephyr could not consider. Furthermore, as the long-term event study is subject to stricter criteria than the short-term study, the latter sub-section will address the adjustments made to arrive at the long-term sample.

7.1.1 Sample Selection Steps in Zephyr

The problem statement of this paper guides the initial criteria set up for the search strategy in Zephyr. Therefore, as this paper analyses worldwide M&A within the oil and gas industry, deal types are limited to include only mergers and acquisitions (ref. 1). Other deal types such as joint ventures, IPOs, buy-

outs, etc. are excluded, as such are more focused on the financing- and ownership structure and thereby follow different dynamics than pure M&A. Table 3 comprises the chosen search strategy in Zephyr, which yields a gross sample of 1,524 deals. The following sub-sections review each of the remaining search strategy steps conducted in Zephyr.

Table 3: Zephyr search strategy

REF.	SEARCH STRATEGY, ZEPHYR	STEP RESULT	SEARCH RESULT
1	**Deal type:** Acquisition, Merger	613,283	613,283
2	**US SIC (primary codes):** 13 - Crude petroleum and natural gas (Acquirer AND target) (1311, 1321, 1381, 1382, 1389)	10,096	4,817
3	**Time period:** on and after 01-01-2002; up to and including 31-12-2016 (rumored, completed-confirmed, completed-assumed, announced)	147,831	4,460
4	**Current deal status:** Completed	1,325,907	3,864
5	**Listed/Unlisted/Delisted companies:** Listed acquirer, listed target, delisted target, unlisted target	277,707	1,524
	Total sample (gross, Zephyr)		**1,524**

Source: own contribution

7.1.1.1 US SIC Code 13 (ref. 2)

As identified in our research question we choose to limit our sample to M&A where both acquirer and target primarily operate within the oil and gas industry, and more specifically, the upstream segment covering the exploration, development and production of oil and gas. A common practice when distinguishing between industries is to use either the two- or four-digit US SIC[12] codes (Goergen & Renneboog 2004; Anand et al. 2005; Thompson 1988; Ahern & Harford 2014; Andrade et al. 2001). The code best representing the upstream oil and gas industry is SIC code 13 (*Crude Petroleum and Natural Gas)*, as it encompasses all *"activities in the preparation of oil and gas up to the point of shipment from the producing property"* (United States Department of Labor 2017), which matches the definition of the upstream segment applied throughout this paper (see Section 4.1.3). Furthermore it is in coherence with several scholars and practitioners (Ramos & Veiga 2014). To ensure homogeneity of our sample, the sample selection is limited to deals where *both* acquirer and target are categorized under the two-digit SIC code 13. Since this thesis examines worldwide M&A, no limitation is laid for the geographic scope of the transactions.

7.1.1.2 Time period (ref. 3)

Thirdly, for our initial gross sample the event must be announced within a 15-year time period spanning from 01-01-2002 to 31-12-2016. The start date is delimited by the benchmark (MSCI Energy), as daily

[12] SIC = Standard Industrial Classification

index prices (obtained from DataStream) only were available from 01-01-2002. Zephyr covers global deals from 2001, and is therefore not a constraint. The end date is based on the latest available year-end. The widest available time period is chosen, as to increase the size of our final sample and therefore, ceteris paribus, enhance the explanatory power of our findings.

7.1.1.3 Completed deals (ref. 4)

As common practice in the M&A literature (Healy et al. 1992; Andrade et al. 2001), a fourth sample criterion is the selection of *completed* transactions only. For the short-term event study, this might not seem like a necessary criterion, since the financial impact is measured as the stock price reaction immediately following the *announcement* date, which often occurs prior to (rather than simultaneously with) the date of completion. However, assuming semi-strong market efficiency, the slightest investor uncertainty concerning the probability of deal completion will immediately be adjusted for in the stock prices of the acquirer (and target, if listed). The greater the expectation of failure for a deal to be completed, the lower the anticipation of potential synergies (i.e. value creation), and subsequently the less variation will, ceteris paribus, be reflected in the stock price (Sudarsanam 2010). Clearly, upon announcement of a deal investors cannot know with certainty whether that deal will be completed but in certain circumstances experienced investors might anticipate non-completion. The greater the level of uncertainty around deal completion, the narrower the stock price movements, which would reduce the aggregate measures of abnormal performance. Therefore, we believe that by excluding non-completed deals from our sample, which due to non-completion cannot drive any real economic value, we can increase the probability of detecting the "true" value impact of the announcement of a deal. Hence, to improve the quality of our findings we include only completed deals.

7.1.1.4 Listed acquirers (ref. 5)

For the fifth criterion, as we measure the financial impact of M&A through acquirer stock returns, our sample includes only acquirers that were publicly listed in the estimation period, throughout the event window and upon the announcement of the deal, to ensure the availability of stock prices. Examining value creation from the acquirer's point of view (i.e. acquirer's stock price), no such requirement is applicable to the target. Thus, the target can be either listed, unlisted or delisted. This further allows for the uncovering of possible differences in value creation for the acquirer depending on whether the target is listed or not.

7.1.2 Sample Selection Steps in Excel

The abovementioned search strategy in Zephyr yields a total gross sample of 1,524 deals (see Table 3). To reach the final sample, further modifications were made manually in Excel by the authors, based on

the specific criteria mentioned in the following sub-sections. The sample selection steps in Excel include integration of data from Zephyr and DataStream. Stock and index prices (measured as total return index[13]) are obtained from DataStream. Table 4 provides an overview of the sample selection steps in Excel, which resulted in a final sample of 550 deals.

Table 4: Excel modifications of data sample

REF.	DATA SAMPLING STRATEGY, EXCEL	# OF DEALS ELIMINATED	SEARCH RESULT
Table 3	*Total sample (gross, Zephyr)*		*1,524*
6	Announcement date must equal rumor date	341	1,183
7	Announcement date: Exclude years 2000 and 2001	15	1,168
8	Only one acquirer per deal entry	26	1,142
9	Ownership stakes: Exclude deals where the acquirer held initial ownership stakes in the target of 50.0% and above (or initial stake was unknown)	135	1,007
10	Ownership stakes: Exclude deals where the acquirer final stake was equal to or less than 50% (or unknown)	20	987
11	Internal transactions excluded	11	976
12	Missing stock prices and market capitalization	32	944
13	Deal announcement date on non-trading day	18	926
14	Thin trading excluded	345	581
15	Overlapping events (same acquirer & same date)	28	553
16	Outliers	3	550
	Total sample (final, short-term)		**550**

Source: own contribution

7.1.2.1 Announcement date issues (ref. 6 & 7)

Our sample is limited to deals where the announcement date matches the rumor date. The Efficient Market Hypothesis (EMH) explains that a market is efficient if all available relevant information is reflected in the price of the related security (Bodie et al. 2014; Fama 1970). The degree of market efficiency continues to raise controversies among scholars, specifically whether markets are efficient in weak form (prices reflect all historical stock data), semi-strong form (prices reflect all publicly available information) or strong form (prices reflect all publicly and privately held information). However, predominant empirical evidence seem to suggest that markets are efficient in semi-strong form, meaning if any information is made available to the public (whether that be intentional or through leakages) the relevant security should reflect such information (Bodie et al. 2014; Binder 1998). The *announcement date* of an M&A with a public acquirer represents the specific date a public offer was made or when either acquirer or target has confirmed continuation or ideation of a specific deal. With semi-strong form market efficiency, the announcement of a deal is therefore expected priced into the securities of the

[13] For measuring stock prices, the Total return index (RI) was chosen rather than Adjusted Prices (P), as RI adjusts for stock splits and dividend payments (assume reinvestment of dividends) and is considered a more precise indication of the stock's performance.

related entities. However, if early rumors (i.e. information unconfirmed by neither target nor acquirer) of a specific deal exist prior to announcement date, such information might (or might not, depending on the level of market efficiency) be priced into the security. To control for such uncertainty, we therefore exclude those deals where the announcement date does not match the rumor date. Subsequently, 341 deals were excluded from the gross sample (ref. 6).

Through the manual sample modification in Excel, it was discovered that Zephyr had failed to exclude 15 deals announced in the years 2000 and 2001. The 15 deals, ranging outside the selected time scope of our sample, were subsequently removed manually (ref. 7). Such incidence might call into question the reliability of Zephyr and thus the quality of our findings, which has led the authors to thoroughly check the remainder data sample for any flaws. No other inconsistencies were found and the dataset is therefore considered sufficiently reliable for the purpose of this thesis.

7.1.2.2 More than one acquirer (ref. 8)

For 26 deals, more than one acquirer was listed in the original dataset pulled from Zephyr. Subsequently several columns contained more than one data point for each measure, which necessitated manual modification. Deals containing more than one acquirer would subsequently reflect several stock returns, which would unjustly amplify the aggregate effect of the single transaction and thereby misrepresent the measure of abnormal returns. Therefore, we have eliminated all deals with more than one acquirer. As our thesis investigates the acquirer point of view, and thus strictly consider the acquirer stock return, no modifications are made to deals with more than one target.

7.1.2.3 Ownership stakes - initial and acquired (ref. 9, 10)

Our sample is confined to transactions, where the acquirer has an initial ownership stake in the target firm of less than 50% and a final stake (i.e. post-acquisition) of at least 50.01%. The aim is to limit our sample to only those transactions, where the acquirer *becomes* the controlling shareholder. As a controlling shareholder a company can be considered to exercise significant influence and control of the target, and effects of the transaction are thus more likely reflected in the acquirer's financial statements and operating performance. However, the definition of a controlling stockholder is widely debated among scholars, as a discrepancy can be made between *ownership* and *control* if a company issues dual class shares with different voting rights or use complex ownership structures such as pyramids (Faccio & Lang 2002; La Porta et al. 1999). Thus, a majority stake of shares might not represent corporate control and likewise a minority stake of shares might qualify for corporate control. However, more recent studies have found the discrepancies to be significant for just a few countries and insignificant for the greater majority (Faccio & Lang 2002). Therefore, as we consider a global sample of deals, we deem

it adequate *not* to distinguish among dual class shares and ownership structures but rather consider an acquirer's equity stake (i.e. ownership) in a target as a proxy for corporate control.

For a transaction to qualify as an *acquisition* the acquirer must obtain a final equity stake of the target of at least 50% (Bureau van Dijk 2017). Furthermore, to avoid ownership structures with equal shareholdings (i.e. 50-50), where ultimate control can be difficult to identify, we define controlling shareholders as those with at least 50.01% ownership stake of the target's equity (ref. 10). To increase the likelihood of measuring the effect for the acquirer of a transaction, a further criterion is that the initial ownership stake cannot exceed 49.99% (ref. 9). Furthermore, all deals with unknown ownership stakes are eliminated to ensure consistency with the above-mentioned argumentation.

7.1.2.4 Omitting internal transactions (ref. 11)

Internal transactions were omitted to avoid uncertainties of transfer pricing and other possible value distorting effects related to within-company transactions. Internal transactions are here defined as deals, where the acquirer and target share the same group owner and trade under the same ISIN code.

7.1.2.5 Missing stock prices and market capitalization (ref. 12)

For some acquirers, stock prices (i.e. return indexes) and market capitalization[14] for the relevant periods were not obtainable from DataStream and such deals (32) have subsequently been excluded from the sample.

7.1.2.6 Deal announcement at non-trading days (ref. 13)

Extracting stock prices from DataStream revealed 18 deals that were announced at non-trading days. As markets are necessarily closed on non-trading days, no price effect can be observed upon the deal announcement date ($t = 0$). Whereas prices adjust on trading days, information (such as that of an announced M&A) is subject to no boundaries and is therefore, according to EMH, spread immediately to investors. The stock price effects of a deal announced at a non-trading day will therefore be subject to slightly different dynamics than that of deals on trading days, which could possibly distort comparability of short-term abnormal stock returns. Therefore, deals announced at non-trading days have been omitted.

[14] As all data obtained from DataStream are reported in local currencies, the market capitalization is calculated as the market capitalization in local currency of the day of the deal announcement, translated into USD with the use of that day's spot exchange rate.

7.1.2.7 Thinly traded stocks (ref. 14)

A stock is characterized as 'thinly traded' if it trades infrequently. More specifically, Bartholdy et al. (2007) defined thinly traded stocks as trading less than 40% of trading days (i.e. less than two trading days a week). Irregular trading cause the cumulative stock return to converge to zero, which eventually complicate the forecasting of the expected normal returns and thus distort test statistics (Maynes & Rumsey 1993). Although several methods are proposed to mitigate the effect of thinly traded stocks (e.g. 'trade to trade' or 'lumped returns' (Bartholdy et al. 2007)), such methods do not eliminate the problem entirely. Rather, as suggested by scholars (Maynes & Rumsey 1993), thinly traded stocks will be eliminated from our sample to avoid any *thin trading bias*, and will furthermore increase the reliability of our findings. To identify thinly traded stocks a measure of traded volume turnover is obtained from DataStream. In line with proposed methodology from Bartholdy et al. (2007), a stock is thinly traded when trading less than 40% of the 250-day estimation period. Elimination of thinly traded stock resulted in eliminations of 345 deals.

7.1.2.8 Overlapping events (ref. 15)

An assumption of the event study is zero covariance (i.e. independence) across securities, as it would interfere with the variance calculation of the aggregate abnormal return (MacKinlay 1997). As, this thesis is focused around an industry, where participants are subject to the same competitive forces and industry shocks, event clustering (i.e. non-zero covariance) is highly likely. To the best of our knowledge, there seems to be no single solution to combat this. We believe the elimination of *all* overlapping events would misrepresent the deal-making environment within the narrowly defined industry. However, deals, where more than one deal is announced on the same day for the single acquirer are eliminated (ref. 15), as it follows the same reasoning for excluding deals with more than one acquirer (ref. 8).

7.1.2.9 Other modifications (ref. 16)

Event studies are known to be sensitive to outliers through the OLS estimators, which are used to measure cumulative abnormal returns. The data have been screened for extreme outliers, based on scatter plots, and revealed three deals with unreasonably large cumulative abnormal returns, which affected the mean considerably. The elimination of outliers increases the reliability of the data, but must not occur to such extent that only the favorable deals are included, which would be data manipulation. As the famous saying by Coase goes; *"If you torture the data long enough it will confess"*. Therefore, only the most extreme outliers have been eliminated.

7.1.3 Definition of long-term sample

The above-mentioned search strategy yields a final sample of 550 deals, which is considered the short-term data sample. To arrive at the final long-term sample two modifications are required. Firstly, as mentioned in the methodology section (6.1.4.2), the long-term sample will be reduced to include only those acquirers with geographic origin in countries covered by the benchmark portfolio index, MSCI World Energy Index. Consequently, 58 deals are excluded (ref. 17). Secondly, as the event windows by definition are longer for the long-term event studies the subsequent sample will necessarily be smaller than that of the short-term event study. Specifically, to ensure data availability throughout all three event windows, the long-term sample will exclude the most recent deal announcements with less than 36 months of post-announcement trading days. Subsequently, 117 deals are excluded (ref. 18) to reach a final long-term sample of 375 deals occurring in the time period 2002-2016. See Table 5 for the elimination strategy used to arrive at the long-term sample.

Table 5: Defining the long-term sample

REF.	DATA SAMPLING STRATEGY, EXCEL	# OF DEALS ELIMINATED	SEARCH RESULT
Table 4	*Total sample (final, short-term)*		*550*
17	Exclude deals with acquirers uncovered by the MSCI World Energy Index	58	492
18	Exclude deals announced in 2014, 2015, 2016	117	375
	Total sample (final, long-term)		**375**

Source: own contribution

7.2 Descriptive Statistics and sub-samples

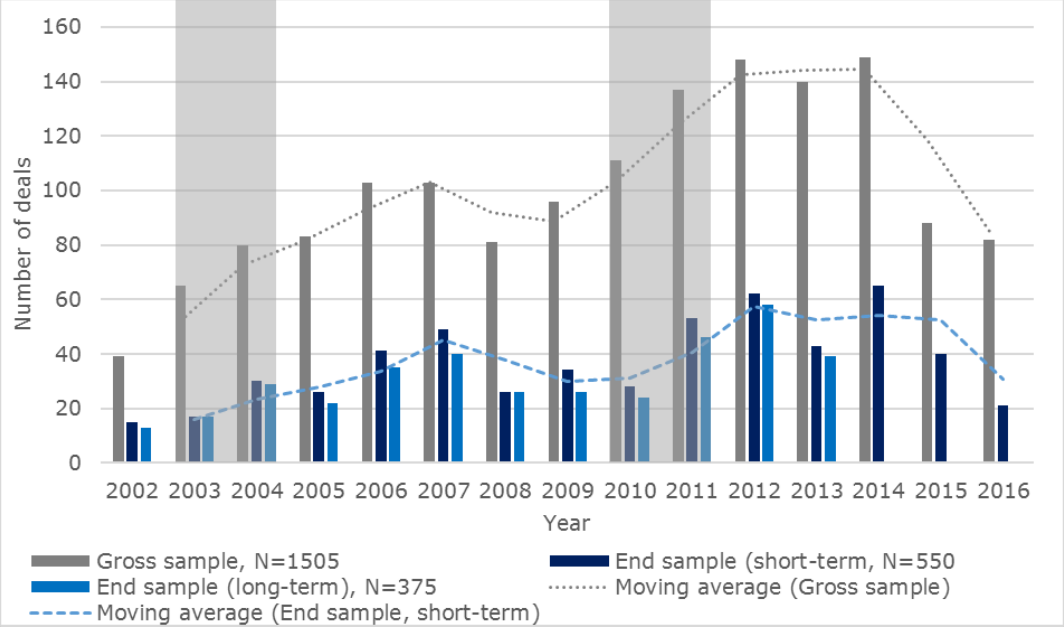
The following section will present the descriptive statistics for our sample. While a wide spectrum of descriptive statistics could be provided, we have limited it to those most relevant to understanding and testing of our defined hypotheses. Within the sub-sections for each sub-sample it will furthermore be identified how each characteristic will be quantified to enable testing in the comparison- and cross-sectional regression analyses.

7.2.1 Merger waves and sample representativeness

Hypothesis 2, which investigates the timing effect of M&A on acquirer value, requires a definition of the upsurge periods within our sample. Specifically, we hypothesize that the ability to respond quickly to industry shocks (e.g. oil price shocks) sets apart the sheep from the goats. Therefore, we define the upsurge of a merger wave as the initial and arguably critical years of a wave *before* it reaches the peak,

where an acquirer's involvement in M&A is initiated due to organizational agility (and skillful trend spotting) rather than mere imitation of competitors. As specified in the literature review, two global merger waves occurred during our sample period: The sixth merger wave took place in 2003 to 2007 and it is argued that we are currently in a seventh merger wave which began around 2011 and so far peaked in 2015 (JP Morgan 2017). However, as the global merger waves might not perfectly correspond to the trends within the O&G industry, we compare the identified global waves M&A activity with our gross sample data on M&A in the upstream O&G industry. Figure 8 shows the annual distribution of deals throughout the sample time period for the gross sample[15] and end-samples for the short- and long-term studies respectively.

Figure 8: Distribution of deals over the sample time period



Source: own contribution

The data reveals a wave-like pattern of merger activity in the upstream O&G industry in 2003-2007 (in accordance with the 6th global merger wave) as well as for 2010-2014, which supports the argumentation for the presence of a seventh merger wave (at least for the industry). Accordingly, we define two periods of merger upsurge; 2003-2004 and 2010-2011. The initial upsurge parallels the sixth global merger wave initiated in 2003 and is validated by the authors as an upsurge, as it represents an initiation period prior to the peak in 2005/2006. The financial crisis in 2007/2008 caused a severe economic downturn throughout the world economy including the O&G industry, which is particularly

[15] The depicted gross sample represents the unfiltered data sample from Zephyr (1,524), though excluding the deals occurring in 2000 and 2001 (19) to ensure consistency with the time period considered (2002-2016).

reflected by the slump in M&A activity in 2008 as depicted in Figure 8. The second merger upsurge is identified in 2010-2011 representing the initial years of the seventh merger wave, with annual M&A volume exceeding the peak of the sixth wave. Despite 2015 being the record year for *global* M&A, our data rightfully displays how the O&G industry experienced a downturn in M&A activity in 2015. This can be attributed to the historical slump in oil prices, demonstrating the decisiveness of energy prices in driving M&A activity.

For each deal, a dummy variable is constructed indicating whether the M&A occurred within the defined upsurge years for the O&G industry (2003-2004 and 2010-2011). Our data sample consists of 128 (116) deals occurring in upsurge years and 422 (259) deals occurring outside of upsurge years for the short-term (long-term) study.

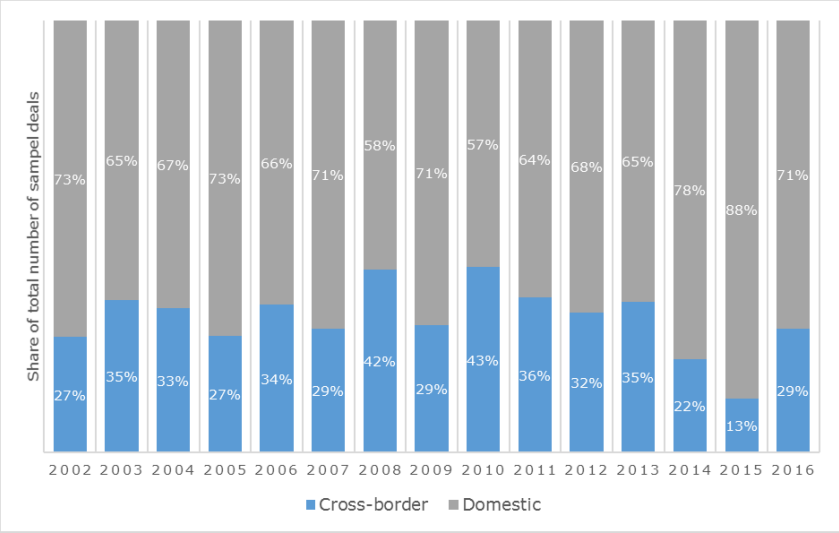
A further note can be made to the representativeness of our end-samples (short- and long-term) relative to the initial gross sample deducted from Zephyr. Comparing the (two-point) moving averages of the gross sample and the end-sample reveals a comparable wave-like pattern. Minor discrepancies apply to the end-sample, which is presumably caused by a slight sample bias, triggered by the strict sample selection steps conducted in Excel. However, as the moving averages reveal a parallel pattern to the gross sample, our end-samples are considered representative.

7.2.2 Cross-border and domestic deals

Hypothesis 3 examines whether there exists a difference in value created from cross-border M&A relative to domestic M&A; thus, each deal in our sample must be denoted as either cross-border or domestic. Based on Zephyr data we define a deal as being cross-border if the acquirer country of origin differs from target country of origin. Likewise, a deal is denoted 'domestic' if acquirer country and target country is identical. For our regression analysis, we construct a dummy variable that equals 1 is the deal is cross-border and 0 if it is domestic. Our data sample consists of 167 (123) cross-border deals and 383 (252) domestic deals for the short-term (long-term) study. Correspondingly, cross-border deals constitute approximately 30% of the total, which resembles the development in global M&A activity, where cross-border represented 36% in 2016. While the global M&A arena experiences increased internationalization and subsequently increased popularity of cross-border deals, the sample data reveals a dissimilar pattern. Figure 9 presents the development in the number of deals in our end-sample (short term) split on cross-border and domestic deals. Accordingly, it is revealed that no clear trend of increased cross-border deals can be observed within the upstream O&G industry, which might challenge

the hypothesis that such are perceived as more value creating than domestic deals. This discrepancy will be considered in the discussion of our findings.

Figure 9: Cross-border development in proportional distribution of sample deals



Source: own contribution

7.2.3 Acquirer size

The size of acquirer can be measured in many ways – e.g. equity market value, number of employees, total assets, sales numbers etc. Inspired by Faccio et al. (2006) we classify acquirers according to their market capitalization in US dollars on the announcement day. From the definition of Nasdaq (2017) large acquirers are defined as firms with a market capitalization above USD 5 billion. This results in a 'large cap' dummy variable that equals 1 if the acquirer has a market capitalization above USD 5 billion, and 0 if the market capitalization is below this level. The samples consist of 139 (71) large cap acquirers and 411 (304) acquirers that are not classified as large cap in the short-term (long-term) samples.

7.2.4 Unlisted and listed targets

The status of the target as being either listed or unlisted is defined based on information extracted from Zephyr. Targets are considered 'listed' if they were publicly listed at the time upon acquisition. In Zephyr, this encompasses targets registered as either 'listed' or 'delisted'. If not registered under these two categories, the target is defined as being unlisted. The argument for including Zephyr-registered 'delisted' targets in the listed category is that Zephyr's output shows the current status of the target at the time of data extraction. Thus, some targets that were publicly listed at the time of the acquisition

would as the consequence of an M&A often be absorbed by the acquirer and consequently the targets' current status would be 'delisted'. To test Hypothesis 5, a dummy variable is constructed. For the value 1 the target is considered unlisted and the value 0 indicates that the target was listed at the time of the acquisition. Interestingly, for both the short-term and long-term sample, unlisted targets represent 82% of the total, leaving just 18% to represent listed targets of the total. While several factors could cause such pattern, it may as well be attributed to our hypothesizing that more value is created from acquiring unlisted targets.

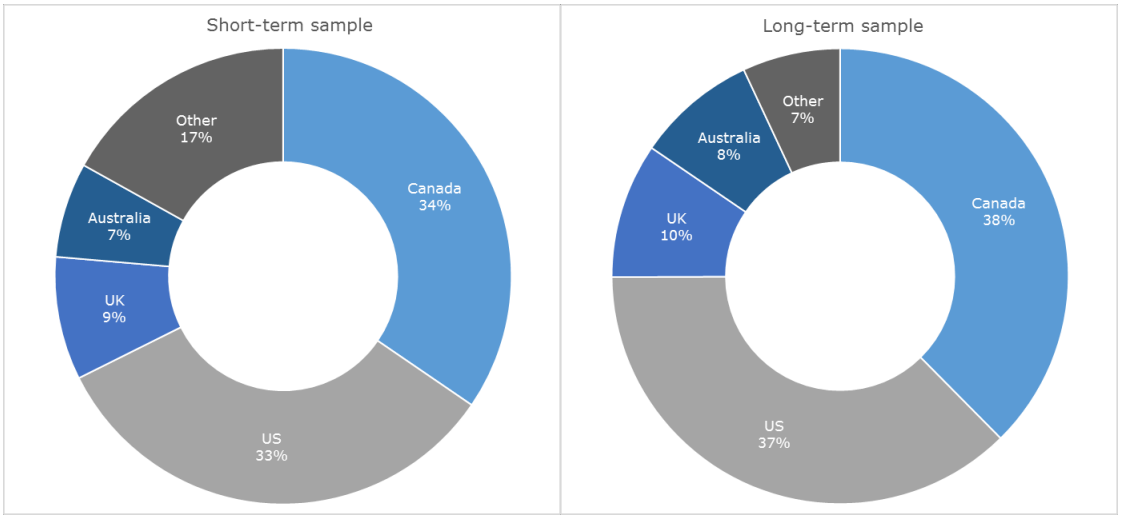
7.2.5 Payment method of deals

M&A deals are hardly financed with either cash or equity. Many use a combination and often also involve debt. The identification of cash-financed deals is based on Zephyr output. Inspired by Andrade et al. (2001) we separate between all-cash deals, and other-financed deals. Thus, we define a deal as cash-financed if 95% of the deal value is financed by cash. Deals that use a mixture of cash, equity, and/or debt are considered as being 'mixed financing'. As cash is hypothesized to be the main driver of value creation, we construct a dummy variable that equals 1 if the deal is defined as cash-financed, and 0 if otherwise. Approximately 25% of our sub-sample is financed by all-cash.

7.2.6 Geographic origin of acquirer

The selected sample is dominated by acquirers with geographic origin in North America, specifically Canada (CA) and the United States (US) representing 34% (38%) and 33% (37%) of the total short-term (long-term) end-sample. The dominance of North American acquirers matches the fact that M&A activity has originated within this region and subsequently might reveal that M&A is more widely used. Furthermore, the high concentration of acquirers in few countries (see Figure 10) might support the fact that O&G activities are highly dependent on the physical location of resources. Canada, US, GB and Australia are all resource-rich nations housing some of the world's largest IOCs. The reason why the more traditional resource-rich countries are not represented in our sample is that such companies are often NOCs and thus not considered to follow the same market mechanisms as the market-driven IOCs. To test whether value creation differs across acquirer countries we construct a dummy variable for acquirers with the value of 1 if located in North America and 0 if otherwise. This ensures coherence with the criteria of minimum 30 occurrences in sub-samples, in order to reach acceptable size and power of the test statistics (Bartholdy et al. 2007). The definition of acquirer country is based on Zephyr information. Including these variables in our cross-sectional regression will further allow us to assess whether our overall results are applicable on a broader scale or if our results are biased due to the high representation of these countries in our sample.

Figure 10: Acquirer country split of end-samples (2002-2016)



Source: own contribution

7.2.7 Overview of sub-samples

Table 6 provides an overview of the sample- and sub-sample sizes.

Table 6: Overview of sub-sample sizes

SUB-SAMPLE SIZES		
N	**SHORT-TERM**	**LONG-TERM**
Overall sample size	*550*	*375*
Within upsurge	128	116
Outside upsurge	422	259
Cross-border	167	123
Domestic	383	252
Target unlisted	452	306
Target listed	98	69
Cash payment	145	90
Other Payment	405	285
Acquirer NA	372	281
Acquirer other than NA	178	94
Acquirer large cap	139	71
Acquirer not large cap	411	304

Source: own contribution

7.2.8 Normality of returns

An assumption of the parametric test is that the means of the sample distribution (i.e. CAR) are normally distributed. Normality is tested for using histograms, boxplots and the Shapiro-Wilk test of normality (see Appendix B). All tests reveal that the data is non-normal with positive skewness and excess kurtosis, implying that the median is smaller than the mean. Especially, BHARs are strongly skewed to the right, which highlights the importance in interpreting the long-term findings with caution. Since the data reveals non-normality the validity of the parametric test is challenged. This can be mitigated by increasing the sample size, as the central limit theorem postulates that *"the sum of a large number of independent variables has a distribution that is approximately normal"* (Ross 1976, p. 252 in Kothari & Warner 2004). Specifically, the large-sample approximation (often referred to as 'asymptotic distribution') is commonly acknowledged among scholars as a sufficient condition of normality, as long as the sample sizes are considered large (i.e. above $N = 30$) (Stock & Watson 2015). Furthermore, Kothari and Warner (2004) validate that the explanatory power of both the short- and long-term event studies are highly sensitive to sample size. With sample sizes of 550 and 375 deals, which are considered large, the bias of non-normality in the parametric test is fairly mitigated. Nevertheless, as the non-parametric test is proven superior to the parametric test in cases of severe non-normality of data (Bartholdy et al. 2007), greater importance will be attributed to the robustness of findings inferred from the non-parametric tests.

CHAPTER 8 | Empirical Findings

This chapter will present the findings from the analysis based on our hypotheses. Firstly, the overall value creation for acquirers is investigated for both the short-term and long-term studies validated by the parametric and non-parametric tests. Secondly, we examine value creation in our sub-samples, which are based on Hypotheses 2 to 7. This part will reveal whether any pre-specified firm- and deal-specific characteristics have greater impact on value creation than others. Lastly, we extend the examination of value drivers to a cross-sectional regression analysis that enables the authors to isolate the effect of one variable by controlling for the other variables. This chapter is strictly limited to the level of quantitative support for our hypotheses, while elaboration and interpretations of our results will be addressed in the discussion (Chapter 9).

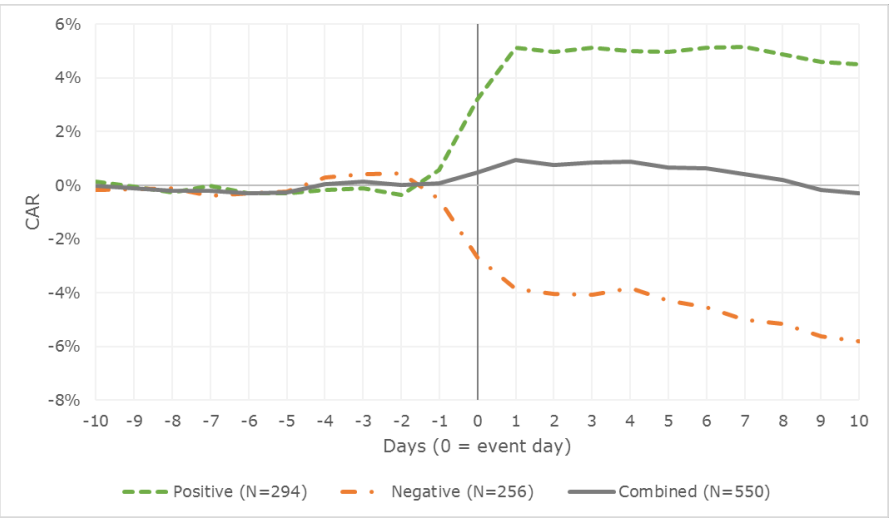
8.1 Overall value creation

In Hypotheses 1a and 1b, which are the baseline of our study, we investigate overall M&A value creation for the shareholders of the acquirer in the short- and long-term. However, as previously stated, we will focus and rely most on the short-term findings, since the long-term study suffers from issues of event isolation, which is also recommended by Fama (1991) and Kothari & Warner (2004).

8.1.1 Short-term value creation

Figure 11 illustrates the value creation for the short-term study.

Figure 11: Cumulative abnormal return split on three-day sign



Source: own contribution

Moreover, splitting the sample into positive and negative value creation, based on the three-day CAR sign, shows that prices seem to stabilize at a new level on the first day following the announcement date – though with a continued negative drift for the negative performers after some days. Nevertheless, the plot alone does not say anything about the significance of CARs; thus, the significance will be covered next.

Table 7 below displays the short-term test statistics and their significance based on the parametric t-test and the Wilcoxon signed-rank test. The announcement effect of 0.92% for the three-day event window, [-1,1], is significantly positive at the 1% level from the parametric test and at the 5% level from the non-parametric test. The eleven-day event window [-5,5] is positive at 0.95% but only rejects the null hypothesis a 10% significance level from the parametric test, with no rejection of the null from the non-parametric test. The CAR for the 21-day event window [-10,10] is insignificant for both tests. Consequently, Hypothesis 1a is supported in the three-day event window and partially in the eleven-day window. This suggests that the M&A announcement does have a short-term positive announcement effect. The inconclusiveness of the 21-day CAR might suggest that the wealth effects of the M&A announcement are short-lived. Overall, the findings suggest that Hypothesis 1a is supported though recognizing the indeed *short-term* effects.

Table 7: Short-term overall value creation

SHORT-TERM OVERALL VALUE CREATION			
N = 550	**[-1,1]**	**[-5,5]**	**[-10,10]**
CAR	0.92%	0.95%	-0.31%
Parametric t-test	2.75 ***	1.77 *	-0.43
Wilcoxon signed-rank test	2.17 **	1.42	0.55

Source: own contribution

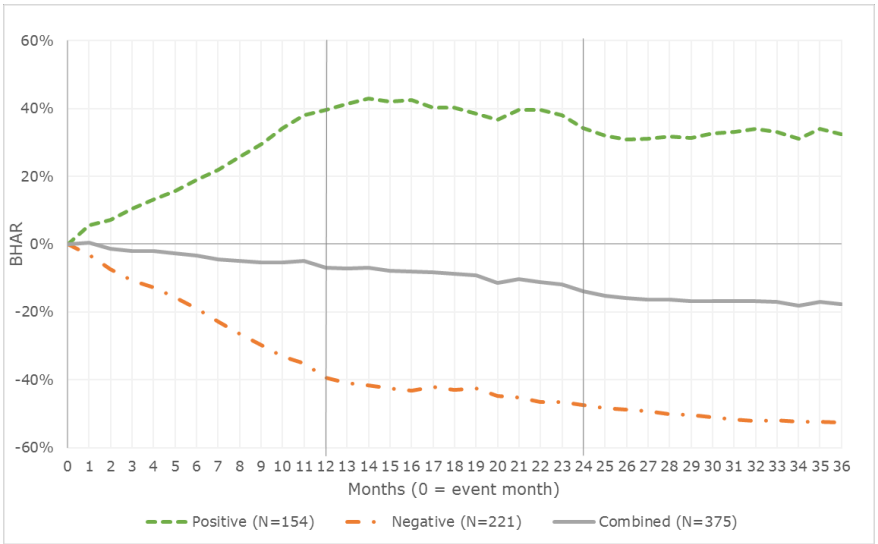
Notes: *Significant at 10%, ** Significant at 5%, ***Significant at 1% (two-sided tests)

8.1.2 Long-term value creation

The overall long-term value creation is examined through Hypothesis 1b over three event window lengths: 12 months, 24 months and 36 months. Like the short-term study, a similar value creation plot split on the one-year BHAR sign is displayed below in Figure 12. It is evident from the figure that the long-term average effect (illustrated by the combined line) has a negative drift, as the event window becomes wider. Moreover, when splitting BHARs based on the one-year sign it becomes clear that the difference between positive and negative performing securities is extreme; by the 36th month following

the announcement, the average BHAR of the positive performers is approximately 90 percentage points greater than the average BHAR for the negative performers. The figure furthermore indicates that most of the value creation or value destruction occurs in the first year, where 221 securities (and thus the majority of our sample) experienced value destruction while only 154 securities benefitted from value creation. After the first year, the BHARs for the positive and negative performers seem to stabilize relative to the development during the first year, although with a slight negative drift.

Figure 12: Cumulative buy-and-hold abnormal return (BHAR) split on one-year sign



Source: own contribution

The overall long-term empirical findings and related test statistics are presented in Table 8 below. For all long-term event windows, we find negative BHARs, which are highly significant for both the parametric t-test and the non-parametric test (Wilcoxon signed-rank test) – only the parametric test for the one-year BHAR shows a 5% significance while the other tests are significant at the 1% level. It is clearly observed that the BHAR decreases over the three years with a one-year BHAR of -7.02%, a two-year BHAR of -13,92%, and a three-year BHAR of -17.60%. Our empirical findings indicate a high degree of (average) value destruction from O&G M&A in the long-term. Nevertheless, the significant negative findings are not surprising, since many long-term studies (especially the ones employing the market model for long-term studies) tend to report significantly negative returns (Martynova & Renneboog 2008). Due to the long-term model specifications as well as the inability to isolate the pure M&A effect, we support existing evidence that conclusions about M&A value destruction in the long-term may be misleading. Therefore, based on our long-term study we are cautious in accepting that M&A on average destroy value in the years following the M&A announcement.

Table 8: Long-term overall value creation

LONG-TERM OVERALL VALUE CREATION			
N = 375	**1 year**	**2 years**	**3 years**
BHAR	-7.02%	-13.92%	-17.60%
Parametric t-test	-2.49 **	-3.60 ***	-3.25 ***
Wilcoxon signed-rank test	-4.26 ***	-6.07 ***	-7.35 ***

Notes: *Significant at 10%, ** Significant at 5%, ***Significant at 1% (two-sided tests)
Source: own contribution

For the remainder of the chapter, we will report our findings, analyzing sub-samples and specific value drivers of O&G M&A, for both the short-term and long-term study; however, as explained, greater emphasis and reliability is attributed to the short-term study.

8.2 Value creation in sub-samples

In order to analyze the remaining hypotheses, the overall sample is divided into sub-samples. By comparing the respective sub-samples (through a mean-comparison test) we can determine whether the stated hypotheses are supported by our empirical findings.

8.2.1 Upsurge in merger waves

The comparison of the merger wave sub-sample pair is showed in Table 9 below. It reports the CAR/BHAR for the overall sample as well as the CAR/BHAR for each sub-sample (within upsurge versus outside upsurge) along with their individual significance. Additionally, the table shows the significance of the difference between the sub-sample means.

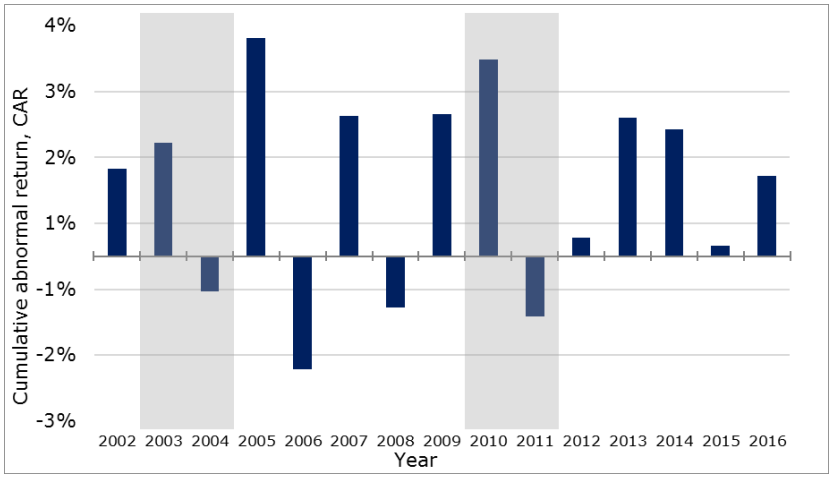
Table 9: Comparing sub-samples - merger wave upsurge

MERGER WAVE UPSURGE						
	OVERALL SAMPLE	WITHIN UPSURGE	OUTSIDE UPSURGE	TWO-SAMPLE T-TEST		
				DIFFERENCE	P-VALUE	RESULTS
SHORT-TERM						
Sample size	*550*	*128*	*422*			
CAR [-1,1]	0,92% ***	0,37%	1,09% ***	-0,71%	0,309	Fail to reject
CAR [-5,5]	0,95% *	0,66%	1,04% *	-0,38%	0,756	Fail to reject
CAR [-10,10]	-0,31%	-0,24%	-0,33%	0,09%	0,957	Fail to reject
LONG-TERM						
Sample size	*375*	*116*	*259*			
BHAR [12]	-7,02% **	4,73%	-12,28% ***	17,01%	0,008 ***	Significant (1%)
BHAR [24]	-13,92% ***	4,87%	-22,33% ***	27,20%	0,003 ***	Significant (1%)
BHAR [36]	-17,60% ***	0,07%	-25,51% ***	25,58%	0,052 *	Significant (10%)

Notes: *Significant at 10%, ** Significant at 5%, ***Significant at 1% (two-sided tests)
Source: own contribution

For the short-term study, the CAR differences between the two sub-samples are insignificant for all event windows, and thus our findings are incapable of giving a conclusive picture. The only significant short-term results reported are for the 'outside upsurge' sub-sample with a CAR[-1,1] of 1.09% and a CAR[-5,5] of 1.04%; significant at 1% and 10% respectively. The CARs for the 'within upsurge' sub-sample are lower but show no significance. While such findings are not conclusive due to a lack of significance, they nevertheless indicate that Hypothesis 2 is not supported – i.e. nothing from the short-term study indicates that M&A are more value creating in upsurge periods. The lack of support for Hypothesis 2 in the short-term study can further be illustrated visually in Figure 13 below, where the average CAR in each year of our sample period seems to be rather random, and at least not higher in the years we define as upsurge years (i.e. 2003-2004, 2010-2011).

Figure 13: Average yearly CAR[-1,1] through the sample time period



Source: own contribution

The long-term study arrives at a rather different conclusion; BHARs for the 'outside upsurge' period are significantly negative (1% level) for all event windows ranging from -12.28% to -25.51%. While the upsurge sub-sample BHARs are not statistically different from zero, the differences between the sub-samples are significant, indicating that M&A within upsurge periods have higher value creation. Such a result is puzzling in comparison with the short-term study, and although the long-term study seems to support Hypothesis 2 we are reluctant to fully accept such a conclusion due to the limitations of the long-term study.

8.2.2 Cross-border versus domestic deals

As seen in the comparison of the cross-border versus domestic deals sub-samples in Table 10 below we fail to reject the null of no difference between cross-border and domestic deals for both the short-term

and the long-term study. Consequently, we find no support for Hypothesis 3 that cross-border deals are superior to domestic deals. Rather, it seems that value creation for O&G firms is not influenced by the nature of the deal being either cross-border or domestic.

Table 10: Comparing sub-samples: cross-border vs. domestic

CROSS-BORDER VS DOMESTIC						
	OVERALL SAMPLE	CROSS-BORDER	DOMESTIC	TWO-SAMPLE T-TEST		
				DIFFERENCE	P-VALUE	RESULTS
SHORT-TERM						
Sample size	*550*	*167*	*383*			
CAR [-1,1]	0,92% ***	0,79%	0,98% **	-0,19%	0,787	Fail to reject
CAR [-5,5]	0,95% *	0,65%	1,08% *	-0,43%	0,721	Fail to reject
CAR [-10,10]	-0,31%	-0,97%	-0,02%	-0,95%	0,557	Fail to reject
LONG-TERM						
Sample size	*375*	*123*	*252*			
BHAR [12]	-7,02% **	-4,92%	-8,04% ***	3,13%	0,645	Fail to reject
BHAR [24]	-13,92% ***	-14,75% *	-13,51% ***	-1,23%	0,891	Fail to reject
BHAR [36]	-17,60% ***	-9,65%	-21,48% ***	11,84%	0,395	Fail to reject

Notes: *Significant at 10%, ** Significant at 5%, ***Significant at 1% (two-sided tests)
Source: own contribution

8.2.3 Size of acquirer

From Table 11 it is clear from the short-term study that large acquirers with a market capitalization above USD 5 billion are less value creating (and possibly value destroying) than smaller acquirers with a market capitalization below USD 5 billion. The difference in means is -1.41% for CAR[-1,1] and negative -1.77% for CAR[-5,5], at the 1% and 5% significance level respectively. Therefore, the short-term findings support Hypothesis 4 that large acquirers are less value creating than smaller acquirers; hence it seems that a size effect exists for O&G firms.

Contrarily, the long-term study report conflicting results, as the two event windows BHAR[24] and BHAR[36] suggest that large acquirers have higher value creation than smaller acquirer (10% and 5% significance level, respectively) – or more specifically, large acquirers are less value destructing compared to smaller acquirers. Although we cannot completely disregard such findings, which are contradictory to Hypothesis 4, we have greater reliability to towards our short-term study where the null is also rejected with a lower p-value.

Table 11: Comparing sub-samples - size of acquirer

SIZE OF ACQUIRER						
	OVERALL SAMPLE	ACQUIRER LARGE CAP	ACQUIRER NOT CAP LARGE	TWO-SAMPLE T-TEST		
				DIFFERENCE	P-VALUE	RESULTS
SHORT-TERM						
Sample size	*550*	*139*	*411*			
CAR [-1,1]	0,92% ***	-0,13%	1,28% ***	-1,41%	0,008 ***	Significant (1%)
CAR [-5,5]	0,95% *	-0,37%	1,40% **	-1,77%	0,032 **	Significant (5%)
CAR [-10,10]	-0,31%	-1,46% ***	0,09%	-1,55%	0,148	Fail to reject
LONG-TERM						
Sample size	*375*	*71*	*304*			
BHAR [12]	-7,02% **	-4,38% *	-7,63% **	3,25%	0,445	Fail to reject
BHAR [24]	-13,92% ***	-5,04%	-15,99% ***	10,95%	0,072 *	Significant (10%)
BHAR [36]	-17,60% ***	-3,34%	-20,93% ***	17,59%	0,026 **	Significant (5%)

Notes: *Significant at 10%, ** Significant at 5%, ***Significant at 1% (two-sided tests)
Source: own contribution

8.2.4 Unlisted target versus listed target

The short-term findings from Table 12 clearly suggest that acquisitions of unlisted targets generate higher value creation than acquisitions of listed targets, as the difference is significant at the 1% level. CAR[-1,1] for unlisted targets is 1.56% and negative -2.00% for listed targets. Similarly, CAR[-5,5] reports 1.77% for unlisted targets and -2.84% for listed targets. The CAR[-10,10] shows the same tendency, though with a weaker significance. All three long-term event windows fail to reject the null hypothesis, but do to some extent display the same tendency as the short-term study. Hence, there is strong support for Hypothesis 5 that the acquisition of unlisted targets is superior to listed targets. Furthermore, the difference in value creation is rather high, ranging between 2.9% and 4.6% for the three short-term event windows. Lastly, our findings suggest that the acquisition of listed targets are not just less value creating but in fact value destroying.

Table 12: Comparing sub-samples - target unlisted versus listed

TARGET UNLISTED VS TARGET LISTED						
	OVERALL SAMPLE	TARGET UNLISTED	TARGET LISTED	TWO-SAMPLE T-TEST		
				DIFFERENCE	P-VALUE	RESULTS
SHORT-TERM						
Sample size	*550*	*452*	*98*			
CAR [-1,1]	0,92% ***	1,56% ***	-2,00% ***	3,56%	0,000 ***	Significant (1%)
CAR [-5,5]	0,95% *	1,77% ***	-2,84% ***	4,61%	0,000 ***	Significant (1%)
CAR [-10,10]	-0,31%	0,21%	-2,68% **	2,89%	0,062 *	Significant (10%)
LONG-TERM						
Sample size	*375*	*306*	*69*			
BHAR [12]	-7,02% **	-5,96% *	-11,72% ***	5,76%	0,289	Fail to reject
BHAR [24]	-13,92% ***	-14,23% ***	-12,51% *	-1,72%	0,826	Fail to reject
BHAR [36]	-17,60% ***	-17,60% ***	-20,09% ***	3,06%	0,744	Fail to reject

Notes: *Significant at 10%, ** Significant at 5%, ***Significant at 1% (two-sided tests)
Source: own contribution

8.2.5 Method of Payment

From Table 13, for CAR[-1,1] it is observed that transactions paid with cash has a CAR of 1.33%, significant at 5% level, while transactions paid with other means have a CAR of 0.77%, significant at 10% level. While this could suggest that paying with cash has a higher announcement effect, we are unable to find a statistical significant difference between the two means for both short-term and long-term event windows. Hence we cannot support for Hypothesis 6; rather our findings suggest that cash-financed deals are not superior to any other payment method.

Table 13: Comparing sub-samples - method of payment

METHOD OF PAYMENT						
	OVERALL SAMPLE	CASH PAYMENT	OTHER PAYMENT	TWO-SAMPLE T-TEST		
				DIFFERENCE	P-VALUE	RESULTS
SHORT-TERM						
Sample size	*550*	*145*	*405*			
CAR [-1,1]	0,92% ***	1,33% **	0,77% *	0,56%	0,424	Fail to reject
CAR [-5,5]	0,95% *	1,17%	0,87%	0,30%	0,773	Fail to reject
CAR [-10,10]	-0,31%	0,90%	-0,74%	1,64%	0,253	Fail to reject
LONG-TERM						
Sample size	*375*	*90*	*285*			
BHAR [12]	-7,02% **	-8,01% **	-6,70% *	-1,31%	0,795	Fail to reject
BHAR [24]	-13,92% ***	-12,99% **	-14,21% ***	1,22%	0,874	Fail to reject
BHAR [36]	-17,60% ***	-11,15%	-19,64% ***	8,49%	0,434	Fail to reject

Notes: *Significant at 10%, ** Significant at 5%, ***Significant at 1% (two-sided tests)
Source: own contribution

8.2.6 Geographic origin of acquirer

Our last hypothesis investigates whether value creation is different for acquirers based in North America (NA) compared to the rest of the world. This hypothesis was generated, since the samples of previous M&A studies have tended to be based in either US and/or Canada, or Europe. Furthermore, two-thirds of our sample proved to be acquirers from North America, which called for an investigation of a geographic effect. However, as seen in Table 14 our findings do not suggest that there is a value creation difference based on whether the acquirer is from North America or elsewhere. Although two short-event windows and all long-term event windows where the acquirer is from North America are statistically significant; no significance is found for the CAR nor BHAR of acquirers based elsewhere. Furthermore, the two-sample t-test fails to reject differences for all event windows. Consequently, we find no support for Hypothesis 7, since CAR and BHAR are not influenced by whether the acquirer is based in North America.

Table 14: Comparing sub-samples - acquirer country of origin

ACQUIRER COUNTRY OF ORIGIN						
	OVERALL SAMPLE	ACQUIRER NA	ACQUIRER OTHER THAN NA	TWO-SAMPLE T-TEST		
				DIFFERENCE	P-VALUE	RESULTS
SHORT-TERM						
Sample size	*550*	*372*	*178*			
CAR [-1,1]	0,92% ***	0,94% **	0,89%	0,04%	0,953	Fail to reject
CAR [-5,5]	0,95% *	1,09% *	0,67%	0,42%	0,718	Fail to reject
CAR [-10,10]	-0,31%	0,15%	-1,25%	1,40%	0,396	Fail to reject
LONG-TERM						
Sample size	*375*	*281*	*94*			
BHAR [12]	-7,02% **	-9,21% ***	-0,46%	-8,75%	0,277	Fail to reject
BHAR [24]	-13,92% ***	-15,54% ***	-9,06%	-6,48%	0,556	Fail to reject
BHAR [36]	-17,60% ***	-22,61% ***	-2,63%	-19,98%	0,232	Fail to reject

Notes: *Significant at 10%, ** Significant at 5%, ***Significant at 1% (two-sided tests)
Source: own contribution

8.3 Cross-sectional regression: Determinants of value creation

The cross-sectional multiple regression is conducted to infer how the cumulative abnormal return is influenced by the different variables. Although the above tests on differences between sub-sample means provided an overall assessment, the regression analysis allows for the evaluation of variables beyond the effect of other variables.

Prior to the analysis, the cross-sectional model is tested for internal correlation, as a strong correlation between two independent variables would result in imperfect multicollinearity. While imperfect multicollinearity is not a problem in estimating the regression coefficients per se, it will cause the individual coefficients (beta) to be imprecisely estimated and thereby question the validity of the cross-sectional model. As demonstrated in Appendices L and M, no strong correlation[16] exists among the variables. Therefore, the explanatory power of the cross-sectional regression analysis is perceived to be unaffected by inter-correlation among variables and is therefore considered to remain valid.

[16] All variables in our model have a correlation below 0.5, which is generally considered as a low correlation (Stock & Watson 2015).

Table 15: Cross-sectional regression output

CROSS-SECTIONAL REGRESSION: DETERMINANTS OF WEALTH EFFECTS FOR ACQUIRERS						
	SHORT-TERM STUDY (DAYS)			LONG-TERM STUDY (MONTHS)		
	CAR [-1,1]	CAR [-5,5]	CAR [-10,10]	BHAR [12]	BHAR [24]	BHAR [36]
Independent variables						
Upsurge	-0,0055	-0,0017	0,0028	0,1756 ***	0,2759 ***	0,2550 *
Cross border	-0,0050	-0,0077	-0,0080	-0,0332	-0,0791	0,0071
Large Cap	-0,0111 *	-0,0131	-0,0097	0,0402	0,1116 *	0,1692 **
Unlisted Target	0,0345 ***	0,0461 ***	0,0269 *	0,0849	0,0306	0,0587
Cash Payment	-0,0001	-0,0045	0,0116	-0,0258	0,0050	0,0768
North America Acquirer	-0,0026	0,0002	0,0975	-0,1015	-0,0995	-0,1903
Intercept	-0,0118	-0,0213	-0,0306	-0,1082	-0,1713	-0,2130
Observations	550	550	550	375	375	375
R^2	0,035	0,023	0,008	0,030	0,035	0,025
Adjusted R^2	0,025	0,012	-0,003	0,014	0,019	0,009
F-statistic	3,97	3,23	1,38	1,81	2,86	3,53
Significance of F-statistic	0,0007	0,004	0,2188	0,0965	0,0099	0,0021

Notes: *Significant at 10%, ** Significant at 5%, ***Significant at 1% (two-sided tests)
Source: own contribution

Table 15 presents the main regression estimates for both the short-term and long-term study. To mitigate potential problems with heteroskedasticity, we use heteroskedasticity-robust standard errors. Generally, the firm- and deal-specific independent variables have difficulties providing significant coefficients. Nevertheless, for the short-term study we find strong evidence (at the 1% level) that the acquisition of unlisted targets is positively correlated with CAR for acquirers; the CAR[-1,1] and CAR[-5,5] increase by 3.45% and 4.61% respectively – both at the 1% significance level. The CAR[-10,10] is less significant (10% level) but still report a 2.69% increase for acquirers when buying unlisted targets relative to listed targets. These findings are consistent with the results from the two-sample test statistic comparing acquisitions of unlisted and listed targets, which provides further support for Hypothesis 5. Additionally, the regression analysis provides weak evidence that large cap acquirers earn 1.11% less CAR compared to acquirers with market capitalization below the large cap category. However, this finding is only significant at the 10% level for CAR[-1,1], while the coefficients for the other event windows are insignificant. Despite the findings from the sub-samples showing a statistical significant difference in large cap and non-large cap acquirers at the 1% and 5% level (for the three- and eleven-day event windows respectively), the cross-sectional findings only support a correlation between large cap acquirers and CAR in the shortest event window [-1,1].

Interestingly, the long-term study finds that upsurge periods are positively correlated with BHAR. The coefficients are statistically significant at the 1% level for BHAR[12] and BHAR[24], while at the 10% level for BHAR[36]. These findings are consistent with the results from the long-term sub-sample comparison, but are in contrast with the short-term findings. Similar to the findings from the long-term

sub-samples, the long-term cross-sectional regression indicate that large cap acquirers experience higher value creation, which is in confliction with the short-term results. In the long-term study, no significance is found for the listed status of the target, which was the variable that showed the greatest significance for the short-term study. It must again be noted that we put greater emphasis on the findings from the short-term study, as we perceive the results as having a higher reliability and validity. Nevertheless, the long-term findings will also be incorporated in the discussion of our results in the next chapter. We will not draw hard conclusions from the long-term results, but rather incorporate them qualitatively.

The measure of fit statistics, R^2 and adjusted R^2 quantifies the extent to which the independent variables explain the variation in the dependent variable. Though the values for our models may seem low (R^2 ranges from 0.8% to 3.5%; adjusted R^2 ranges from 0% to 2.5%), it is not uncommon compared to other studies on M&A value drivers (Moeller et al. 2005). This generally indicates that our regression model, along with much of the M&A literature, do not seem to explain much of the variance of CAR nor BHAR; hence, abnormal returns are influenced by other factors not included in the model of our study and other M&A studies.

8.4 Summary of empirical findings

The short-term empirical findings find that O&G M&A result in a significantly positive overall cumulative abnormal return of 0.92% for the three-day event window. While the eleven-day event window also show positive CAR, only the parametric test is weakly significant. The 21-day event window is not significantly different from zero. Consequently, we find support for Hypothesis 1a that M&A create value in the short-term, but the effect quickly becomes insignificant by widening the event window. The long-term study finds that M&A experience significantly negative BHAR for all event windows, which was expected due to findings from existing literature. These findings support Hypothesis 1b. Nevertheless, we argue that a conclusion that M&A in the long-term destroy value may be misleading. This will be addressed further in the discussion.

The analysis of firm- and deal-specific characteristics' impact on acquirer value creation led to mixed results. The sub-sample and cross-sectional regression analyses show that the acquisition of unlisted targets generate strongly significant greater announcements effect relative to listed targets, for the short-term study. Therefore, we find support for Hypothesis 5. Additionally, the analyses suggest that there is an acquirer size effect although the sign of the coefficient changes depending on the time horizon of the study. The short-term study supports a negative effect of large acquirers on value creation whereas the

long-term study finds the opposite. Hence, Hypothesis 4 is supported by the short-term study but not by the long-term study. For M&A occurring within the defined upsurge periods of a merger wave, the short-term study suggests no significant difference in value creation relative to deals occurring outside the upsurge periods. While less explanatory power is attributed the long-term study, these results suggest that BHARs are significantly greater for acquirers in upsurge periods relative to takeovers occurring outside the defined upsurge periods. Conclusively, this could suggest that Hypothesis 2 is weakly supported, but such conclusion would require further robustness checks. The remaining hypotheses report insignificant results, and thus we find no support for Hypotheses 3, 6, and 7.

CHAPTER 9 | Discussion

This chapter is two-fold. Firstly, we will thoroughly discuss the meaning of our empirical findings within the broader context of the oil and gas industry and M&A literature in relation to what was hypothesized. As our findings seem to contradict the evidence of prior O&G M&A studies a lot of effort will be put into investigating explanations for such discrepancies, as well as discussing the apparent differences in underlying assumptions. The second part of the chapter will discuss the implications our findings may have for practitioners within the O&G industry.

9.1 Discussion of empirical findings

Ideally, the primary purpose of M&A should be to increase overall performance of the firm; for public firms, such performance improvement would be expected to result in a share price increase. Arguably, the high levels of takeover activity in the global market, which is also evident for the O&G industry, would suggest that M&A represent a beneficial strategy to improve firm performance. However, decades of literature examining M&A acquirer value creation have not been able to explain the apparent popularity of such practices. While a thin majority of scholars on average support a slightly positive return to acquirer shareholders in the short-term, for longer time horizons M&A evidence is rather conclusive in reporting significant *negative* performance or at best insignificant returns. The question of whether M&A in fact do provide real benefits is thus as relevant today as it was a century ago.

The following sections will at first discuss the issue of overall value creation in relation to our empirical findings and Hypotheses 1a and 1b. Subsequently, we will consider whether the hypothesized value drivers can be attributed any explanatory power in impacting M&A value creation for acquirers.

9.1.1 Discussion of overall value creation

The stock price reflects investor perceptions of *present* values, which are based on expectations of *future* cash flows. As concluded in the empirical findings, we find significant positive cumulative abnormal (stock) returns for O&G acquirers of 0.92% around the announcement day. Therefore, our short-term findings arguably suggest that investors *initially* expect O&G M&A to create sustained value. Nevertheless, M&A is often an incremental process, where the realization of synergies – and consequently actual economic benefits – to a large extent depends on the post-integration processes. Not knowing with certainty whether the integration will be successful, the investor perception upon deal

announcement does not necessarily reflect the real economic benefits of the M&A. Hence, a conclusion that a merger is successful merely based on short-term investor reactions may not paint the full picture. As we find positive announcement effects, we can at least infer that investors *perceive* the M&A to be of value in the future. Whether it creates real (and sustained) economic benefits, should be backed by other studies – the long-term event study is one proposal.

Interestingly, our findings of positive short-term value creation contrast Ng & Donker (2013a) and Ng & Cox (2016) that find negative announcement effects (CAR) for Canadian and American O&G acquirers respectively. As both studies follow the same methodological procedures and cover identical sample periods (1990-2008), the correspondence of their findings is not particularly surprising. To verify that the discrepancies between their and our findings were not caused by differences in the geographical choice of samples, we tested whether Canadian or American acquirers within our sample had individual explanatory power of acquirer performance. Through an extension of the cross-sectional regression, we find that no explanatory power can be attributed to the country of origin (see Appendix N). This leaves us perplexed as to what might then cause the discrepancies. Possible explanations for the contrasting results come down to (1) different sample periods – our sample period ranges from 2002 to 2016, whereas the abovementioned studies use the sample period 1990-2008 – or (2) the use of different techniques for estimating abnormal returns. Since both studies (Ng & Donker 2013a; Ng & Cox 2016) apply the market model (analogous to our study), the differences in findings might thus be a result of different sample periods.

Where their samples encapsulate the fifth (1993-2000) and the sixth (2003-2007) global merger waves, our sample covers the sixth and the seventh (2011-present). A recent McKinsey study of O&G firms find that different motivations for engaging in M&A each result in different levels of value creation for O&G acquirers, depending on the behavior of oil prices. Specifically, they find that in flat-price environments deals that were motivated by economies of scale to realize cost reductions created positive acquirer return, whereas deals motivated by acquiring new reserves (i.e. growth) were value destroying. Likewise, deals conducted in rising-price environments were more value creating when the underlying deal motive was growth-oriented such as the expansion into new reserves and resource types. Overall, the study found greater acquirer returns for rising-price environments (1998-2015) relative to flat-price environments (1986-1998) (Evans et al. 2016). While our thesis has not investigated the underlying motives of engaging in M&A, the findings of the McKinsey study could help in explaining the difference between our findings of positive value creation in 2002-2016 (i.e. predominantly a rising-price environment) in contrast to prior findings of negative value creation in 1990-2008 (i.e. flat- and

rising-price environments). Consequently, it seems that announcement effects could vary over time, and calls for a further and even wider investigation of O&G M&A value creation.

Besides investigating the causes for differences in our findings relative to that of Ng & Donker (2013a) and Ng & Cox (2016), we find it necessary to challenge the underlying assertion used by these studies to explain their results. Specifically, as mentioned in Hypothesis 1a and 1b, they argue that O&G acquirers *must* experience lower returns simply because of the engagement in M&A. They reason that M&A is driven exclusively by reserves expansion, which would reduce operational risk and hence the required return (Ng & Donker 2013a; Ng & Cox 2016). We, on the other hand, argue that (1) value from M&A can be generated beyond the mere expansion of reserves, and (2) the action of expanding reserves is not necessarily negatively linked to abnormal return (see Hypothesis 1a and 1b). The former could be achieved through other obtainable synergies, such as cost reductions and obtainment of key capabilities (e.g. advanced technologies).

The Royal Dutch Shell acquisition of BG in 2015-2016 exemplifies how O&G deals are motivated by other underlying incentives than merely reserves expansion. Interestingly, while reserves expansion is highlighted as a significant boost to Shell's operating cash flow, the key rationale of the deal arguably expands far beyond such simple addition. As stated by the CEO of Shell, Ben van Beurden:

> *"It is about quality. The combined value of our existing and potential energy projects creates a company more able to brave the cycles in our industry and strengthens our ability to pay the dividend at any oil price that might reasonably be expected"* (Shell 2016).

Thus, like we hypothesized, it is argued that the combination of the two firms is greater than the sum of its parts. As a mega-merger with a deal value of approximately USD 50 billion, it naturally allows for a greater scope of synergies. According to van Beurden these include operational synergies from merging reserves located in the same basins (North Sea), expansion to attractive markets with specialized capabilities (deep-water interests in Brazil), improved relationship building with key stakeholders (Petrobras, the NOC in Brazil), and substantial savings from overlapping costs (Shell 2016). While the benefits may seem exuberant and possibly are highly biased as stemming from the acquirer CEO, we find it interesting and highly consenting with our hypothesizing that the acquiring company highlight the importance of obtaining a broad range of synergies as motivators for engaging in M&A – and thus not merely the access to new reserves.

Our results of positive acquirer announcement effects support our notion that M&A can drive benefits beyond the mere addition of new reserves to the balance sheet. Thus, we challenge the findings of the O&G studies by Ng & Donker (2013a) and Ng & Cox (2016), which leads us to the standpoint that more research is needed to validate whether the discrepancies are indeed caused by timing issues or other unidentified variables.

9.1.1.1 Long-term considerations

Conceptually, long-terms studies are interesting, since they intend to incorporate the closing and post-integration of the deal. The post-integration process is particularly important for the realization of expected synergies and has often proven to be the source of which the expected synergies either are captured or lost. However, methodologically the M&A effect is exceptionally difficult to isolate in the long-term, as numerous overlapping events can affect the return measure. Moreover, as it is inherently difficult to exactly estimate the expected return had the M&A not occurred, slight estimation errors will often prevail, which inflates when accumulated over a long period of time. As emphasized throughout the paper, we therefore recognize that long-term results should be inferred upon with caution.

Whereas the short-term event study suggests that O&G acquirers benefit from a positive abnormal stock return following the engagement in M&A, the opposite is suggested by our long-term event study. This inconsistency can arguably be justified by three distinct explanations. Firstly, as just mentioned, uncertainties of isolating the true effects of the single event question the validity of the long-term models. Consequently, a conclusion drawn from the long-term study, that M&A in the O&G industry are value *destroying*, may be misleading. Secondly, it may be that markets are somewhat irrational and tend to overestimate the potential value creation from the acquisition upon announcement, which leads to positive short-term returns. If this is the case, as more information about the deal is released to the public, investors would revise their expectations downwards. If the downward expectations are greater than the initial (overestimated) increase in acquirer returns it would eventually be reflected as long-term negative returns. While such reasoning might explain the discrepancies of our short- and long-term studies, it seems questionable that investors *systematically* would misinterpret the value potential of all M&A. Lastly, the difficulties of the post-integration processes might be destroying the value potential as expected upon announcement, and thus result in negative long-term returns. Altogether, we believe the methodological issues with the long-term studies imply that such results should be interpreted carefully. With that being said, the magnitude of our negative long-term findings could suggest that the integration process in O&G deals is particularly challenging. Thus, more research is needed to investigate whether such holds true.

9.1.2 Discussion of value drivers

This section will discuss each of the value drivers in relation to our hypothesized and empirical findings. Specifically, it is considered whether any of the identified variables can be of true value in explaining the behavior of the abnormal return of the acquirer engaging in M&A. Ultimately, the revelation of any value drivers could shape the considerations of O&G managers who seek to engage in M&A within the borders of their industry.

9.1.2.1 Upsurge merger wave

Our short-term study finds no significant value creating difference in upsurge periods compared to any other period. While it remains unexplored whether upsurge periods would compare differently to specific other periods (such as peaks, downturn or more stable periods), our hypothesizing was based on prior literature that predominantly found value creation to be greater during the upsurge of a wave. However, as the short-term study was not capable of providing support for Hypothesis 3, it could suggest that mergers occurring in upsurge periods are not necessarily followed by inefficient and irrational mergers, which was argued by previous literature.

In contrast to our short-term results, the long-term findings provide strong support for the hypothesis that deals within our defined upsurge periods are significantly more value creating than other periods. Potentially, such opposing results could suggest that M&A occurring in upsurge periods will be 'compensated' by the market in the long-term but not in the short-term. Upon the immediate announcement of the M&A, the market does not know with certainty whether they are in an upsurge period. Specifically, an increase in M&A activity might not be perceived by investors as a persistent trend marking the beginning of a merger wave, but could just as likely represent a small 'bump', which might not require a strategic response of O&G firms. Due to their fixed-asset nature, O&G firms are often perceived as highly inelastic, where any major strategic investment decisions (e.g. M&A) is complex, time-consuming and often irreversible. As stated by the CEO of Shell (2016); "*This company is like an ocean-going tanker. It takes an age to turn*". Therefore, O&G companies would only be expected to restructure (e.g. engage in M&A) if they perceived the trigger (e.g. industry shock) to be enduring. In our hypothesis we argue, that only the most capable O&G firms are able to detect such industry shocks and react to them in a timely manner. However, the discrepancy of our short- and long-term results might indicate that the average investor is unable to detect whether the increased M&A activity is caused by a true industry shock or a simple irregularity, while in the midst of it. Therefore, the mere fact of increased merger activity is not necessarily enough to immediately (i.e. in the short-term) convince investors that the pursuance of M&A should be more value creating. Rather, it could be

the case that the market only realizes later that the M&A occurring one, two or three years prior fell within an upsurge period, where M&A were potentially considered to be more value creating. Keeping in mind the shortfalls of the long-term study, our suggestion that mergers occurring in upsurge periods could result in higher value creation in the long-term, should be carefully interpreted and necessitates further research.

9.1.2.2 Cross-border relative to domestic deals

The sub-sample and cross-sectional analysis found no evidence for any statistical significant difference in value creation for cross-border and domestic deals. While the evidence from M&A literature is mixed, we anticipated greater value creation for cross-border relative to domestic deals. Our underlying assumption was that O&G firms are highly dependent on sustaining their reserves bases, which we argued increasingly needs to be pursued across borders, due to the depletion of world reserves. However, while our findings suggest that the market does not perceive cross-border deals to be more or less valuable than domestic deals, we still believe the advantages of pursuing growth (i.e. M&A) across borders could be applicable. Our findings could merely suggest that investors perceive the uncertainties and complexities of merging across borders large enough to cancel out such advantages. Perhaps investors are indifferent between cross-border deals – with great opportunities for reserves expansion but high complexity of country-related differences – and domestic deals – with perhaps smaller growth opportunities but greater certainty through home-market familiarity.

In our literature review we emphasized that cross-border M&A activity has been experiencing an upward sloping trend on a global scale since the fifth global merger wave with the enlargement of internationalization. Interestingly, the proportion of cross-border deal activity within the upstream O&G industry has been rather stable throughout 2002-2016 and therefore contradicts this global trend. Some of the discrepancy can be explained by the already high level of industry-wide cross-border deals of approximately 30%, which resembles the record-measure for overall M&A of 36% (see Section 3.1.2). However, it might also be that the severity of depleting reserves is exaggerated, and sustaining the firm's reserve replacement ratio does not necessarily require an increasing rate of global operations. Therefore, the market might perceive a cross-border deal to be just as value creating as a domestic deal taking all aspects into account. While we would suggest for managers to take such considerations into account, no clear inference can be made to determine whether cross-border or domestic deals are more valuable for acquirers.

9.1.2.3 Size of acquirer

The size effect of the acquirer on value created provided us with surprisingly contrasting results for the short-term and long-term study. While our short-term study – consistent with prior M&A evidence – showed that large acquirers experience significantly lower value creation compared with smaller acquirers, our long-term study found the opposite. Existing M&A literature explain the negative correlation between acquirer size and value creation by the tendency of large acquirers to pay higher premiums, which might erode the value potential of the deal. Furthermore, incentive alignment and agency problems can be a bigger issue in large corporations due to the more distinct separation of ownership and control. The tendency of large firms to overpay is particularly evident within the O&G industry. Let alone in the US in 2014, 38 O&G companies recognized capital impairments of USD 84.6 billion following a rash of asset acquisitions (Stevens 2016). It should be noted that the competitive advantages of scale for O&G companies should not be confused with the tendency of large firms to pay higher premiums. Just because they have the resources to pay an excessive premium, does not rationalize that they should do so. Similarly, the tendency of large acquirers to pay excessive premiums does not necessarily mean that scale cannot be advantageous[17].

While less importance is attributed to the long-term results, it is puzzling how the size effects differ from the short-term study. These discrepancies might indicate that the direction of the size effect is inconclusive, possibly caused by unidentified and disturbing variables, or that large firms in the long-term can more successfully integrate the target. However, as the long-term studies suffer from methodological issues, greater explanatory power should be attributed to the short-term evidence. Thus, we argue that large acquirers are prone to suffer from lower value creation from M&A relative to acquirers with market capitalizations below 5 billion USD. Such finding would at first seem of little use to managers, as it would strictly suggest that large cap O&G firms should avoid M&A. Rather, we propose that managers of large O&G firms should direct greater attention and carefulness to the screening process of targets to avoid paying excessive premiums that plausibly could be the reason for their inferior performance relative to smaller acquirers.

9.1.2.4 Unlisted relative to listed target

Our findings from the short-term event study provide strong evidence that, within the upstream O&G industry, acquiring unlisted rather than listed targets is considerably more valuable for acquirers. The difference is sizeable and significant at high confidence levels, and furthermore robust when controlling

[17] Recall the argumentation in Hypothesis 1a and 1b that increased scale and a subsequently larger capital base are perceived to represent one of the competitive advantages for O&G firms enabling them to brave the industry cyclicality and convince resource-rich nations to grant them access to their reserves.

for other independent variables, through our cross-sectional regression. Furthermore, the findings suggest that the mere act of acquiring listed targets is significantly value *destroying*. Our findings are consistent with the majority of prior M&A literature that, nevertheless, have not been able to determine the underlying reason(s) for why this is the case. For the upstream O&G industry we propose that accessibility of capital could be a decisive factor in explaining such. The productive output of O&G firms is highly dependent on large fixed assets, which require massive capital investments to acquire, develop, maintain and even shut down such assets. While debt is a possibility for unlisted targets, there is an obvious limit to the amount that can be raised, which makes it inferior to equity capital raised on stock exchanges. Hence, there is a chance that the constraint on capital for unlisted targets could translate into a constrained optimization of the investment strategies pursued by such targets. If this was the case, then a listed acquirer could improve the efficiency of the previously constrained unlisted target by simply lifting the liquidity constraint.

While the difference in value creation between acquiring listed and unlisted targets may be explained by other unidentified fundamental factors, we suggest that managers of O&G firms should keep in mind the prevalent benefits of acquiring unlisted targets. However, it must also be stressed that a seemingly attractive *listed* target should not be disregarded simply because of its trading status, since the concept of value creation is not solely dependent on target status. Lastly, it should be noted that no significant differences between listed and unlisted targets were observable from the long-term event study. The reasons could be two-fold; (1) methodological problems of capturing the effect, and (2) value creation is unaffected by target status in the long-term. As the findings of the short-term studies are highly confident we argue the likelihood of the latter argument to be low.

9.1.2.5 Method of payment

Unlike much existing M&A literature, our findings suggest that method of payment has no effect on value creation, when measured as cash-financed deals relative to any other payment method. Where M&A evidence tends to find a positive link between cash-financing and value creation (often rationalized based on asymmetric information), some scholars have argued that the effect might not have direct causation with method of payment. Rather such scholars suggest the link is explained by some other underlying effect, yet to be identified. Our findings for the O&G industry suggest that cash as a method of payment is not superior to any other method of payment consistent with the meta-analysis of King et al. (2004). Hence, it seems that investors in O&G firms do not perceive method of payment as a revealing factor of the acquirer management's confidence in their ability to create value in

M&A. Rather, other factors are possibly more important for the market when evaluating the potential value creation of an acquisition.

9.1.2.6 Geographic origin of acquirer

The inability to find any statistical significant difference between North American acquirers and the remainder of our sample, suggest that our findings are unbiased from the high representation of North American acquirers. Furthermore, it suggests that our findings are broadly applicable to the global O&G industry, independent of acquirer country. As mentioned in the discussion, we were inclined to test the robustness of our results to Canadian and American acquirers respectively against the remainder sample, as our findings oppose recent studies finding negative value creation for such acquirer countries. This analysis yielded no evidence of any differences[18]. Therefore, we posit that acquirers located in certain countries do not experience any benefit over other nationalities within our sample.

9.1.3 Concluding remarks

It is important to highlight that, while the upstream O&G industry is one of the most active industries in terms of M&A, surprisingly little research has been devoted to investigating the performance effects of such. Therefore, while we had hoped to identify more evident drivers of O&G acquirer value creation, it should be kept in mind that we are tapping into a rather uninvestigated field (i.e. the industry) with little benchmarking against other studies (i.e. few previously identified variables have been proven to be of importance in the O&G industry). The emergence of a few recent studies on the performance effects related to the highly unique oil and gas industry supports our notion that this is a particularly interesting industry to investigate. Our short-term studies evidence value-creation for upstream O&G acquirers, which could be one of the explanations for the recent intensification of M&A activity within the industry. However, the long-term evidence of value destruction contrasts such findings, and leaves us puzzled as to (1) whether the benefits of M&A not yet have been methodologically detected, (2) whether it is practitioners that continue to pursue M&A due to irrational managerial behaviors, or (3) whether the post-integration processes eliminate all potential value creation.

[18] We also tested whether the geography effect of acquirers from United Kingdom and Australia, as these were the third and fourth largest represented acquirer countries, which furthermore constituted sub-samples large enough to ensure statistical robustness (i.e. N>30). No statistical significant differences were found. See Appendix N.

9.2 Strategic and managerial implications

9.2.1 M&A as a strategic tool for growth

The upstream O&G industry, characterized by cyclical, high-risk and capital intensive business divisions, requires O&G firms to be flexible and capable of making difficult choices. Historically, industry players have responded to changes in the business environment with waves of consolidation to obtain the necessary scale and financial robustness that is required to brave the cycles initiated by industry shocks. Hence, while M&A have presented a critical tool for strategic growth and improved firm performance, it has arguably also proved to be an important survival mechanism in the industry. However, research finds that 70-90% of mergers fail (Christensen et al. 2011). Subsequently, the question then arises of whether M&A is a valuable strategic tool to achieve growth and increased robustness when compared to the alternatives of internal development or partnerships and alliances with other companies.

While our study found evidence of short-term value creation for O&G M&A, this finding is an *average* measure indicating that some acquisitions were perceived more favorable and others less promising. Hence, we cannot exclusively presume that O&G M&A in nature are always value creating. Indeed, M&A is inherently risky and the extent to which the assumed synergies are realized is highly uncertain. Nevertheless, the alternative modes for growth and firm improvement may not per definition be any better. Partnership or alliances can in some circumstances be beneficial but are also highly complex processes that encompass giving up full control. Improving firm performance through internal development has similarly proven to be problematic, costly and highly uncertain.

Especially within the upstream O&G industry, internal development and discovery of resources is a longsome and costly process with a high degree of uncertainty as to whether a 'new reserve project' will be economically profitable and whether the company will even be granted access to drill and operate. Subsequently, growth through M&A *"may seem like an easy and obvious solution. After all, with the acquisition of established companies, acquirers effectively circumvent much of the challenge and uncertainty surrounding the internal, organic growth process"* (King et al. 2004, p.197). Furthermore, it is generally acknowledged that M&A offer faster access to resources compared to internal development. The element of speed might for O&G firms be extremely valuable considering the high degree of industry shocks that often necessitates strategic action. As presented, there are risks and obstacles for

both internal development and partnerships as well, and thus M&A may be no more difficult to successfully execute than other alternative strategies to improve firm performance.

9.2.2 'Lower for longer' scenario

The drop of oil prices in June 2014 sent a shockwave through the O&G industry. While, the current oil prices cannot be considered low in a historical context and volatility in prices should not be a surprise to an inherently cyclical industry, the 2014-price drop may be an indicator of a more serious source of concern. As argued in the industry review, there are specific reasons to believe that oil prices may be adjusting to a new lower level, which possibly could reflect changes in the fundamental dynamics of the industry. Several interpretations can be made from this;

On the one hand, if prices remain lower for the next couple of years, we might need to be cautious in extrapolating our results to the future O&G deal environment. The recent McKinsey study (Evans et al. 2016) suggest that different values are ascribed to different M&A strategies depending on which pricing-environment such deals are conducted within. Specifically, low-price environments reward scale economies and cost reduction efforts, while high-price environments reward growth-seeking opportunities. This thesis has investigated the value creation attributed to O&G acquirers in a predominantly rising oil price environment, 2002-2016. If prices will remain lower for longer, and thereby mark a new era of flat-price environments, practitioners will possibly pursue different M&A strategies than what has been prevalent within our sample period. While our study does not investigate the different strategic motivations underlying M&A deals, the McKinsey findings could suggest that our results would be different had we tested it within a flat-price environment. Therefore, if prices indeed will remain lower the applicability of our results in future O&G deal-making is uncertain.

On the other hand, if the lower prices do not merely represent an interim down cycle but rather a fundamental change in the underlying dynamics of the industry, then we suggest a revision is needed of the way in which value creation is perceived within the industry. Arguably, this would have significant impacts for the way in which deals (M&A) are conducted. The reasons are three-fold and extend beyond the mere decrease in oil prices. According to Stevens (2016), the business models of O&G firms are built upon three underlying assumptions: (1) demand for O&G is ever growing, (2) O&G reserves are scarce, and (3) reserves are an appreciating asset (Ng & Donker 2013a; Stevens 2016). In recent years, the validity of each of these assumptions have been challenged (Stevens 2016).

Firstly, due to the embeddedness of O&G within our industrialized societies, the robustness of demand growth has for long been taken as given. Subsequently, the O&G business model assumes that value can be maximized simply by increasing reserves and production; *"if oil is found, customers will follow"* (Stevens 2016, p.16). However, intensifying pressures to decarbonize the world economy and increasingly competitive renewable sources of energy seem to limit the demand for O&G and accelerate the notion of 'peak oil'. If demand is not growing endlessly, then O&G firms cannot necessarily generate value simply by producing more and expanding their reserves base.

Secondly, the impression of O&G scarcity might be overrated. As argued by BP: *"global proved oil reserves (the narrowest category of resources) have more than doubled over the past 35 years"* (BP 2017) suggesting that even though O&G represent *non-renewable* resources, their rate of depletion will not be relevant for the next foreseeable future. Lifting the perceived constraint of supply scarcity would result in an even greater excess supply (than forecasted), which would keep the lid on prices. Persistently low prices would translate directly into lower profitability of O&G firms.

Thirdly, reserves have for long, and are still to a large extent, considered as a de facto appreciating asset, which is based on the underlying assumption that energy prices (which determine the value of reserves) and oil demand are ever-increasing in the long-term. However, as argued in the industry review, it might no longer be the case that lower prices will be followed by higher prices and consequently the value of reserves cannot be perceived as continuously increasing.

Altogether, if demand is not growing, O&G are not scarce and reserves are not necessarily appreciating in value, then O&G firms would have to rethink their business models. As argued throughout the paper, the IOCs (and scholars) often seem to be too obsessed with reserves expansion and interim cost-cutting with the expectation that oil prices eventually will rise. However, if the above argumentation holds and prices will indeed not rise, then O&G firms must seek value elsewhere. The successes of Independents that specialize within a specific area of expertise (such as advanced technologies) suggest that the traditional IOCs could more sustainably pursue value creation by redirecting efforts to the development of key technological and managerial capabilities. It could also be argued that if O&G demand is significantly declining, O&G firms might reconsider transitioning into the neighboring renewable sources of energy. No matter how O&G companies choose to pursue value, we believe the redefinition of value creation would have severe consequences for the strategies pursued by O&G firms. As M&A is considered a *strategic* tool for growth, this change would fundamentally affect the way in which M&A is conducted: if value cannot be created by expanding reserves, would O&G managers then engage in

just as intense M&A activity as we see today? Would O&G mergers and acquisitions instead be motivated by the objective of obtaining key capabilities, such as advanced technologies and managerial competencies? And would it even make sense to *acquire* such capabilities or should they be developed internally? We believe the winners will be those O&G firms that are able to predict *and react* to the (possibly) changing industry dynamics.

9.2.3 M&A outside the borders of the industry

This study solely examined acquisitions of upstream O&G companies by other upstream O&G companies, and though oil and gas will likely be the dominating source of energy for many years to come, the increasing renewables sector as a potential game-changer for O&G firms cannot be completely ignored. Big IOCs like Total, ExxonMobil, Royal Dutch Shell, Chevron and BP are potentially facing a critical choice of how they perceive themselves as energy companies going forward: "*Do they diversify into wind and solar power to compete in a world of tightening curbs on greenhouse gas emissions and increasingly competitive renewable energy and storage? Or do they stick to oil and gas, knowing the world will continue to need fossil fuels for decades to come?"* (Crooks & Stacey 2016).

From a historical point of view, it seems that O&G companies should stick to what they know best. While a few European O&G companies are increasing their investments in renewables – e.g. Statoil is developing its offshore wind business, and Total has acquired major stakes in solar power and battery technology firms – they are still relatively minor business divisions compared to their core O&G business (Crooks & Stacey 2016). Furthermore, other O&G firms have largely failed their efforts in renewables and shut some of them down – e.g. BP pulled out of solar power in 2014 and tried to sell their wind operations in 2013 (Crooks 2016). The reduced focus on renewables arguably *"because they [IOCs] don't really believe in it, and they haven't brought in the right expertise"* (Crooks & Stacey 2016). Succeeding in a new business requires both executive prioritization and the proper know-how, which can be difficult to achieve solely through internal development without any renewable-specific capabilities.

However, the change is now that wind and solar energy *can* be profitable; in fact, it was recently announced that an off-shore wind farm will for the first time ever run subsidy-free, which is a breakthrough for the cost competitiveness of wind power (DONG Energy 2017). It further demonstrates that the gradual increase in renewables at the expense of fossil fuels is viable. The increased competitiveness of renewables opens for the possibility that some O&G firms in the next decade may

slowly shift from mainly being oil and gas firms towards 'energy companies'. Such strategic decision would possibly provide O&G firms with a viable alternative to circumvent the ever more present challenges of tough market conditions within their core segments. Part of a possible shift to renewables would likely to take place through the engagement in M&A, which could indeed prove to be value creating for shareholders if handled correctly. Specifically, the minority shareholder group opposing Shell's acquisition of BG argued that there were better ways for Shell to spend their money, highlighting a possible expansion into renewables, which arguably would better prepare the company for the future.

CHAPTER 10 | **Conclusion and Future Research**

This thesis investigates M&A value creation, measured as abnormal returns, for acquirers in the global upstream oil and gas industry from 2002 to 2016. In addition, it explores whether firm- and deal-specific characteristics have had any explanatory effect on such value creation.

Using the event study methodology, we test whether upstream oil and gas acquirers experience value creation in the short-term and long-term when engaging in M&A. Value creation is measured as cumulative abnormal return, and the statistical significance of such is tested through parametric and non-parametric tests. We find a significantly positive abnormal return of 0.92% for acquirers in the shortest event window of three days surrounding the announcement date. This finding is significant at the 1% level but as the event window widens the statistical significance weakens. While the presence of value creation suggests that the immediate announcement effect for acquirers engaging in M&A is perceived positively by the market, the insignificance of the 21-day event window suggests that the wealth effects may be short-lived. Our short-term findings add to the part of M&A literature that finds significant – but small – positive abnormal returns accruing to acquirers.

In coherence with the majority of M&A scholars, we find significant evidence of negative long-term abnormal returns for acquirers. Specifically, we find buy-and-hold abnormal returns of -7.02% for acquirers twelve months following the M&A announcement. This may suggest that difficulties in the post-integration process destroy the value potential assumed upon M&A announcement. Throughout this thesis, we have stressed that the measurement of abnormal returns in long-term studies particularly suffer from challenges in isolating the true effects of the single M&A event. Therefore, the long-term results should be inferred upon cautiously, and in line with several scholars, we argue that the true long-term wealth effects of M&A remain ambiguous.

Additionally, our thesis seeks to uncover specific M&A value drivers, which are tested using a two-sample test statistic and a cross-sectional regression analysis. From thorough reviews of M&A literature and industry dynamics we identify six potential firm- and deal-specific characteristics that are hypothesized to be influencing value creation for upstream O&G acquirers. We find strong significant evidence that the acquisition of unlisted targets is considerably more valuable for oil and gas acquirers

than the acquisition of listed targets in the short-term study. Additionally, we find support in the short-term study that large acquirers experience lower abnormal returns than smaller acquirers; however, this effect is reversed and significant for the long-term study, which suggests that inference of a size effect should be made with caution. Lastly, our long-term study suggests that acquisitions announced in our defined upsurge periods of merger waves are more value creating compared to M&A occurring outside the upsurge period. Due to the methodological concerns with the long-term event study, such findings are however only indicative and require further validation. We find no evidence that the value creation of acquirers is influenced by cross-border relative to domestic deals, cash-financed deals relative to deals financed with other payment methods, nor different geographic origins of acquirers.

The upstream O&G industry is one of the most active industries in terms of M&A but surprisingly little research has been devoted to investigating the wealth effects of such. Two recent studies have evidenced negative short-term abnormal returns for O&G acquirers in North America, which contrasts our findings. While the discrepancies might be attributed to differences in sample time periods, we challenge the conclusiveness of their findings. Further research is needed to validate whether the discrepancies are indeed caused by timing issues or other unidentified variables. Additionally, inspired by the findings of Evans et al. (2016), it remains particularly interesting to examine whether more specific strategic motivations for engaging in M&A benefit shareholders differently. This would put even further focus on the context within which M&A is configured.

Intrigued by Lubatkin (1983), this thesis focuses on a single industry to avoid the over-generalization and oversimplification prevalent in existing M&A literature. While we find support that value is indeed created for acquirers engaging in M&A with industry-related targets, the complete notions of value creation and value drivers do not seem to be fully exhausted. Recognizing that M&A is a complex and wide-reaching phenomenon, it is possible that more qualitative research methods (e.g. interviews and case studies) could elucidate our understanding of how value is created. Meanwhile, the continuous increase in the global deal-making environment indicates that practitioners will continue to pursue growth and value creation through M&A.

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APPENDIX A: MSCI World Energy Index Factsheet

MSCI WORLD ENERGY INDEX (USD)

The MSCI World Energy Index is designed to capture the large and mid cap segments across 23 Developed Markets (DM) countries*. All securities in the index are classified in the Energy sector as per the Global Industry Classification Standard (GICS®).

CUMULATIVE INDEX PERFORMANCE - GROSS RETURNS (USD) (MAR 2002 – MAR 2017)

ANNUAL PERFORMANCE (%)

Year	MSCI World Energy	MSCI World	MSCI ACWI
2016	27.57	8.15	8.48
2015	-22.17	-0.32	-1.84
2014	-11.02	5.50	4.71
2013	18.84	27.37	23.44
2012	2.50	16.54	16.80
2011	0.70	-5.02	-6.86
2010	12.52	12.34	13.21
2009	27.04	30.79	35.41
2008	-37.71	-40.33	-41.85
2007	30.39	9.57	12.18
2006	18.41	20.65	21.53
2005	29.39	10.02	11.37
2004	28.82	15.25	15.75
2003	26.72	33.76	34.63

INDEX PERFORMANCE — GROSS RETURNS (%) (MAR 31, 2017)

	1 Mo	3 Mo	1 Yr	YTD	ANNUALIZED 3 Yr	5 Yr	10 Yr	Since Dec 30, 1994
MSCI World Energy	0.17	-4.79	15.29	-4.79	-6.20	-0.26	1.65	9.02
MSCI World	1.14	6.53	15.43	6.53	6.12	9.99	4.81	7.44
MSCI ACWI	1.29	7.05	15.69	7.05	5.65	8.97	4.56	7.27

FUNDAMENTALS (MAR 31, 2017)

	Div Yld (%)	P/E	P/E Fwd	P/BV
MSCI World Energy	3.59	563.75	21.34	1.67
MSCI World	2.43	22.09	16.61	2.31
MSCI ACWI	2.43	20.99	15.96	2.21

INDEX RISK AND RETURN CHARACTERISTICS (MAR 31, 2017)

	Turnover (%) [1]	ANNUALIZED STD DEV (%) [2] 3 Yr	5 Yr	10 Yr	SHARPE RATIO [2, 3] 3 Yr	5 Yr	10 Yr	Since Dec 30, 1994	MAXIMUM DRAWDOWN (%)	Period YYYY-MM-DD
MSCI World Energy	4.06	18.65	17.01	21.34	-0.27	0.05	0.14	0.40	55.93	2008-05-21—2009-03-03
MSCI World	2.34	10.64	10.95	16.54	0.58	0.90	0.31	0.37	57.46	2007-10-31—2009-03-09
MSCI ACWI	2.74	10.80	11.06	17.01	0.53	0.81	0.29	0.36	58.06	2007-10-31—2009-03-09

[1] Last 12 months [2] Based on monthly gross returns data [3] Based on ICE LIBOR 1M

* Developed Markets countries include: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Hong Kong, Ireland, Israel, Italy, Japan, Netherlands, New Zealand, Norway, Portugal, Singapore, Spain, Sweden, Switzerland, the UK and the US.

The MSCI World Energy Index was launched on Sep 15, 1999. Data prior to the launch date is back-tested data (i.e. calculations of how the index might have performed over that time period had the index existed). There are frequently material differences between back-tested performance and actual results. Past performance -- whether actual or back-tested -- is no indication or guarantee of future performance.

MSCI

MSCI WORLD ENERGY INDEX

MAR 31, 2017

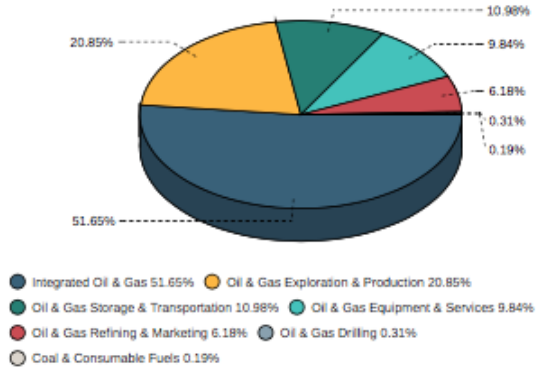
INDEX CHARACTERISTICS

	MSCI World Energy
Number of Constituents	90
	Mkt Cap (USD Millions)
Index	2,335,794.92
Largest	340,070.32
Smallest	1,905.73
Average	25,953.28
Median	9,458.50

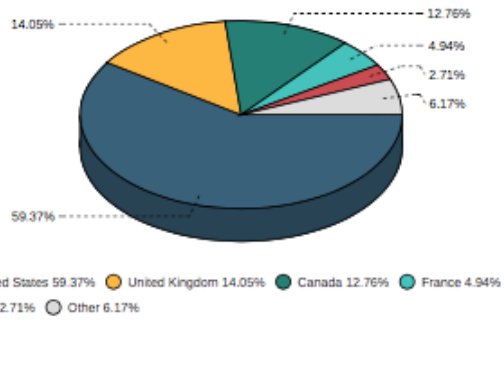
TOP 10 CONSTITUENTS

	Country	Float Adj Mkt Cap (USD Billions)	Index Wt. (%)
EXXON MOBIL CORP	US	340.07	14.56
CHEVRON CORP	US	202.69	8.68
TOTAL	FR	115.40	4.94
ROYAL DUTCH SHELL A	GB	114.53	4.90
SCHLUMBERGER	US	108.66	4.65
BP	GB	108.26	4.63
ROYAL DUTCH SHELL B	GB	102.31	4.38
ENBRIDGE	CA	68.05	2.91
CONOCOPHILLIPS	US	61.79	2.65
EOG RESOURCES	US	56.23	2.41
Total		1,278.00	54.71

SUB-INDUSTRY WEIGHTS



COUNTRY WEIGHTS

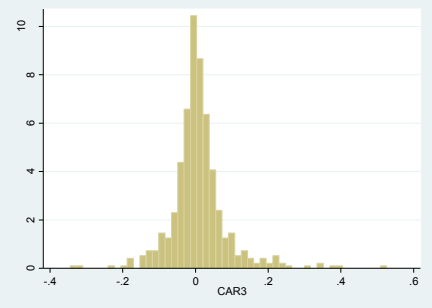


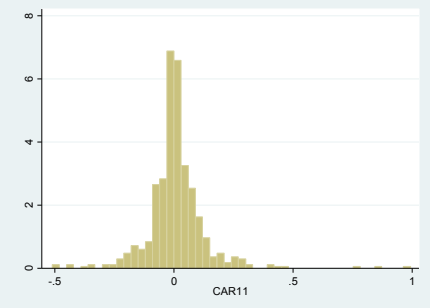
INDEX METHODOLOGY

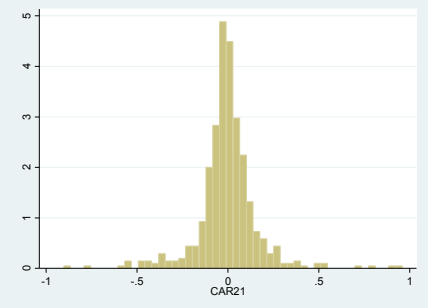
The index is based on the MSCI Global Investable Market Indexes (GIMI) Methodology —a comprehensive and consistent approach to index construction that allows for meaningful global views and cross regional comparisons across all market capitalization size, sector and style segments and combinations. This methodology aims to provide exhaustive coverage of the relevant investment opportunity set with a strong emphasis on index liquidity, investability and replicability. The index is reviewed quarterly—in February, May, August and November—with the objective of reflecting change in the underlying equity markets in a timely manner, while limiting undue index turnover. During the May and November semi-annual index reviews, the index is rebalanced and the large and mid capitalization cutoff points are recalculated.

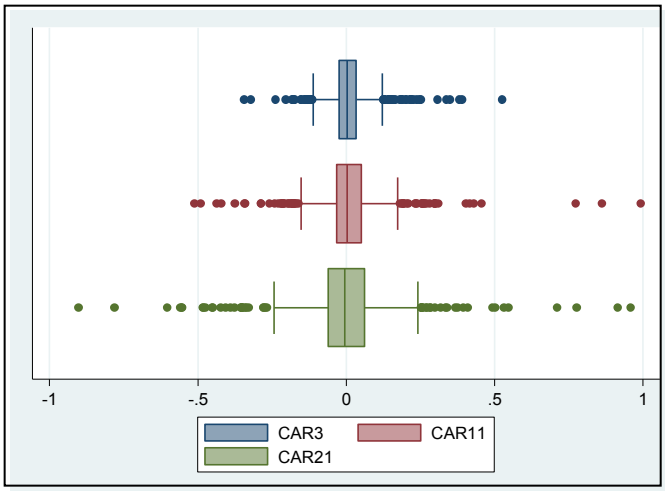
APPENDIX B: Stata output – test for normality in sample data

```
. swilk CAR3 CAR11 CAR21

                    Shapiro-Wilk W test for normal data

    Variable |   Obs        W          V          z       Prob>z
-------------+-------------------------------------------------
        CAR3 |   550    0.87059    47.439      9.317    0.00000
       CAR11 |   550    0.82572    63.888     10.036    0.00000
       CAR21 |   550    0.86210    50.554      9.471    0.00000
```



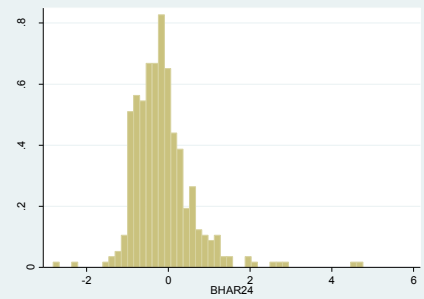


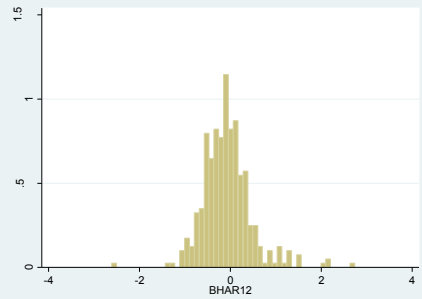


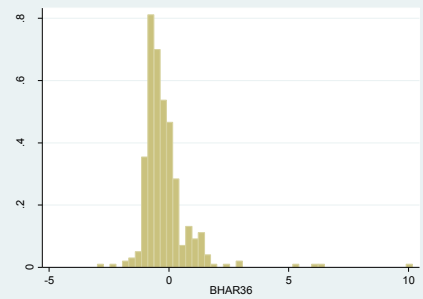


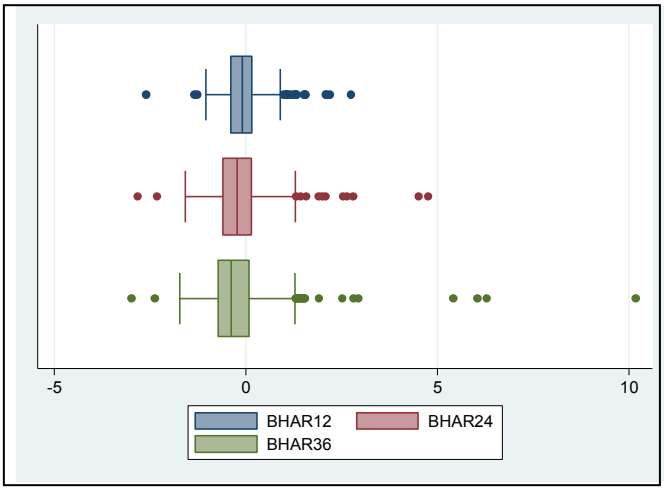

```
                          CAR3
-------------------------------------------------------------
      Percentiles      Smallest
 1%    -.1789909      -.3447287
 5%     -.098057      -.3209128
10%    -.0643106      -.2382076       Obs                 550
25%    -.0244914      -.2038923       Sum of Wgt.         550

50%     .0032133                      Mean           .00921
                       Largest       Std. Dev.      .0785727
75%     .0341476       .3506748
90%     .0873963       .3818195       Variance       .0061737
95%     .1411049       .3898444       Skewness       1.185631
99%      .307578       .5263376       Kurtosis       10.76141

                          CAR11
-------------------------------------------------------------
      Percentiles      Smallest
 1%    -.3431563      -.5110507
 5%    -.1747052      -.4893192
10%    -.1035322      -.4364251       Obs                 550
25%    -.0328869      -.4221245       Sum of Wgt.         550

50%     .0029156                      Mean          .0094899
                       Largest       Std. Dev.      .1259913
75%     .0521803       .4572427
90%     .1191491       .7745866       Variance       .0158738
95%     .1925618       .8619462       Skewness       1.650852
99%     .4170072       .9935192       Kurtosis       17.12235

                          CAR21
-------------------------------------------------------------
      Percentiles      Smallest
 1%    -.5526904      -.9027491
 5%    -.2436523      -.7815284
10%    -.1391211      -.6032444       Obs                 550
25%     -.061036      -.5599844       Sum of Wgt.         550

50%    -.0046605                      Mean          -.0030523
                       Largest       Std. Dev.      .1667916
75%     .0614117       .7115117
90%     .1420557       .7765688       Variance       .0278194
95%     .2280319       .9156797       Skewness       .2251952
99%     .5309858       .9593476       Kurtosis       11.04898
```

```
. swilk BHAR12 BHAR24 BHAR36

                    Shapiro-Wilk W test for normal data

    Variable |   Obs        W           V       z       Prob>z
-------------+--------------------------------------------------
      BHAR12 |   375    0.92455     19.605   7.060    0.00000
      BHAR24 |   375    0.86239     35.758   8.485    0.00000
      BHAR36 |   375    0.67311     84.944  10.538    0.00000
```










```
                          BHAR12
-------------------------------------------------------------
      Percentiles      Smallest
 1%    -1.050276      -2.611637
 5%    -.8123884      -1.351235
10%    -.6534454      -1.264776       Obs                 375
25%    -.3952456      -1.050276       Sum of Wgt.         375

50%    -.1015672                      Mean           -.0701748
                      Largest         Std. Dev.       .5451104
75%     .1573879      2.079203
90%     .4989083      2.104736        Variance        .2971453
95%     .8915753      2.200151        Skewness        .9477412
99%     2.079203      2.743939        Kurtosis        7.553086

                          BHAR24
-------------------------------------------------------------
      Percentiles      Smallest
 1%    -1.346166      -2.819124
 5%    -.9665525      -2.314723
10%    -.8689492      -1.581975       Obs                 375
25%    -.6068502      -1.346166       Sum of Wgt.         375

50%    -.2315758                      Mean           -.1391708
                      Largest         Std. Dev.       .7476056
75%     .1536698      2.644839
90%     .6336023      2.797001        Variance        .5589142
95%     1.112412      4.514805        Skewness        1.945213
99%     2.644839      4.761968        Kurtosis        12.64856

                          BHAR36
-------------------------------------------------------------
      Percentiles      Smallest
 1%    -1.720706      -2.986857
 5%    -1.023456      -2.375069
10%    -.9193229      -1.726954       Obs                 375
25%    -.7257276      -1.720706       Sum of Wgt.         375

50%    -.3869816                      Mean           -.1760062
                      Largest         Std. Dev.       1.047319
75%     .0780842      5.410104
90%      .825911      6.045521        Variance        1.096878
95%     1.305462      6.290743        Skewness        4.393409
99%     5.410104      10.17525        Kurtosis        36.13118
```

APPENDIX C: Stata – overall value creation, parametric t-tests

```
. ttest CAR3 == 0

One-sample t test

Variable |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
    CAR3 |     550     .00921    .0033504    .0785727     .002629    .0157911
---------+--------------------------------------------------------------------
    mean = mean(CAR3)                                         t =   2.7490
Ho: mean = 0                                     degrees of freedom =      549

    Ha: mean < 0                 Ha: mean != 0                 Ha: mean > 0
 Pr(T < t) = 0.9969         Pr(|T| > |t|) = 0.0062          Pr(T > t) = 0.0031

. ttest CAR11 == 0

One-sample t test

Variable |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
   CAR11 |     550    .0094899    .0053723    .1259913   -.0010629    .0200426
---------+--------------------------------------------------------------------
    mean = mean(CAR11)                                        t =   1.7664
Ho: mean = 0                                     degrees of freedom =      549

    Ha: mean < 0                 Ha: mean != 0                 Ha: mean > 0
 Pr(T < t) = 0.9611         Pr(|T| > |t|) = 0.0779          Pr(T > t) = 0.0389

. ttest CAR21 == 0

One-sample t test

Variable |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
   CAR21 |     550   -.0030523     .007112    .1667916   -.0170224    .0109178
---------+--------------------------------------------------------------------
    mean = mean(CAR21)                                        t =  -0.4292
Ho: mean = 0                                     degrees of freedom =      549

    Ha: mean < 0                 Ha: mean != 0                 Ha: mean > 0
 Pr(T < t) = 0.3340         Pr(|T| > |t|) = 0.6680          Pr(T > t) = 0.6660
```

```
. ttest BHAR12 == 0

One-sample t test

Variable |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
  BHAR12 |     375   -.0701748    .0281494    .5451104   -.1255257   -.0148239
---------+--------------------------------------------------------------------
    mean = mean(BHAR12)                                       t =  -2.4929
Ho: mean = 0                                     degrees of freedom =      374

    Ha: mean < 0                 Ha: mean != 0                 Ha: mean > 0
 Pr(T < t) = 0.0066         Pr(|T| > |t|) = 0.0131          Pr(T > t) = 0.9934

. ttest BHAR24 == 0

One-sample t test

Variable |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
  BHAR24 |     375   -.1391708    .0386062    .7476056   -.2150832   -.0632584
---------+--------------------------------------------------------------------
    mean = mean(BHAR24)                                       t =  -3.6049
Ho: mean = 0                                     degrees of freedom =      374

    Ha: mean < 0                 Ha: mean != 0                 Ha: mean > 0
 Pr(T < t) = 0.0002         Pr(|T| > |t|) = 0.0004          Pr(T > t) = 0.9998

. ttest BHAR36 == 0

One-sample t test

Variable |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
  BHAR36 |     375   -.1760062    .0540833    1.047319   -.2823517   -.0696607
---------+--------------------------------------------------------------------
    mean = mean(BHAR36)                                       t =  -3.2544
Ho: mean = 0                                     degrees of freedom =      374

    Ha: mean < 0                 Ha: mean != 0                 Ha: mean > 0
 Pr(T < t) = 0.0006         Pr(|T| > |t|) = 0.0012          Pr(T > t) = 0.9994
```

APPENDIX D: Stata – overall value creation, non-parametric

```
. signrank CAR3 = 0

Wilcoxon signed-rank test

        sign |      obs    sum ranks    expected
-------------+---------------------------------
    positive |      294        83846     75762.5
    negative |      256        67679     75762.5
        zero |        0            0           0
-------------+---------------------------------
         all |      550       151525      151525

unadjusted variance     13902419
adjustment for ties            0
adjustment for zeros           0
                       ----------
adjusted variance       13902419

Ho: CAR3 = 0
                 z =   2.168
    Prob > |z| =   0.0302

. signrank CAR11 = 0

Wilcoxon signed-rank test

        sign |      obs    sum ranks    expected
-------------+---------------------------------
    positive |      285        81037     75762.5
    negative |      265        70488     75762.5
        zero |        0            0           0
-------------+---------------------------------
         all |      550       151525      151525

unadjusted variance     13902419
adjustment for ties            0
adjustment for zeros           0
                       ----------
adjusted variance       13902419

Ho: CAR11 = 0
                 z =   1.415
    Prob > |z| =   0.1572

. signrank CAR21 = 0

Wilcoxon signed-rank test

        sign |      obs    sum ranks    expected
-------------+---------------------------------
    positive |      264        73700     75762.5
    negative |      286        77825     75762.5
        zero |        0            0           0
-------------+---------------------------------
         all |      550       151525      151525

unadjusted variance     13902419
adjustment for ties            0
adjustment for zeros           0
                       ----------
adjusted variance       13902419

Ho: CAR21 = 0
                 z =  -0.553
    Prob > |z| =   0.5802
```

```
. signrank BHAR12 = 0

Wilcoxon signed-rank test

        sign |      obs    sum ranks    expected
-------------+---------------------------------
    positive |      154        26294       35250
    negative |      221        44206       35250
        zero |        0            0           0
-------------+---------------------------------
         all |      375        70500       70500

unadjusted variance  4412125.00
adjustment for ties        0.00
adjustment for zeros       0.00
                     ----------
adjusted variance    4412125.00

Ho: BHAR12 = 0
                 z =  -4.264
    Prob > |z| =   0.0000

. signrank BHAR24 = 0

Wilcoxon signed-rank test

        sign |      obs    sum ranks    expected
-------------+---------------------------------
    positive |      122        22494       35250
    negative |      253        48006       35250
        zero |        0            0           0
-------------+---------------------------------
         all |      375        70500       70500

unadjusted variance  4412125.00
adjustment for ties        0.00
adjustment for zeros       0.00
                     ----------
adjusted variance    4412125.00

Ho: BHAR24 = 0
                 z =  -6.073
    Prob > |z| =   0.0000

. signrank BHAR36 = 0

Wilcoxon signed-rank test

        sign |      obs    sum ranks    expected
-------------+---------------------------------
    positive |      110        19803       35250
    negative |      265        50697       35250
        zero |        0            0           0
-------------+---------------------------------
         all |      375        70500       70500

unadjusted variance  4412125.00
adjustment for ties        0.00
adjustment for zeros       0.00
                     ----------
adjusted variance    4412125.00

Ho: BHAR36 = 0
                 z =  -7.354
    Prob > |z| =   0.0000
```

APPENDIX E: Stata output – Sub-sample: Merger wave upsurge

```
. ttest CAR3_Upsurge == CAR3_Nupsurge, unpaired unequal

Two-sample t test with unequal variances

   Variable |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
------------+---------------------------------------------------------------------
  CAR3_U~e |     128     .003749    .0057198   .0647127   -.0075696    .0150675
  CAR3_N~e |     422    .0108665     .004007    .082314    .0029903    .0187427
------------+---------------------------------------------------------------------
   combined |     550     .00921    .0033504   .0785727     .002629    .0157911
------------+---------------------------------------------------------------------
       diff |           -.0071175    .0069837              -.0208686    .0066336

    diff = mean(CAR3_Upsurge) - mean(CAR3_Nupsurge)                 t =  -1.0192
Ho: diff = 0                     Satterthwaite's degrees of freedom =  263.122

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.1545         Pr(|T| > |t|) = 0.3091          Pr(T > t) = 0.8455

. ttest CAR11_Upsurge == CAR11_Nupsurge, unpaired unequal

Two-sample t test with unequal variances

   Variable |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
------------+---------------------------------------------------------------------
  CAR11_U~ |     128    .0065632    .0105548   .1194141   -.0143228    .0274493
  CAR11_N~ |     422    .0103776     .006233    .128043   -.0018742    .0226293
------------+---------------------------------------------------------------------
   combined |     550    .0094899    .0053723   .1259913   -.0010629    .0200426
------------+---------------------------------------------------------------------
       diff |           -.0038143    .0122578              -.0279704    .0203418

    diff = mean(CAR11_Upsurge) - mean(CAR11_Nupsurge)               t =  -0.3112
Ho: diff = 0                     Satterthwaite's degrees of freedom =  222.849

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.3780         Pr(|T| > |t|) = 0.7560          Pr(T > t) = 0.6220

. ttest CAR21_Upsurge == CAR21_Nupsurge, unpaired unequal

Two-sample t test with unequal variances

   Variable |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
------------+---------------------------------------------------------------------
  CAR21_U~ |     128   -.0023797    .0139351   .1576577   -.0299548    .0251953
  CAR21_N~ |     422   -.0032563    .0082582   .1696447   -.0194886    .0129761
------------+---------------------------------------------------------------------
   combined |     550   -.0030523     .007112   .1667916   -.0170224    .0109178
------------+---------------------------------------------------------------------
       diff |            .0008765    .0161983              -.0310443    .0327974

    diff = mean(CAR21_Upsurge) - mean(CAR21_Nupsurge)               t =   0.0541
Ho: diff = 0                     Satterthwaite's degrees of freedom =   223.55

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.5216         Pr(|T| > |t|) = 0.9569          Pr(T > t) = 0.4784
```

```
. ttest BHAR12_Upsurge == BHAR12_Nupsurge, unpaired unequal

Two-sample t test with unequal variances

   Variable |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
------------+---------------------------------------------------------------------
  BHAR12.. |     116    .0473039    .0545825   .5878717   -.0608135    .1554214
  BHAR12.. |     259   -.1227908    .0321506   .5174144   -.1861017   -.0594798
------------+---------------------------------------------------------------------
   combined |     375   -.0701748    .0281494   .5451104   -.1255257   -.0148239
------------+---------------------------------------------------------------------
       diff |            .1700947    .0633475               .0451723    .2950171

    diff = mean(BHAR12_Upsurge) - mean(BHAR12_Nupsurge)             t =   2.6851
Ho: diff = 0                     Satterthwaite's degrees of freedom =  198.018

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.9961         Pr(|T| > |t|) = 0.0079          Pr(T > t) = 0.0039

. ttest BHAR24_Upsurge == BHAR24_Nupsurge, unpaired unequal

Two-sample t test with unequal variances

   Variable |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
------------+---------------------------------------------------------------------
  BHAR24.. |     116    .0486788    .0810126   .8725321   -.1117915    .2091491
  BHAR24.. |     259   -.2233042     .041585   .6692479   -.3051935   -.1414149
------------+---------------------------------------------------------------------
   combined |     375   -.1391708    .0386062   .7476056   -.2150832   -.0632584
------------+---------------------------------------------------------------------
       diff |            .271983    .0910624               .0922828    .4516832

    diff = mean(BHAR24_Upsurge) - mean(BHAR24_Nupsurge)             t =   2.9868
Ho: diff = 0                     Satterthwaite's degrees of freedom =  178.077

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.9984         Pr(|T| > |t|) = 0.0032          Pr(T > t) = 0.0016

. ttest BHAR36_Upsurge == BHAR36_Nupsurge, unpaired unequal

Two-sample t test with unequal variances

   Variable |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
------------+---------------------------------------------------------------------
  BHAR36.. |     116    .0006652     .117437   1.264835   -.2319548    .2332852
  BHAR36.. |     259   -.2551331    .0575107   .9255464   -.3683832   -.1418831
------------+---------------------------------------------------------------------
   combined |     375   -.1760062    .0540833   1.047319   -.2823517   -.0696607
------------+---------------------------------------------------------------------
       diff |            .2557983    .1307628              -.0023044     .513901

    diff = mean(BHAR36_Upsurge) - mean(BHAR36_Nupsurge)             t =   1.9562
Ho: diff = 0                     Satterthwaite's degrees of freedom =  172.354

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.9740         Pr(|T| > |t|) = 0.0521          Pr(T > t) = 0.0260
```

```
. ttest CAR3_Upsurge == 0

One-sample t test

------------------------------------------------------------------------------
Variable |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
CAR3_U~e |     128    .003749    .0057198    .0647127   -.0075696    .0150675
------------------------------------------------------------------------------
    mean = mean(CAR3_Upsurge)                                     t =   0.6554
Ho: mean = 0                                     degrees of freedom =      127

    Ha: mean < 0                 Ha: mean != 0                 Ha: mean > 0
 Pr(T < t) = 0.7433         Pr(|T| > |t|) = 0.5134          Pr(T > t) = 0.2567

. ttest CAR11_Upsurge == 0

One-sample t test

------------------------------------------------------------------------------
Variable |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
CAR11_U~ |     128    .0065632    .0105548    .1194141   -.0143228    .0274493
------------------------------------------------------------------------------
    mean = mean(CAR11_Upsurge)                                    t =   0.6218
Ho: mean = 0                                     degrees of freedom =      127

    Ha: mean < 0                 Ha: mean != 0                 Ha: mean > 0
 Pr(T < t) = 0.7324         Pr(|T| > |t|) = 0.5352          Pr(T > t) = 0.2676

. ttest CAR21_Upsurge == 0

One-sample t test

------------------------------------------------------------------------------
Variable |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
CAR21_U~ |     128   -.0023797    .0139351    .1576577   -.0299548    .0251953
------------------------------------------------------------------------------
    mean = mean(CAR21_Upsurge)                                    t =  -0.1708
Ho: mean = 0                                     degrees of freedom =      127

    Ha: mean < 0                 Ha: mean != 0                 Ha: mean > 0
 Pr(T < t) = 0.4323         Pr(|T| > |t|) = 0.8647          Pr(T > t) = 0.5677
```

```
. ttest CAR3_Nupsurge == 0

One-sample t test

------------------------------------------------------------------------------
Variable |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
CAR3_N~e |     422    .0108665     .004007     .082314    .0029903    .0187427
------------------------------------------------------------------------------
    mean = mean(CAR3_Nupsurge)                                    t =   2.7119
Ho: mean = 0                                     degrees of freedom =      421

    Ha: mean < 0                 Ha: mean != 0                 Ha: mean > 0
 Pr(T < t) = 0.9965         Pr(|T| > |t|) = 0.0070          Pr(T > t) = 0.0035

. ttest CAR11_Nupsurge == 0

One-sample t test

------------------------------------------------------------------------------
Variable |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
CAR11_N~ |     422    .0103776     .006233     .128043   -.0018742    .0226293
------------------------------------------------------------------------------
    mean = mean(CAR11_Nupsurge)                                   t =   1.6649
Ho: mean = 0                                     degrees of freedom =      421

    Ha: mean < 0                 Ha: mean != 0                 Ha: mean > 0
 Pr(T < t) = 0.9517         Pr(|T| > |t|) = 0.0967          Pr(T > t) = 0.0483

. ttest CAR21_Nupsurge == 0

One-sample t test

------------------------------------------------------------------------------
Variable |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
CAR21_N~ |     422   -.0032563    .0082582    .1696447   -.0194886    .0129761
------------------------------------------------------------------------------
    mean = mean(CAR21_Nupsurge)                                   t =  -0.3943
Ho: mean = 0                                     degrees of freedom =      421

    Ha: mean < 0                 Ha: mean != 0                 Ha: mean > 0
 Pr(T < t) = 0.3468         Pr(|T| > |t|) = 0.6936          Pr(T > t) = 0.6532
```

```
. ttest BHAR12_Upsurge == 0

One-sample t test

------------------------------------------------------------------------------
Variable |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
BHAR12.. |     116    .0473039    .0545825    .5878717   -.0608135    .1554214
------------------------------------------------------------------------------
    mean = mean(BHAR12_Upsurge)                                   t =   0.8666
Ho: mean = 0                                     degrees of freedom =      115

    Ha: mean < 0                 Ha: mean != 0                 Ha: mean > 0
 Pr(T < t) = 0.8060         Pr(|T| > |t|) = 0.3879          Pr(T > t) = 0.1940

. ttest BHAR24_Upsurge == 0

One-sample t test

------------------------------------------------------------------------------
Variable |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
BHAR24.. |     116    .0486788    .0810126    .8725321   -.1117915    .2091491
------------------------------------------------------------------------------
    mean = mean(BHAR24_Upsurge)                                   t =   0.6009
Ho: mean = 0                                     degrees of freedom =      115

    Ha: mean < 0                 Ha: mean != 0                 Ha: mean > 0
 Pr(T < t) = 0.7254         Pr(|T| > |t|) = 0.5491          Pr(T > t) = 0.2746

. ttest BHAR36_Upsurge == 0

One-sample t test

------------------------------------------------------------------------------
Variable |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
BHAR36.. |     116    .0006652     .117437    1.264835   -.2319548    .2332852
------------------------------------------------------------------------------
    mean = mean(BHAR36_Upsurge)                                   t =   0.0057
Ho: mean = 0                                     degrees of freedom =      115

    Ha: mean < 0                 Ha: mean != 0                 Ha: mean > 0
 Pr(T < t) = 0.5023         Pr(|T| > |t|) = 0.9955          Pr(T > t) = 0.4977
```

```
. ttest BHAR12_Nupsurge == 0

One-sample t test

------------------------------------------------------------------------------
Variable |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
BHAR12.. |     259   -.1227908    .0321506    .5174144   -.1861017   -.0594798
------------------------------------------------------------------------------
    mean = mean(BHAR12_Nupsurge)                                  t =  -3.8192
Ho: mean = 0                                     degrees of freedom =      258

    Ha: mean < 0                 Ha: mean != 0                 Ha: mean > 0
 Pr(T < t) = 0.0001         Pr(|T| > |t|) = 0.0002          Pr(T > t) = 0.9999

. ttest BHAR24_Nupsurge == 0

One-sample t test

------------------------------------------------------------------------------
Variable |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
BHAR24.. |     259   -.2233042     .041585    .6692479   -.3051935   -.1414149
------------------------------------------------------------------------------
    mean = mean(BHAR24_Nupsurge)                                  t =  -5.3698
Ho: mean = 0                                     degrees of freedom =      258

    Ha: mean < 0                 Ha: mean != 0                 Ha: mean > 0
 Pr(T < t) = 0.0000         Pr(|T| > |t|) = 0.0000          Pr(T > t) = 1.0000

. ttest BHAR36_Nupsurge == 0

One-sample t test

------------------------------------------------------------------------------
Variable |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
BHAR36.. |     259   -.2551331    .0575107    .9255464   -.3683832   -.1418831
------------------------------------------------------------------------------
    mean = mean(BHAR36_Nupsurge)                                  t =  -4.4363
Ho: mean = 0                                     degrees of freedom =      258

    Ha: mean < 0                 Ha: mean != 0                 Ha: mean > 0
 Pr(T < t) = 0.0000         Pr(|T| > |t|) = 0.0000          Pr(T > t) = 1.0000
```

APPENDIX F: Stata output – Sub-sample: Cross-border versus domestic deals

```
. ttest CAR3_Crossborder == CAR3_Domestic, unpaired unequal

Two-sample t test with unequal variances

   Variable |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
------------+--------------------------------------------------------------------
  CAR3_C~r |     167    .0079048    .0055774    .0720761   -.003107    .0189166
  CAR3_D~c |     383    .0097792    .0041556    .0813269   .0016084    .0179499
------------+--------------------------------------------------------------------
   combined |     550     .00921    .0033504    .0785727    .002629    .0157911
------------+--------------------------------------------------------------------
      diff |           -.0018744    .0069553               -.0155534    .0118046
------------------------------------------------------------------------------
    diff = mean(CAR3_Crossborder) - mean(CAR3_Domestic)           t =  -0.2695
Ho: diff = 0                     Satterthwaite's degrees of freedom =   354.05

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.3939         Pr(|T| > |t|) = 0.7877          Pr(T > t) = 0.6061

. ttest CAR11_Crossborder == CAR11_Domestic, unpaired unequal

Two-sample t test with unequal variances

   Variable |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
------------+--------------------------------------------------------------------
  CAR11_~r |     167    .0065254    .0100835    .1303082   -.0133831    .0264339
  CAR11_~c |     383    .0107825     .006347    .1242137    -.001697    .0232619
------------+--------------------------------------------------------------------
   combined |     550    .0094899    .0053723    .1259913   -.0010629    .0200426
------------+--------------------------------------------------------------------
      diff |           -.0042571    .0119148               -.0277033    .0191892
------------------------------------------------------------------------------
    diff = mean(CAR11_Crossbor~r) - mean(CAR11_Domestic)          t =  -0.3573
Ho: diff = 0                     Satterthwaite's degrees of freedom =   302.932

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.3606         Pr(|T| > |t|) = 0.7211          Pr(T > t) = 0.6394

. ttest CAR21_Crossborder == CAR21_Domestic, unpaired unequal

Two-sample t test with unequal variances

   Variable |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
------------+--------------------------------------------------------------------
  CAR21_~r |     167   -.0096532    .0138703    .1792434   -.0370381    .0177317
  CAR21_~c |     383   -.0001741    .0082381    .1612219   -.0163717    .0160236
------------+--------------------------------------------------------------------
   combined |     550   -.0030523     .007112    .1667916   -.0170224    .0109178
------------+--------------------------------------------------------------------
      diff |           -.0094791    .0161323               -.0412311    .0222729
------------------------------------------------------------------------------
    diff = mean(CAR21_Crossbor~r) - mean(CAR21_Domestic)          t =  -0.5876
Ho: diff = 0                     Satterthwaite's degrees of freedom =   288.189

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.2786         Pr(|T| > |t|) = 0.5573          Pr(T > t) = 0.7214

. ttest BHAR12_Crossborder == BHAR12_Domestic, unpaired unequal

Two-sample t test with unequal variances

   Variable |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
------------+--------------------------------------------------------------------
  BHAR12~r |     123   -.0491777    .0609526     .675997   -.1698395    .0714841
  BHAR12~c |     252   -.0804234    .0295685    .4693858   -.1386574   -.0221894
------------+--------------------------------------------------------------------
   combined |     375   -.0701748    .0281494    .5451104   -.1255257   -.0148239
------------+--------------------------------------------------------------------
      diff |            .0312457     .067746               -.1024263    .1649177
------------------------------------------------------------------------------
    diff = mean(BHAR12_Crossbo~r) - mean(BHAR12_Domestic)         t =   0.4612
Ho: diff = 0                     Satterthwaite's degrees of freedom =   181.296

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.6774         Pr(|T| > |t|) = 0.6452          Pr(T > t) = 0.3226

. ttest BHAR24_Crossborder == BHAR24_Domestic, unpaired unequal

Two-sample t test with unequal variances

   Variable |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
------------+--------------------------------------------------------------------
  BHAR24~r |     123   -.1474651    .0786909    .8727244   -.3032416    .0083114
  BHAR24~c |     252   -.1351224     .042843    .6801109   -.2194999   -.0507449
------------+--------------------------------------------------------------------
   combined |     375   -.1391708    .0386062    .7476056   -.2150832   -.0632584
------------+--------------------------------------------------------------------
      diff |           -.0123427    .0895979               -.1890388    .1643533
------------------------------------------------------------------------------
    diff = mean(BHAR24_Crossbo~r) - mean(BHAR24_Domestic)         t =  -0.1378
Ho: diff = 0                     Satterthwaite's degrees of freedom =   196.648

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.4453         Pr(|T| > |t|) = 0.8906          Pr(T > t) = 0.5547

. ttest BHAR36_Crossborder == BHAR36_Domestic, unpaired unequal

Two-sample t test with unequal variances

   Variable |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
------------+--------------------------------------------------------------------
  BHAR36~r |     123   -.0964743    .1295391    1.436658   -.3529099    .1599612
  BHAR36~c |     252   -.2148253    .0498636    .7915596   -.3130296    -.116621
------------+--------------------------------------------------------------------
   combined |     375   -.1760062    .0540833    1.047319   -.2823517   -.0696607
------------+--------------------------------------------------------------------
      diff |            .118351    .1388047               -.155786     .392488
------------------------------------------------------------------------------
    diff = mean(BHAR36_Crossbo~r) - mean(BHAR36_Domestic)         t =   0.8526
Ho: diff = 0                     Satterthwaite's degrees of freedom =   159.134

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.8024         Pr(|T| > |t|) = 0.3951          Pr(T > t) = 0.1976
```

```
. ttest CAR3_Crossborder == 0

One-sample t test

Variable |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
CAR3_C~r |     167    .0079048    .0055774    .0720761   -.003107    .0189166

    mean = mean(CAR3_Crossborder)                     t =   1.4173
Ho: mean = 0                     degrees of freedom =      166

    Ha: mean < 0                 Ha: mean != 0                 Ha: mean > 0
 Pr(T < t) = 0.9209         Pr(|T| > |t|) = 0.1583          Pr(T > t) = 0.0791
```

```
. ttest CAR3_Domestic == 0

One-sample t test

Variable |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
CAR3_D~c |     383    .0097792    .0041556    .0813269    .0016084    .0179499

    mean = mean(CAR3_Domestic)                     t =   2.3532
Ho: mean = 0                     degrees of freedom =      382

    Ha: mean < 0                 Ha: mean != 0                 Ha: mean > 0
 Pr(T < t) = 0.9904         Pr(|T| > |t|) = 0.0191          Pr(T > t) = 0.0096
```

```
. ttest CAR11_Crossborder == 0

One-sample t test

Variable |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
CAR11_~r |     167    .0065254    .0100835    .1303082   -.0133831    .0264339

    mean = mean(CAR11_Crossborder)                     t =   0.6471
Ho: mean = 0                     degrees of freedom =      166

    Ha: mean < 0                 Ha: mean != 0                 Ha: mean > 0
 Pr(T < t) = 0.7408         Pr(|T| > |t|) = 0.5184          Pr(T > t) = 0.2592
```

```
. ttest CAR11_Domestic == 0

One-sample t test

Variable |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
CAR11_~c |     383    .0107825     .006347    .1242137   -.001697    .0232619

    mean = mean(CAR11_Domestic)                     t =   1.6988
Ho: mean = 0                     degrees of freedom =      382

    Ha: mean < 0                 Ha: mean != 0                 Ha: mean > 0
 Pr(T < t) = 0.9549         Pr(|T| > |t|) = 0.0902          Pr(T > t) = 0.0451
```

```
. ttest CAR21_Crossborder == 0

One-sample t test

Variable |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
CAR21_~r |     167   -.0096532    .0138703    .1792434   -.0370381    .0177317

    mean = mean(CAR21_Crossborder)                     t =  -0.6960
Ho: mean = 0                     degrees of freedom =      166

    Ha: mean < 0                 Ha: mean != 0                 Ha: mean > 0
 Pr(T < t) = 0.2437         Pr(|T| > |t|) = 0.4874          Pr(T > t) = 0.7563
```

```
. ttest CAR21_Domestic == 0

One-sample t test

Variable |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
CAR21_~c |     383   -.0001741    .0082381    .1612219   -.0163717    .0160236

    mean = mean(CAR21_Domestic)                     t =  -0.0211
Ho: mean = 0                     degrees of freedom =      382

    Ha: mean < 0                 Ha: mean != 0                 Ha: mean > 0
 Pr(T < t) = 0.4916         Pr(|T| > |t|) = 0.9832          Pr(T > t) = 0.5084
```

```
. ttest BHAR12_Crossborder == 0

One-sample t test

Variable |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
BHAR12~r |     123   -.0491777    .0609526     .675997   -.1698395    .0714841

    mean = mean(BHAR12_Crossborder)                     t =  -0.8068
Ho: mean = 0                     degrees of freedom =      122

    Ha: mean < 0                 Ha: mean != 0                 Ha: mean > 0
 Pr(T < t) = 0.2107         Pr(|T| > |t|) = 0.4213          Pr(T > t) = 0.7893
```

```
. ttest BHAR12_Domestic == 0

One-sample t test

Variable |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
BHAR12~c |     252   -.0804234    .0295685    .4693858   -.1386574   -.0221894

    mean = mean(BHAR12_Domestic)                     t =  -2.7199
Ho: mean = 0                     degrees of freedom =      251

    Ha: mean < 0                 Ha: mean != 0                 Ha: mean > 0
 Pr(T < t) = 0.0035         Pr(|T| > |t|) = 0.0070          Pr(T > t) = 0.9965
```

```
. ttest BHAR24_Crossborder == 0

One-sample t test

Variable |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
BHAR24~r |     123   -.1474651    .0786909    .8727244   -.3032416    .0083114

    mean = mean(BHAR24_Crossborder)                     t =  -1.8740
Ho: mean = 0                     degrees of freedom =      122

    Ha: mean < 0                 Ha: mean != 0                 Ha: mean > 0
 Pr(T < t) = 0.0317         Pr(|T| > |t|) = 0.0633          Pr(T > t) = 0.9683
```

```
. ttest BHAR24_Domestic == 0

One-sample t test

Variable |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
BHAR24~c |     252   -.1351224     .042843    .6801109   -.2194999   -.0507449

    mean = mean(BHAR24_Domestic)                     t =  -3.1539
Ho: mean = 0                     degrees of freedom =      251

    Ha: mean < 0                 Ha: mean != 0                 Ha: mean > 0
 Pr(T < t) = 0.0009         Pr(|T| > |t|) = 0.0018          Pr(T > t) = 0.9991
```

```
. ttest BHAR36_Crossborder == 0

One-sample t test

Variable |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
BHAR36~r |     123   -.0964743    .1295391    1.436658   -.3529099    .1599612

    mean = mean(BHAR36_Crossborder)                     t =  -0.7448
Ho: mean = 0                     degrees of freedom =      122

    Ha: mean < 0                 Ha: mean != 0                 Ha: mean > 0
 Pr(T < t) = 0.2289         Pr(|T| > |t|) = 0.4579          Pr(T > t) = 0.7711
```

```
. ttest BHAR36_Domestic == 0

One-sample t test

Variable |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
BHAR36~c |     252   -.2148253    .0498636    .7915596   -.3130296    -.116621

    mean = mean(BHAR36_Domestic)                     t =  -4.3083
Ho: mean = 0                     degrees of freedom =      251

    Ha: mean < 0                 Ha: mean != 0                 Ha: mean > 0
 Pr(T < t) = 0.0000         Pr(|T| > |t|) = 0.0000          Pr(T > t) = 1.0000
```

APPENDIX G: Stata output – Sub-sample: Size of acquirer

```
. ttest CAR3_Large_Cap == CAR3_Large_Cap_Other, unpaired unequal

Two-sample t test with unequal variances

   Variable |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
------------+--------------------------------------------------------------------
   CAR3_L~p |     139   -.0012911    .0030429    .035875   -.0073077    .0047256
   CAR3_L~r |     411    .0127615    .0043518    .088224    .0042069    .0213161
------------+--------------------------------------------------------------------
   combined |     550     .00921    .0033504   .0785727     .002629    .0157911
------------+--------------------------------------------------------------------
       diff |           -.0140526    .0053101               -.0244839   -.0036212
------------------------------------------------------------------------------
     diff = mean(CAR3_Large_Cap) - mean(CAR3_Large_Cap~r)          t =  -2.6464
Ho: diff = 0                     Satterthwaite's degrees of freedom =  531.472

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.0042         Pr(|T| > |t|) = 0.0084          Pr(T > t) = 0.9958

. ttest CAR11_Large_Cap == CAR11_Large_Cap_Other, unpaired unequal

Two-sample t test with unequal variances

   Variable |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
------------+--------------------------------------------------------------------
   CAR11_~p |     139   -.0037108    .0042086    .0496191   -.0120326    .0046109
   CAR11_~r |     411    .0139543    .0070362    .1426452    .0001229    .0277858
------------+--------------------------------------------------------------------
   combined |     550    .0094899    .0053723    .1259913   -.0010629    .0200426
------------+--------------------------------------------------------------------
       diff |           -.0176651    .0081988               -.0337701   -.0015602
------------------------------------------------------------------------------
     diff = mean(CAR11_Large_Cap) - mean(CAR11_Large_Ca~r)          t =  -2.1546
Ho: diff = 0                     Satterthwaite's degrees of freedom =  547.604

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.0158         Pr(|T| > |t|) = 0.0316          Pr(T > t) = 0.9842

. ttest CAR21_Large_Cap == CAR21_Large_Cap_Other, unpaired unequal

Two-sample t test with unequal variances

   Variable |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
------------+--------------------------------------------------------------------
   CAR21_~p |     139   -.0146312     .005221    .0615544   -.0249546   -.0043077
   CAR21_~r |     411    .0008637    .0093479    .1895119   -.0175122    .0192396
------------+--------------------------------------------------------------------
   combined |     550   -.0030523     .007112    .1667916   -.0170224    .0109178
------------+--------------------------------------------------------------------
       diff |           -.0154949    .0107071               -.0365269    .0055372
------------------------------------------------------------------------------
     diff = mean(CAR21_Large_Cap) - mean(CAR21_Large_Ca~r)          t =  -1.4472
Ho: diff = 0                     Satterthwaite's degrees of freedom =  547.426

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.0742         Pr(|T| > |t|) = 0.1484          Pr(T > t) = 0.9258
```

```
. ttest BHAR12_Large_Cap == BHAR12_Large_Cap_Other, unpaired unequal

Two-sample t test with unequal variances

   Variable |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
------------+--------------------------------------------------------------------
   BHAR12~p |      71   -.0437962    .0252717    .2129428   -.0941989    .0066066
   BHAR12~r |     304   -.0763356    .0342253    .5967384    -.143685   -.0089863
------------+--------------------------------------------------------------------
   combined |     375   -.0701748    .0281494    .5451104   -.1255257   -.0148239
------------+--------------------------------------------------------------------
       diff |            .0325395    .0425444               -.0511663    .1162452
------------------------------------------------------------------------------
     diff = mean(BHAR12_Large_Cap) - mean(BHAR12_Large_C~r)          t =   0.7648
Ho: diff = 0                     Satterthwaite's degrees of freedom =  316.379

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.7775         Pr(|T| > |t|) = 0.4449          Pr(T > t) = 0.2225

. ttest BHAR24_Large_Cap == BHAR24_Large_Cap_Other, unpaired unequal

Two-sample t test with unequal variances

   Variable |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
------------+--------------------------------------------------------------------
   BHAR24~p |      71    -.050424    .0385548    .3248685   -.1273191    .0264711
   BHAR24~r |     304   -.1598978    .0467082    .8143846   -.2518113   -.0679844
------------+--------------------------------------------------------------------
   combined |     375   -.1391708    .0386062    .7476056   -.2150832   -.0632584
------------+--------------------------------------------------------------------
       diff |            .1094738     .060565               -.0097384    .228686
------------------------------------------------------------------------------
     diff = mean(BHAR24_Large_Cap) - mean(BHAR24_Large_C~r)          t =   1.8075
Ho: diff = 0                     Satterthwaite's degrees of freedom =  284.62

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.9641         Pr(|T| > |t|) = 0.0717          Pr(T > t) = 0.0359

. ttest BHAR36_Large_Cap == BHAR36_Large_Cap_Other, unpaired unequal

Two-sample t test with unequal variances

   Variable |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
------------+--------------------------------------------------------------------
   BHAR36~p |      71   -.0334205    .0426864    .3596822   -.1185559    .0517149
   BHAR36~r |     304   -.2093075    .0658481    1.148102    -.338885   -.0797299
------------+--------------------------------------------------------------------
   combined |     375   -.1760062    .0540833    1.047319   -.2823517   -.0696607
------------+--------------------------------------------------------------------
       diff |             .175887    .0784736               .0215422    .3302317
------------------------------------------------------------------------------
     diff = mean(BHAR36_Large_Cap) - mean(BHAR36_Large_C~r)          t =   2.2414
Ho: diff = 0                     Satterthwaite's degrees of freedom =  346.388

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.9872         Pr(|T| > |t|) = 0.0256          Pr(T > t) = 0.0128
```

```
. ttest CAR3_Large_Cap == 0

One-sample t test

Variable |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
CAR3_L~p |     139   -.0012911    .0030429    .035875   -.0073077    .0047256

    mean = mean(CAR3_Large_Cap)                                   t =  -0.4243
Ho: mean = 0                                     degrees of freedom =      138

    Ha: mean < 0                 Ha: mean != 0                 Ha: mean > 0
 Pr(T < t) = 0.3360         Pr(|T| > |t|) = 0.6720          Pr(T > t) = 0.6640
```

```
. ttest CAR3_Large_Cap_Other == 0

One-sample t test

Variable |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
CAR3_L~r |     411    .0127615    .0043518    .088224    .0042069    .0213161

    mean = mean(CAR3_Large_Cap_Other)                             t =   2.9325
Ho: mean = 0                                     degrees of freedom =      410

    Ha: mean < 0                 Ha: mean != 0                 Ha: mean > 0
 Pr(T < t) = 0.9982         Pr(|T| > |t|) = 0.0036          Pr(T > t) = 0.0018
```

```
. ttest CAR11_Large_Cap == 0

One-sample t test

Variable |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
CAR11_~p |     139   -.0037108    .0042086    .0496191   -.0120326    .0046109

    mean = mean(CAR11_Large_Cap)                                  t =  -0.8817
Ho: mean = 0                                     degrees of freedom =      138

    Ha: mean < 0                 Ha: mean != 0                 Ha: mean > 0
 Pr(T < t) = 0.1897         Pr(|T| > |t|) = 0.3795          Pr(T > t) = 0.8103
```

```
. ttest CAR11_Large_Cap_Other == 0

One-sample t test

Variable |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
CAR11_~r |     411    .0139543    .0070362    .1426452    .0001229    .0277858

    mean = mean(CAR11_Large_Cap_Other)                            t =   1.9832
Ho: mean = 0                                     degrees of freedom =      410

    Ha: mean < 0                 Ha: mean != 0                 Ha: mean > 0
 Pr(T < t) = 0.9760         Pr(|T| > |t|) = 0.0480          Pr(T > t) = 0.0240
```

```
. ttest CAR21_Large_Cap == 0

One-sample t test

Variable |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
CAR21_~p |     139   -.0146312     .005221    .0615544   -.0249546   -.0043077

    mean = mean(CAR21_Large_Cap)                                  t =  -2.8024
Ho: mean = 0                                     degrees of freedom =      138

    Ha: mean < 0                 Ha: mean != 0                 Ha: mean > 0
 Pr(T < t) = 0.0029         Pr(|T| > |t|) = 0.0058          Pr(T > t) = 0.9971
```

```
. ttest CAR21_Large_Cap_Other == 0

One-sample t test

Variable |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
CAR21_~r |     411    .0008637    .0093479    .1895119   -.0175122    .0192396

    mean = mean(CAR21_Large_Cap_Other)                            t =   0.0924
Ho: mean = 0                                     degrees of freedom =      410

    Ha: mean < 0                 Ha: mean != 0                 Ha: mean > 0
 Pr(T < t) = 0.5368         Pr(|T| > |t|) = 0.9264          Pr(T > t) = 0.4632
```

```
. ttest BHAR12_Large_Cap == 0

One-sample t test

Variable |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
BHAR12~p |      71   -.0437962    .0252717    .2129428   -.0941989    .0066066

    mean = mean(BHAR12_Large_Cap)                                 t =  -1.7330
Ho: mean = 0                                     degrees of freedom =       70

    Ha: mean < 0                 Ha: mean != 0                 Ha: mean > 0
 Pr(T < t) = 0.0437         Pr(|T| > |t|) = 0.0875          Pr(T > t) = 0.9563
```

```
. ttest BHAR12_Large_Cap_Other == 0

One-sample t test

Variable |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
BHAR12~r |     304   -.0763356    .0342253    .5967384   -.143685   -.0089863

    mean = mean(BHAR12_Large_Cap_Other)                           t =  -2.2304
Ho: mean = 0                                     degrees of freedom =      303

    Ha: mean < 0                 Ha: mean != 0                 Ha: mean > 0
 Pr(T < t) = 0.0132         Pr(|T| > |t|) = 0.0265          Pr(T > t) = 0.9868
```

```
. ttest BHAR24_Large_Cap == 0

One-sample t test

Variable |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
BHAR24~p |      71    -.050424    .0385548    .3248685   -.1273191    .0264711

    mean = mean(BHAR24_Large_Cap)                                 t =  -1.3079
Ho: mean = 0                                     degrees of freedom =       70

    Ha: mean < 0                 Ha: mean != 0                 Ha: mean > 0
 Pr(T < t) = 0.0976         Pr(|T| > |t|) = 0.1952          Pr(T > t) = 0.9024
```

```
. ttest BHAR24_Large_Cap_Other == 0

One-sample t test

Variable |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
BHAR24~r |     304   -.1598978    .0467082    .8143846   -.2518113   -.0679844

    mean = mean(BHAR24_Large_Cap_Other)                           t =  -3.4233
Ho: mean = 0                                     degrees of freedom =      303

    Ha: mean < 0                 Ha: mean != 0                 Ha: mean > 0
 Pr(T < t) = 0.0004         Pr(|T| > |t|) = 0.0007          Pr(T > t) = 0.9996
```

```
. ttest BHAR36_Large_Cap == 0

One-sample t test

Variable |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
BHAR36~p |      71   -.0334205    .0426864    .3596822   -.1185559    .0517149

    mean = mean(BHAR36_Large_Cap)                                 t =  -0.7829
Ho: mean = 0                                     degrees of freedom =       70

    Ha: mean < 0                 Ha: mean != 0                 Ha: mean > 0
 Pr(T < t) = 0.2182         Pr(|T| > |t|) = 0.4363          Pr(T > t) = 0.7818
```

```
. ttest BHAR36_Large_Cap_Other == 0

One-sample t test

Variable |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
BHAR36~r |     304   -.2093075    .0658481    1.148102   -.338885   -.0797299

    mean = mean(BHAR36_Large_Cap_Other)                           t =  -3.1786
Ho: mean = 0                                     degrees of freedom =      303

    Ha: mean < 0                 Ha: mean != 0                 Ha: mean > 0
 Pr(T < t) = 0.0008         Pr(|T| > |t|) = 0.0016          Pr(T > t) = 0.9992
```

APPENDIX H: Stata output – Sub-sample: Unlisted versus listed target

```
. ttest CAR3_Target_Unlisted == CAR3_Target_Listed, unpaired unequal

Two-sample t test with unequal variances

   Variable |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
------------+--------------------------------------------------------------------
   CAR3_T.. |     452    .0155522    .003697    .0785983    .0082869    .0228176
   CAR3_T.. |      98   -.0200418    .007261    .0718799   -.0344528   -.0056308
------------+--------------------------------------------------------------------
   combined |     550     .00921    .0033504    .0785727     .002629    .0157911
------------+--------------------------------------------------------------------
       diff |            .035594    .0081479                .0194959    .0516922
------------------------------------------------------------------------------
    diff = mean(CAR3_Target_Un~d) - mean(CAR3_Target_Li~d)        t =   4.3685
Ho: diff = 0                     Satterthwaite's degrees of freedom =  151.619

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 1.0000         Pr(|T| > |t|) = 0.0000          Pr(T > t) = 0.0000

. ttest CAR11_Target_Unlisted == CAR11_Target_Listed, unpaired unequal

Two-sample t test with unequal variances

   Variable |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
------------+--------------------------------------------------------------------
   CAR11_.. |     452    .0177008    .0061351    .1304337    .0056439    .0297577
   CAR11_.. |      98   -.0283811    .0095713    .0947515   -.0473776   -.0093846
------------+--------------------------------------------------------------------
   combined |     550    .0094899    .0053723    .1259913   -.0010629    .0200426
------------+--------------------------------------------------------------------
       diff |            .0460819    .0113688                .0236537     .06851
------------------------------------------------------------------------------
    diff = mean(CAR11_Target_U~d) - mean(CAR11_Target_L~d)        t =   4.0534
Ho: diff = 0                     Satterthwaite's degrees of freedom =  186.317

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 1.0000         Pr(|T| > |t|) = 0.0001          Pr(T > t) = 0.0000

. ttest CAR21_Target_Unlisted == CAR21_Target_Listed, unpaired unequal

Two-sample t test with unequal variances

   Variable |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
------------+--------------------------------------------------------------------
   CAR21_.. |     452    .0021004    .0081636    .1735598   -.0139429    .0181438
   CAR21_.. |      98   -.0268177    .0130547    .1292346   -.0527276   -.0009078
------------+--------------------------------------------------------------------
   combined |     550   -.0030523     .007112    .1667916   -.0170224    .0109178
------------+--------------------------------------------------------------------
       diff |            .0289181     .015397               -.0014618    .059298
------------------------------------------------------------------------------
    diff = mean(CAR21_Target_U~d) - mean(CAR21_Target_L~d)        t =   1.8782
Ho: diff = 0                     Satterthwaite's degrees of freedom =  181.719

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.9690         Pr(|T| > |t|) = 0.0620          Pr(T > t) = 0.0310
```

```
. ttest BHAR12_Target_Unlisted == BHAR12_Target_Listed, unpaired unequal

Two-sample t test with unequal variances

   Variable |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
------------+--------------------------------------------------------------------
   BHAR12.. |     306   -.0595802    .0331132    .5792451   -.1247396    .0055791
   BHAR12.. |      69   -.1171595    .0428388     .355846    -.202643   -.0316759
------------+--------------------------------------------------------------------
   combined |     375   -.0701748    .0281494    .5451104   -.1255257   -.0148239
------------+--------------------------------------------------------------------
       diff |            .0575792    .0541447               -.0493475    .164506
------------------------------------------------------------------------------
    diff = mean(BHAR12_Ta~listed) - mean(BHAR12_Ta~Listed)        t =   1.0634
Ho: diff = 0                     Satterthwaite's degrees of freedom =   160.74

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.8554         Pr(|T| > |t|) = 0.2892          Pr(T > t) = 0.1446

. ttest BHAR24_Target_Unlisted == BHAR24_Target_Listed, unpaired unequal

Two-sample t test with unequal variances

   Variable |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
------------+--------------------------------------------------------------------
   BHAR24.. |     306   -.1423355    .0451178    .7892387   -.2311171    -.053554
   BHAR24.. |      69   -.1251357    .0636912    .5290591   -.2522296    .0019581
------------+--------------------------------------------------------------------
   combined |     375   -.1391708    .0386062    .7476056   -.2150832   -.0632584
------------+--------------------------------------------------------------------
       diff |           -.0171998    .0780525               -.1714654    .1370658
------------------------------------------------------------------------------
    diff = mean(BHAR24_Ta~listed) - mean(BHAR24_Ta~Listed)        t =  -0.2204
Ho: diff = 0                     Satterthwaite's degrees of freedom =  145.216

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.4129         Pr(|T| > |t|) = 0.8259          Pr(T > t) = 0.5871

. ttest BHAR36_Target_Unlisted == BHAR36_Target_Listed, unpaired unequal

Two-sample t test with unequal variances

   Variable |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
------------+--------------------------------------------------------------------
   BHAR36.. |     306   -.1703858    .0645409    1.129005   -.2973877    -.043384
   BHAR36.. |      69   -.2009312    .0675514    .5611241    -.335728   -.0661345
------------+--------------------------------------------------------------------
   combined |     375   -.1760062    .0540833    1.047319   -.2823517   -.0696607
------------+--------------------------------------------------------------------
       diff |            .0305454    .0934276               -.1536317    .2147225
------------------------------------------------------------------------------
    diff = mean(BHAR36_Ta~listed) - mean(BHAR36_Ta~Listed)        t =   0.3269
Ho: diff = 0                     Satterthwaite's degrees of freedom =   209.83

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.6280         Pr(|T| > |t|) = 0.7440          Pr(T > t) = 0.3720
```

```
. ttest CAR3_Target_Unlisted == 0

One-sample t test

Variable |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
CAR3_T.. |     452    .0155522    .003697    .0785983    .0082869    .0228176

    mean = mean(CAR3_Target_Unlisted)                             t =   4.2068
Ho: mean = 0                                     degrees of freedom =      451

    Ha: mean < 0                 Ha: mean != 0                 Ha: mean > 0
 Pr(T < t) = 1.0000         Pr(|T| > |t|) = 0.0000          Pr(T > t) = 0.0000
```

```
. ttest CAR3_Target_Listed == 0

One-sample t test

Variable |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
CAR3_T.. |      98   -.0200418    .007261    .0718799   -.0344528   -.0056308

    mean = mean(CAR3_Target_Listed)                               t =  -2.7602
Ho: mean = 0                                     degrees of freedom =       97

    Ha: mean < 0                 Ha: mean != 0                 Ha: mean > 0
 Pr(T < t) = 0.0035         Pr(|T| > |t|) = 0.0069          Pr(T > t) = 0.9965
```

```
.  ttest CAR11_Target_Unlisted == 0

One-sample t test

Variable |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
CAR11_.. |     452    .0177008    .0061351    .1304337    .0056439    .0297577

    mean = mean(CAR11_Target_Unlisted)                            t =   2.8852
Ho: mean = 0                                     degrees of freedom =      451

    Ha: mean < 0                 Ha: mean != 0                 Ha: mean > 0
 Pr(T < t) = 0.9980         Pr(|T| > |t|) = 0.0041          Pr(T > t) = 0.0020
```

```
. ttest CAR11_Target_Listed == 0

One-sample t test

Variable |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
CAR11_.. |      98   -.0283811    .0095713    .0947515   -.0473776   -.0093846

    mean = mean(CAR11_Target_Listed)                              t =  -2.9652
Ho: mean = 0                                     degrees of freedom =       97

    Ha: mean < 0                 Ha: mean != 0                 Ha: mean > 0
 Pr(T < t) = 0.0019         Pr(|T| > |t|) = 0.0038          Pr(T > t) = 0.9981
```

```
.  ttest CAR21_Target_Unlisted == 0

One-sample t test

Variable |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
CAR21_.. |     452    .0021004    .0081636    .1735598   -.0139429    .0181438

    mean = mean(CAR21_Target_Unlisted)                            t =   0.2573
Ho: mean = 0                                     degrees of freedom =      451

    Ha: mean < 0                 Ha: mean != 0                 Ha: mean > 0
 Pr(T < t) = 0.6015         Pr(|T| > |t|) = 0.7971          Pr(T > t) = 0.3985
```

```
. ttest CAR21_Target_Listed == 0

One-sample t test

Variable |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
CAR21_.. |      98   -.0268177    .0130547    .1292346   -.0527276   -.0009078

    mean = mean(CAR21_Target_Listed)                              t =  -2.0543
Ho: mean = 0                                     degrees of freedom =       97

    Ha: mean < 0                 Ha: mean != 0                 Ha: mean > 0
 Pr(T < t) = 0.0213         Pr(|T| > |t|) = 0.0426          Pr(T > t) = 0.9787
```

```
. ttest BHAR12_Target_Unlisted == 0

One-sample t test

Variable |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
BHAR12.. |     306   -.0595802    .0331132    .5792451   -.1247396    .0055791

    mean = mean(BHAR12_Target_Unlisted)                           t =  -1.7993
Ho: mean = 0                                     degrees of freedom =      305

    Ha: mean < 0                 Ha: mean != 0                 Ha: mean > 0
 Pr(T < t) = 0.0365         Pr(|T| > |t|) = 0.0730          Pr(T > t) = 0.9635
```

```
. ttest BHAR24_Target_Unlisted == 0

One-sample t test

Variable |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
BHAR24.. |     306   -.1423355    .0451178    .7892387   -.2311171    -.053554

    mean = mean(BHAR24_Target_Unlisted)                           t =  -3.1548
Ho: mean = 0                                     degrees of freedom =      305

    Ha: mean < 0                 Ha: mean != 0                 Ha: mean > 0
 Pr(T < t) = 0.0009         Pr(|T| > |t|) = 0.0018          Pr(T > t) = 0.9991
```

```
. ttest BHAR36_Target_Unlisted == 0

One-sample t test

Variable |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
BHAR36.. |     306   -.1703858    .0645409    1.129005   -.2973877    -.043384

    mean = mean(BHAR36_Target_Unlisted)                           t =  -2.6400
Ho: mean = 0                                     degrees of freedom =      305

    Ha: mean < 0                 Ha: mean != 0                 Ha: mean > 0
 Pr(T < t) = 0.0044         Pr(|T| > |t|) = 0.0087          Pr(T > t) = 0.9956
```

```
. ttest BHAR12_Target_Listed == 0

One-sample t test

Variable |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
BHAR12.. |      69   -.1171595    .0428388     .355846    -.202643   -.0316759

    mean = mean(BHAR12_Target_Listed)                             t =  -2.7349
Ho: mean = 0                                     degrees of freedom =       68

    Ha: mean < 0                 Ha: mean != 0                 Ha: mean > 0
 Pr(T < t) = 0.0040         Pr(|T| > |t|) = 0.0080          Pr(T > t) = 0.9960
```

```
. ttest BHAR24_Target_Listed == 0

One-sample t test

Variable |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
BHAR24.. |      69   -.1251357    .0636912    .5290591   -.2522296    .0019581

    mean = mean(BHAR24_Target_Listed)                             t =  -1.9647
Ho: mean = 0                                     degrees of freedom =       68

    Ha: mean < 0                 Ha: mean != 0                 Ha: mean > 0
 Pr(T < t) = 0.0268         Pr(|T| > |t|) = 0.0535          Pr(T > t) = 0.9732
```

```
. ttest BHAR36_Target_Listed == 0

One-sample t test

Variable |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
BHAR36.. |      69   -.2009312    .0675514    .5611241    -.335728   -.0661345

    mean = mean(BHAR36_Target_Listed)                             t =  -2.9745
Ho: mean = 0                                     degrees of freedom =       68

    Ha: mean < 0                 Ha: mean != 0                 Ha: mean > 0
 Pr(T < t) = 0.0020         Pr(|T| > |t|) = 0.0041          Pr(T > t) = 0.9980
```

APPENDIX I: Stata output – Sub-sample: Method of payment

```
. ttest CAR3_Payment_Cash == CAR3_Payment_Other, unpaired unequal

Two-sample t test with unequal variances

   Variable |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
------------+--------------------------------------------------------------------
  CAR3_P~h |     145    .013328    .0056774    .0683644    .0021063    .0245497
  CAR3_P~r |     405   .0077357     .004072    .0819471   -.0002692    .0157406
------------+--------------------------------------------------------------------
   combined |     550     .00921    .0033504    .0785727     .002629    .0157911
------------+--------------------------------------------------------------------
      diff |            .0055923    .0069867               -.0081565     .019341
------------------------------------------------------------------------------
    diff = mean(CAR3_Payment_C~h) - mean(CAR3_Payment_O~r)        t =   0.8004
Ho: diff = 0                     Satterthwaite's degrees of freedom =  301.794

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.7880         Pr(|T| > |t|) = 0.4241          Pr(T > t) = 0.2120

. ttest CAR11_Payment_Cash == CAR11_Payment_Other, unpaired unequal

Two-sample t test with unequal variances

   Variable |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
------------+--------------------------------------------------------------------
  CAR11_~h |     145    .0117215    .0081036    .0975802   -.0042959    .0277388
  CAR11_~r |     405    .0086909    .0066989    .1348136   -.0044782      .02186
------------+--------------------------------------------------------------------
   combined |     550    .0094899    .0053723    .1259913   -.0010629    .0200426
------------+--------------------------------------------------------------------
      diff |            .0030306     .010514               -.017648    .0237092
------------------------------------------------------------------------------
    diff = mean(CAR11_Payment_~h) - mean(CAR11_Payment_~r)        t =   0.2882
Ho: diff = 0                     Satterthwaite's degrees of freedom =  349.828

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.6133         Pr(|T| > |t|) = 0.7733          Pr(T > t) = 0.3867

. ttest CAR21_Payment_Cash == CAR21_Payment_Other, unpaired unequal

Two-sample t test with unequal variances

   Variable |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
------------+--------------------------------------------------------------------
  CAR21_~h |     145    .0090244    .0113353    .1364954   -.0133807    .0314295
  CAR21_~r |     405    -.007376    .0087619    .1763301   -.0246006    .0098486
------------+--------------------------------------------------------------------
   combined |     550   -.0030523     .007112    .1667916   -.0170224    .0109178
------------+--------------------------------------------------------------------
      diff |            .0164004    .0143269               -.0117845    .0445853
------------------------------------------------------------------------------
    diff = mean(CAR21_Payment_~h) - mean(CAR21_Payment_~r)        t =   1.1447
Ho: diff = 0                     Satterthwaite's degrees of freedom =  326.002

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.8734         Pr(|T| > |t|) = 0.2532          Pr(T > t) = 0.1266
```

```
. ttest BHAR12_Payment_Cash == BHAR12_Payment_Other, unpaired unequal

Two-sample t test with unequal variances

   Variable |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
------------+--------------------------------------------------------------------
  BHAR12~h |      90   -.0801271    .0357405    .3390639   -.1511427   -.0091116
  BHAR12~r |     285    -.067032    .0353053     .596022   -.1365252    .0024613
------------+--------------------------------------------------------------------
   combined |     375   -.0701748    .0281494    .5451104   -.1255257   -.0148239
------------+--------------------------------------------------------------------
      diff |           -.0130952    .0502379               -.112007    .0858167
------------------------------------------------------------------------------
    diff = mean(BHAR12_Payment~h) - mean(BHAR12_Payment~r)        t =  -0.2607
Ho: diff = 0                     Satterthwaite's degrees of freedom =  267.589

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.3973         Pr(|T| > |t|) = 0.7946          Pr(T > t) = 0.6027

. ttest BHAR24_Payment_Cash == BHAR24_Payment_Other, unpaired unequal

Two-sample t test with unequal variances

   Variable |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
------------+--------------------------------------------------------------------
  BHAR24~h |      90   -.1298826    .0605168    .5741126   -.2501282   -.009637
  BHAR24~r |     285   -.1421039    .0471171    .7954289    -.234847   -.0493608
------------+--------------------------------------------------------------------
   combined |     375   -.1391708    .0386062    .7476056   -.2150832   -.0632584
------------+--------------------------------------------------------------------
      diff |            .0122213    .0766962               -.1389893    .1634319
------------------------------------------------------------------------------
    diff = mean(BHAR24_Payment~h) - mean(BHAR24_Payment~r)        t =   0.1593
Ho: diff = 0                     Satterthwaite's degrees of freedom =  205.895

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.5632         Pr(|T| > |t|) = 0.8736          Pr(T > t) = 0.4368

. ttest BHAR36_Payment_Cash == BHAR36_Payment_Other, unpaired unequal

Two-sample t test with unequal variances

   Variable |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
------------+--------------------------------------------------------------------
  BHAR36~h |      90   -.1115127     .087227    .8275083   -.2848309    .0618056
  BHAR36~r |     285   -.1963726    .0656453     1.10822   -.3255856   -.0671595
------------+--------------------------------------------------------------------
   combined |     375   -.1760062    .0540833    1.047319   -.2823517   -.0696607
------------+--------------------------------------------------------------------
      diff |            .0848599     .109169               -.1304204    .3001402
------------------------------------------------------------------------------
    diff = mean(BHAR36_Payment~h) - mean(BHAR36_Payment~r)        t =   0.7773
Ho: diff = 0                     Satterthwaite's degrees of freedom =  198.418

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.7811         Pr(|T| > |t|) = 0.4379          Pr(T > t) = 0.2189
```

```
. ttest CAR3_Payment_Cash == 0

One-sample t test

Variable |  Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
CAR3_P~h |  145    .013328    .0056774    .0683644    .0021063    .0245497

    mean = mean(CAR3_Payment_Cash)                     t =   2.3476
Ho: mean = 0                     degrees of freedom =      144

    Ha: mean < 0                 Ha: mean != 0                 Ha: mean > 0
 Pr(T < t) = 0.9899         Pr(|T| > |t|) = 0.0203          Pr(T > t) = 0.0101
```

```
. ttest CAR3_Payment_Other == 0

One-sample t test

Variable |  Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
CAR3_P~r |  405    .0077357     .004072    .0819471   -.0002692    .0157406

    mean = mean(CAR3_Payment_Other)                    t =   1.8997
Ho: mean = 0                     degrees of freedom =      404

    Ha: mean < 0                 Ha: mean != 0                 Ha: mean > 0
 Pr(T < t) = 0.9709         Pr(|T| > |t|) = 0.0582          Pr(T > t) = 0.0291
```

```
. ttest CAR11_Payment_Cash == 0

One-sample t test

Variable |  Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
CAR11_~h |  145    .0117215    .0081036    .0975802   -.0042959    .0277388

    mean = mean(CAR11_Payment_Cash)                    t =   1.4465
Ho: mean = 0                     degrees of freedom =      144

    Ha: mean < 0                 Ha: mean != 0                 Ha: mean > 0
 Pr(T < t) = 0.9249         Pr(|T| > |t|) = 0.1502          Pr(T > t) = 0.0751
```

```
. ttest CAR11_Payment_Other == 0

One-sample t test

Variable |  Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
CAR11_~r |  405    .0086909    .0066989    .1348136   -.0044782     .02186

    mean = mean(CAR11_Payment_Other)                   t =   1.2974
Ho: mean = 0                     degrees of freedom =      404

    Ha: mean < 0                 Ha: mean != 0                 Ha: mean > 0
 Pr(T < t) = 0.9024         Pr(|T| > |t|) = 0.1953          Pr(T > t) = 0.0976
```

```
. ttest CAR21_Payment_Cash == 0

One-sample t test

Variable |  Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
CAR21_~h |  145    .0090244    .0113353    .1364954   -.0133807    .0314295

    mean = mean(CAR21_Payment_Cash)                    t =   0.7961
Ho: mean = 0                     degrees of freedom =      144

    Ha: mean < 0                 Ha: mean != 0                 Ha: mean > 0
 Pr(T < t) = 0.7864         Pr(|T| > |t|) = 0.4273          Pr(T > t) = 0.2136
```

```
. ttest CAR21_Payment_Other == 0

One-sample t test

Variable |  Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
CAR21_~r |  405   -.007376    .0087619    .1763301   -.0246006    .0098486

    mean = mean(CAR21_Payment_Other)                   t =  -0.8418
Ho: mean = 0                     degrees of freedom =      404

    Ha: mean < 0                 Ha: mean != 0                 Ha: mean > 0
 Pr(T < t) = 0.2002         Pr(|T| > |t|) = 0.4004          Pr(T > t) = 0.7998
```

```
. ttest BHAR12_Payment_Cash == 0

One-sample t test

Variable |  Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
BHAR12~h |   90   -.0801271    .0357405    .3390639   -.1511427   -.0091116

    mean = mean(BHAR12_Payment_Cash)                   t =  -2.2419
Ho: mean = 0                     degrees of freedom =       89

    Ha: mean < 0                 Ha: mean != 0                 Ha: mean > 0
 Pr(T < t) = 0.0137         Pr(|T| > |t|) = 0.0275          Pr(T > t) = 0.9863
```

```
. ttest BHAR12_Payment_Other == 0

One-sample t test

Variable |  Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
BHAR12~r |  285   -.067032    .0353053     .596022   -.1365252    .0024613

    mean = mean(BHAR12_Payment_Other)                  t =  -1.8986
Ho: mean = 0                     degrees of freedom =      284

    Ha: mean < 0                 Ha: mean != 0                 Ha: mean > 0
 Pr(T < t) = 0.0293         Pr(|T| > |t|) = 0.0586          Pr(T > t) = 0.9707
```

```
. ttest BHAR24_Payment_Cash == 0

One-sample t test

Variable |  Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
BHAR24~h |   90   -.1298826    .0605168    .5741126   -.2501282   -.009637

    mean = mean(BHAR24_Payment_Cash)                   t =  -2.1462
Ho: mean = 0                     degrees of freedom =       89

    Ha: mean < 0                 Ha: mean != 0                 Ha: mean > 0
 Pr(T < t) = 0.0173         Pr(|T| > |t|) = 0.0346          Pr(T > t) = 0.9827
```

```
. ttest BHAR24_Payment_Other == 0

One-sample t test

Variable |  Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
BHAR24~r |  285   -.1421039    .0471171    .7954289    -.234847   -.0493608

    mean = mean(BHAR24_Payment_Other)                  t =  -3.0160
Ho: mean = 0                     degrees of freedom =      284

    Ha: mean < 0                 Ha: mean != 0                 Ha: mean > 0
 Pr(T < t) = 0.0014         Pr(|T| > |t|) = 0.0028          Pr(T > t) = 0.9986
```

```
. ttest BHAR36_Payment_Cash == 0

One-sample t test

Variable |  Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
BHAR36~h |   90   -.1115127     .087227    .8275083   -.2848309    .0618056

    mean = mean(BHAR36_Payment_Cash)                   t =  -1.2784
Ho: mean = 0                     degrees of freedom =       89

    Ha: mean < 0                 Ha: mean != 0                 Ha: mean > 0
 Pr(T < t) = 0.1022         Pr(|T| > |t|) = 0.2044          Pr(T > t) = 0.8978
```

```
. ttest BHAR36_Payment_Other == 0

One-sample t test

Variable |  Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
BHAR36~r |  285   -.1963726    .0656453     1.10822   -.3255856   -.0671595

    mean = mean(BHAR36_Payment_Other)                  t =  -2.9914
Ho: mean = 0                     degrees of freedom =      284

    Ha: mean < 0                 Ha: mean != 0                 Ha: mean > 0
 Pr(T < t) = 0.0015         Pr(|T| > |t|) = 0.0030          Pr(T > t) = 0.9985
```

APPENDIX J: Stata output – Sub-sample: Geographic origin of acquirer

```
. ttest CAR3_Acquirer_NA == CAR3_Acquirer_Other, unpaired unequal

Two-sample t test with unequal variances
```

Variable	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
CAR3_A~A	372	.0093473	.0040809	.0787091	.0013227	.0173718
CAR3_A~r	178	.0089232	.0058844	.0785077	-.0026894	.0205358
combined	550	.00921	.0033504	.0785727	.002629	.0157911
diff		.0004241	.007161		-.01366	.0145081

```
    diff = mean(CAR3_Acquirer_NA) - mean(CAR3_Acquirer_~r)        t =   0.0592
Ho: diff = 0                     Satterthwaite's degrees of freedom =  349.617

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.5236         Pr(|T| > |t|) = 0.9528          Pr(T > t) = 0.4764
```

```
. ttest CAR11_Acquirer_NA == CAR11_Acquirer_Other, unpaired unequal

Two-sample t test with unequal variances
```

Variable	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
CAR11_~A	372	.0108469	.0064918	.1252088	-.0019184	.0236122
CAR11_~r	178	.0066537	.009588	.1279199	-.0122678	.0255753
combined	550	.0094899	.0053723	.1259913	-.0010629	.0200426
diff		.0041932	.011579		-.0185818	.0269681

```
    diff = mean(CAR11_Acquirer~A) - mean(CAR11_Acquirer~r)        t =   0.3621
Ho: diff = 0                     Satterthwaite's degrees of freedom =  342.174

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.6413         Pr(|T| > |t|) = 0.7175          Pr(T > t) = 0.3587
```

```
. ttest CAR21_Acquirer_NA == CAR21_Acquirer_Other, unpaired unequal

Two-sample t test with unequal variances
```

Variable	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
CAR21_~A	372	.0014794	.0079371	.1530849	-.0141279	.0170867
CAR21_~r	178	-.0125229	.014424	.1924403	-.040988	.0159423
combined	550	-.0030523	.007112	.1667916	-.0170224	.0109178
diff		.0140023	.0164636		-.018402	.0464065

```
    diff = mean(CAR21_Acquirer~A) - mean(CAR21_Acquirer~r)        t =   0.8505
Ho: diff = 0                     Satterthwaite's degrees of freedom =  287.828

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.8021         Pr(|T| > |t|) = 0.3958          Pr(T > t) = 0.1979
```

```
. ttest BHAR12_Acquirer_NA == BHAR12_Acquirer_Other, unpaired unequal

Two-sample t test with unequal variances
```

Variable	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
BHAR12~A	281	-.0921164	.0278843	.4674259	-.1470059	-.037227
BHAR12~r	94	-.0045834	.0751847	.7289431	-.1538854	.1447186
combined	375	-.0701748	.0281494	.5451104	-.1255257	-.0148239
diff		-.0875331	.080189		-.2463073	.0712411

```
    diff = mean(BHAR12_Acquire~A) - mean(BHAR12_Acquire~r)        t =  -1.0916
Ho: diff = 0                     Satterthwaite's degrees of freedom =  119.592

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.1386         Pr(|T| > |t|) = 0.2772          Pr(T > t) = 0.8614
```

```
. ttest BHAR24_Acquirer_NA == BHAR24_Acquirer_Other, unpaired unequal

Two-sample t test with unequal variances
```

Variable	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
BHAR24~A	281	-.1554088	.0385105	.6455534	-.2312156	-.079602
BHAR24~r	94	-.0906295	.1026147	.9948867	-.294402	.113143
combined	375	-.1391708	.0386062	.7476056	-.2150832	-.0632584
diff		-.0647793	.1096031		-.2817812	.1522227

```
    diff = mean(BHAR24_Acquire~A) - mean(BHAR24_Acquire~r)        t =  -0.5910
Ho: diff = 0                     Satterthwaite's degrees of freedom =   120.25

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.2778         Pr(|T| > |t|) = 0.5556          Pr(T > t) = 0.7222
```

```
. ttest BHAR36_Acquirer_NA == BHAR36_Acquirer_Other, unpaired unequal

Two-sample t test with unequal variances
```

Variable	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
BHAR36~A	281	-.2260941	.0486227	.8150653	-.3218066	-.1303816
BHAR36~r	94	-.0262752	.159144	1.542958	-.3423036	.2897533
combined	375	-.1760062	.0540833	1.047319	-.2823517	-.0696607
diff		-.199819	.1664061		-.5295686	.1299307

```
    diff = mean(BHAR36_Acquire~A) - mean(BHAR36_Acquire~r)        t =  -1.2008
Ho: diff = 0                     Satterthwaite's degrees of freedom =  110.852

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.1162         Pr(|T| > |t|) = 0.2324          Pr(T > t) = 0.8838
```

```
. ttest CAR3_Acquirer_NA == 0

One-sample t test

Variable |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
CAR3_A~A |     372    .0093473    .0040809    .0787091    .0013227    .0173718

    mean = mean(CAR3_Acquirer_NA)                     t =   2.2905
Ho: mean = 0                     degrees of freedom =      371

    Ha: mean < 0                 Ha: mean != 0                 Ha: mean > 0
 Pr(T < t) = 0.9887         Pr(|T| > |t|) = 0.0226          Pr(T > t) = 0.0113
```

```
. ttest CAR3_Acquirer_Other == 0

One-sample t test

Variable |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
CAR3_A~r |     178    .0089232    .0058844    .0785077   -.0026894    .0205358

    mean = mean(CAR3_Acquirer_Other)                  t =   1.5164
Ho: mean = 0                     degrees of freedom =      177

    Ha: mean < 0                 Ha: mean != 0                 Ha: mean > 0
 Pr(T < t) = 0.9344         Pr(|T| > |t|) = 0.1312          Pr(T > t) = 0.0656
```

```
. ttest CAR11_Acquirer_NA == 0

One-sample t test

Variable |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
CAR11_~A |     372    .0108469    .0064918    .1252088   -.0019184    .0236122

    mean = mean(CAR11_Acquirer_NA)                    t =   1.6709
Ho: mean = 0                     degrees of freedom =      371

    Ha: mean < 0                 Ha: mean != 0                 Ha: mean > 0
 Pr(T < t) = 0.9522         Pr(|T| > |t|) = 0.0956          Pr(T > t) = 0.0478
```

```
. ttest CAR11_Acquirer_Other == 0

One-sample t test

Variable |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
CAR11_~r |     178    .0066537     .009588    .1279199   -.0122678    .0255753

    mean = mean(CAR11_Acquirer_Other)                 t =   0.6940
Ho: mean = 0                     degrees of freedom =      177

    Ha: mean < 0                 Ha: mean != 0                 Ha: mean > 0
 Pr(T < t) = 0.7557         Pr(|T| > |t|) = 0.4886          Pr(T > t) = 0.2443
```

```
. ttest CAR21_Acquirer_NA == 0

One-sample t test

Variable |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
CAR21_~A |     372    .0014794    .0079371    .1530849   -.0141279    .0170867

    mean = mean(CAR21_Acquirer_NA)                    t =   0.1864
Ho: mean = 0                     degrees of freedom =      371

    Ha: mean < 0                 Ha: mean != 0                 Ha: mean > 0
 Pr(T < t) = 0.5739         Pr(|T| > |t|) = 0.8522          Pr(T > t) = 0.4261
```

```
. ttest CAR21_Acquirer_Other == 0

One-sample t test

Variable |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
CAR21_~r |     178   -.0125229     .014424    .1924403    -.040988    .0159423

    mean = mean(CAR21_Acquirer_Other)                 t =  -0.8682
Ho: mean = 0                     degrees of freedom =      177

    Ha: mean < 0                 Ha: mean != 0                 Ha: mean > 0
 Pr(T < t) = 0.1932         Pr(|T| > |t|) = 0.3865          Pr(T > t) = 0.8068
```

```
. ttest BHAR12_Acquirer_NA == 0

One-sample t test

Variable |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
BHAR12~A |     281   -.0921164    .0278843    .4674259   -.1470059    -.037227

    mean = mean(BHAR12_Acquirer_NA)                   t =  -3.3035
Ho: mean = 0                     degrees of freedom =      280

    Ha: mean < 0                 Ha: mean != 0                 Ha: mean > 0
 Pr(T < t) = 0.0005         Pr(|T| > |t|) = 0.0011          Pr(T > t) = 0.9995
```

```
. ttest BHAR12_Acquirer_Other == 0

One-sample t test

Variable |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
BHAR12~r |      94   -.0045834    .0751847    .7289431   -.1538854    .1447186

    mean = mean(BHAR12_Acquirer_Other)                t =  -0.0610
Ho: mean = 0                     degrees of freedom =       93

    Ha: mean < 0                 Ha: mean != 0                 Ha: mean > 0
 Pr(T < t) = 0.4758         Pr(|T| > |t|) = 0.9515          Pr(T > t) = 0.5242
```

```
. ttest BHAR24_Acquirer_NA == 0

One-sample t test

Variable |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
BHAR24~A |     281   -.1554088    .0385105    .6455534   -.2312156    -.079602

    mean = mean(BHAR24_Acquirer_NA)                   t =  -4.0355
Ho: mean = 0                     degrees of freedom =      280

    Ha: mean < 0                 Ha: mean != 0                 Ha: mean > 0
 Pr(T < t) = 0.0000         Pr(|T| > |t|) = 0.0001          Pr(T > t) = 1.0000
```

```
. ttest BHAR24_Acquirer_Other == 0

One-sample t test

Variable |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
BHAR24~r |      94   -.0906295    .1026147    .9948867    -.294402     .113143

    mean = mean(BHAR24_Acquirer_Other)                t =  -0.8832
Ho: mean = 0                     degrees of freedom =       93

    Ha: mean < 0                 Ha: mean != 0                 Ha: mean > 0
 Pr(T < t) = 0.1897         Pr(|T| > |t|) = 0.3794          Pr(T > t) = 0.8103
```

```
. ttest BHAR36_Acquirer_NA == 0

One-sample t test

Variable |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
BHAR36~A |     281   -.2260941    .0486227    .8150653   -.3218066   -.1303816

    mean = mean(BHAR36_Acquirer_NA)                   t =  -4.6500
Ho: mean = 0                     degrees of freedom =      280

    Ha: mean < 0                 Ha: mean != 0                 Ha: mean > 0
 Pr(T < t) = 0.0000         Pr(|T| > |t|) = 0.0000          Pr(T > t) = 1.0000
```

```
. ttest BHAR36_Acquirer_Other == 0

One-sample t test

Variable |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
BHAR36~r |      94   -.0262752     .159144    1.542958   -.3423036    .2897533

    mean = mean(BHAR36_Acquirer_Other)                t =  -0.1651
Ho: mean = 0                     degrees of freedom =       93

    Ha: mean < 0                 Ha: mean != 0                 Ha: mean > 0
 Pr(T < t) = 0.4346         Pr(|T| > |t|) = 0.8692          Pr(T > t) = 0.5654
```

APPENDIX K: Stata output – Correlations among variables

```
. cor CAR3 Upsurge Cross_border Large_Cap Target_Unlisted Payment_Cash Acquirer_NA
(obs=550)
```

	CAR3	Upsurge	Cross_~r	Large_~p	T~listed	Paymen~h	Acquir~A
CAR3	1.0000						
Upsurge	-0.0383	1.0000					
Cross_border	-0.0110	0.0761	1.0000				
Large_Cap	-0.0778	0.0064	0.0254	1.0000			
Target_Unl~d	0.1735	-0.0359	0.1008	-0.1119	1.0000		
Payment_Cash	0.0314	-0.0268	-0.0272	-0.0631	0.1600	1.0000	
Acquirer_NA	0.0025	0.0039	-0.3461	-0.2058	-0.0276	0.0258	1.0000

```
. cor CAR11 Upsurge Cross_border Large_Cap Target_Unlisted Payment_Cash Acquirer_NA
(obs=550)
```

	CAR11	Upsurge	Cross_~r	Large_~p	T~listed	Paymen~h	Acquir~A
CAR11	1.0000						
Upsurge	-0.0128	1.0000					
Cross_border	-0.0156	0.0761	1.0000				
Large_Cap	-0.0610	0.0064	0.0254	1.0000			
Target_Unl~d	0.1401	-0.0359	0.1008	-0.1119	1.0000		
Payment_Cash	0.0106	-0.0268	-0.0272	-0.0631	0.1600	1.0000	
Acquirer_NA	0.0156	0.0039	-0.3461	-0.2058	-0.0276	0.0258	1.0000

```
. cor CAR21 Upsurge Cross_border Large_Cap Target_Unlisted Payment_Cash Acquirer_NA
(obs=550)
```

	CAR21	Upsurge	Cross_~r	Large_~p	T~listed	Paymen~h	Acquir~A
CAR21	1.0000						
Upsurge	0.0022	1.0000					
Cross_border	-0.0262	0.0761	1.0000				
Large_Cap	-0.0404	0.0064	0.0254	1.0000			
Target_Unl~d	0.0664	-0.0359	0.1008	-0.1119	1.0000		
Payment_Cash	0.0434	-0.0268	-0.0272	-0.0631	0.1600	1.0000	
Acquirer_NA	0.0393	0.0039	-0.3461	-0.2058	-0.0276	0.0258	1.0000

```
. cor BHAR12 Upsurge Cross_border Large_Cap Target_Unlisted Payment_Cash Acquirer_NA
(obs=375)
```

	BHAR12	Upsurge	Cross_~r	Large_~p	T~listed	Paymen~h	Acquir~A
BHAR12	1.0000						
Upsurge	0.1444	1.0000					
Cross_border	0.0269	0.0486	1.0000				
Large_Cap	0.0234	0.0153	0.0828	1.0000			
Target_Unl~d	0.0410	-0.0544	0.1412	-0.1570	1.0000		
Payment_Cash	-0.0103	0.0157	-0.0069	-0.0006	0.1540	1.0000	
Acquirer_NA	-0.0697	0.0010	-0.4609	-0.0503	-0.0047	0.0225	1.0000

```
. cor BHAR24 Upsurge Cross_border Large_Cap Target_Unlisted Payment_Cash Acquirer_NA
(obs=375)
```

	BHAR24	Upsurge	Cross_~r	Large_~p	T~listed	Paymen~h	Acquir~A
BHAR24	1.0000						
Upsurge	0.1684	1.0000					
Cross_border	-0.0078	0.0486	1.0000				
Large_Cap	0.0574	0.0153	0.0828	1.0000			
Target_Unl~d	-0.0089	-0.0544	0.1412	-0.1570	1.0000		
Payment_Cash	0.0070	0.0157	-0.0069	-0.0006	0.1540	1.0000	
Acquirer_NA	-0.0376	0.0010	-0.4609	-0.0503	-0.0047	0.0225	1.0000

```
. cor BHAR36 Upsurge Cross_border Large_Cap Target_Unlisted Payment_Cash Acquirer_NA
(obs=375)
```

	BHAR36	Upsurge	Cross_~r	Large_~p	T~listed	Paymen~h	Acquir~A
BHAR36	1.0000						
Upsurge	0.1130	1.0000					
Cross_border	0.0531	0.0486	1.0000				
Large_Cap	0.0659	0.0153	0.0828	1.0000			
Target_Unl~d	0.0113	-0.0544	0.1412	-0.1570	1.0000		
Payment_Cash	0.0347	0.0157	-0.0069	-0.0006	0.1540	1.0000	
Acquirer_NA	-0.0828	0.0010	-0.4609	-0.0503	-0.0047	0.0225	1.0000

APPENDIX L: Stata output – Cross-sectional regressions (short-term)

```
. regress CAR3 Upsurge Cross_border Large_Cap Target_Unlisted Payment_Cash Acquirer_NA, robust

Linear regression                               Number of obs     =        550
                                                F(6, 543)         =       3.97
                                                Prob > F          =     0.0007
                                                R-squared         =     0.0354
                                                Root MSE          =      .0776

------------------------------------------------------------------------------
             |               Robust
        CAR3 |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
     Upsurge |  -.0054964   .0068586    -0.80   0.423    -.0189692    .0079763
Cross_border |  -.0050395   .0078521    -0.64   0.521    -.0204637    .0103848
     Large_Cap |  -.0110665   .0057012    -1.94   0.053    -.0222656    .0001326
Target_Unlisted |   .034512   .0082305     4.19   0.000     .0183446    .0506795
Payment_Cash |  -.0001048   .0070981    -0.01   0.988     -.014048    .0138383
Acquirer_NA |   -.002605   .0083131    -0.31   0.754    -.0189347    .0137247
       _cons |  -.0117569   .0112114    -1.05   0.295    -.0337798    .0102661
------------------------------------------------------------------------------

. r2_a
Adj R-square = 0.0247

. regress CAR11 Upsurge Cross_border Large_Cap Target_Unlisted Payment_Cash Acquirer_NA, robust

Linear regression                               Number of obs     =        550
                                                F(6, 543)         =       3.23
                                                Prob > F          =     0.0040
                                                R-squared         =     0.0228
                                                Root MSE          =      .12524

------------------------------------------------------------------------------
             |               Robust
       CAR11 |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
     Upsurge |  -.0017133   .0123396    -0.14   0.890    -.0259526     .022526
Cross_border |  -.0077339   .0141481    -0.55   0.585    -.0355257    .0200579
     Large_Cap |  -.0131441   .0087925    -1.49   0.136    -.0304155    .0041274
Target_Unlisted |    .04611   .0119168     3.87   0.000     .0227014    .0695186
Payment_Cash |  -.0044636   .0109689    -0.41   0.684    -.0260102    .0170831
Acquirer_NA |   .0002047   .0140379     0.01   0.988    -.0273705    .0277799
       _cons |  -.021297   .0167409    -1.27   0.204    -.0541818    .0115878
------------------------------------------------------------------------------

. r2_a
Adj R-square = 0.0120

. regress CAR21 Upsurge Cross_border Large_Cap Target_Unlisted Payment_Cash Acquirer_NA, robust

Linear regression                               Number of obs     =        550
                                                F(6, 543)         =       1.38
                                                Prob > F          =     0.2188
                                                R-squared         =     0.0081
                                                Root MSE          =      .16703

------------------------------------------------------------------------------
             |               Robust
       CAR21 |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
     Upsurge |   .0027593   .0161074     0.17   0.864    -.0288812    .0343998
Cross_border |  -.0079632   .0183273    -0.43   0.664    -.0439644     .028038
     Large_Cap |  -.0097403   .0123751    -0.79   0.432    -.0340493    .0145687
Target_Unlisted |   .0269412   .0158237     1.70   0.089     -.004142    .0580244
Payment_Cash |   .0116286   .0149764     0.78   0.438    -.0177901    .0410473
Acquirer_NA |   .0097469   .0197519     0.49   0.622    -.0290527    .0485465
       _cons |  -.0306138    .024727    -1.24   0.216    -.0791862    .0179586
------------------------------------------------------------------------------

. r2_a
Adj R-square = -0.0028
```

APPENDIX M: Stata output – Cross-sectional regressions (long-term)

```
. regress BHAR12 Upsurge Cross_border Large_Cap Target_Unlisted Payment_Cash Acquirer_NA, robust

Linear regression                               Number of obs     =        375
                                                F(6, 368)         =       1.81
                                                Prob > F          =     0.0965
                                                R-squared         =     0.0298
                                                Root MSE          =      .5413

------------------------------------------------------------------------------
             |               Robust
      BHAR12 |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
     Upsurge |   .1755571   .0634285     2.77   0.006     .0508294    .3002848
Cross_border |  -.0331804     .06793    -0.49   0.626      -.16676    .1003992
   Large_Cap |   .0401796   .0444301     0.90   0.366    -.0471891    .1275483
Target_Unlis~d |   .0848871   .0574417     1.48   0.140    -.028068    .1978423
Payment_Cash |  -.0258498   .0518987    -0.50   0.619    -.127905    .0762054
  Acquirer_NA |   -.101536   .0822219    -1.23   0.218    -.2632197    .0601476
        _cons |  -.1081843   .0861762    -1.26   0.210    -.2776439    .0612754
------------------------------------------------------------------------------

. r2_a
Adj R-square = 0.0139

. regress BHAR24 Upsurge Cross_border Large_Cap Target_Unlisted Payment_Cash Acquirer_NA, robust

Linear regression                               Number of obs     =        375
                                                F(6, 368)         =       2.86
                                                Prob > F          =     0.0099
                                                R-squared         =     0.0346
                                                Root MSE          =     .74054

------------------------------------------------------------------------------
             |               Robust
      BHAR24 |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
     Upsurge |   .2758595   .0915874     3.01   0.003     .0957593    .4559597
Cross_border |  -.0791031   .1023589    -0.77   0.440    -.2803848    .1221787
   Large_Cap |   .1115677   .0629279     1.77   0.077    -.0121757     .235311
Target_Unlis~d |   .0305795   .0849044     0.36   0.719    -.1363792    .1975382
Payment_Cash |   .0050018   .0767842     0.07   0.948     -.145989    .1559926
  Acquirer_NA |  -.0994862   .1246242    -0.80   0.425    -.3445513    .1455788
        _cons |  -.1712859   .1288522    -1.33   0.185    -.4246649    .0820931
------------------------------------------------------------------------------

. r2_a
Adj R-square = 0.0188

. regress BHAR36 Upsurge Cross_border Large_Cap Target_Unlisted Payment_Cash Acquirer_NA, robust

Linear regression                               Number of obs     =        375
                                                F(6, 368)         =       3.53
                                                Prob > F          =     0.0021
                                                R-squared         =     0.0249
                                                Root MSE          =     1.0426

------------------------------------------------------------------------------
             |               Robust
      BHAR36 |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
     Upsurge |   .2550047   .1327721     1.92   0.056    -.0060826     .516092
Cross_border |    .007149   .1183035     0.06   0.952    -.2254867    .2397846
   Large_Cap |   .1691573   .0826332     2.05   0.041     .0066648    .3316498
Target_Unlis~d |   .0586826   .0968645     0.61   0.545    -.1317947    .2491599
Payment_Cash |   .0768267   .1112615     0.69   0.490    -.1419613    .2956148
  Acquirer_NA |  -.1902932   .1515933    -1.26   0.210    -.4883909    .1078045
        _cons |   -.21299   .1538607    -1.38   0.167    -.5155464    .0895665
------------------------------------------------------------------------------

. r2_a
Adj R-square = 0.0090
```

APPENDIX N: Stata output – Cross-sectional regression with US, CA, GB, AU

```
. regress CAR3 Upsurge Cross_border Large_Cap Target_Unlisted Payment_Cash Acquirer_US Acquirer_CA Acquirer_
> GB Acquirer_AU, robust

Linear regression                               Number of obs     =        550
                                                F(9, 540)         =       2.89
                                                Prob > F          =     0.0024
                                                R-squared         =     0.0366
                                                Root MSE          =     .07776

------------------------------------------------------------------------------
             |               Robust
        CAR3 |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
     Upsurge |  -.0062566   .0070662    -0.89   0.376    -.0201371    .007624
Cross_border |  -.0045785   .0080466    -0.57   0.570    -.0203849    .011228
   Large_Cap |  -.0106896   .0054291    -1.97   0.049    -.0213544   -.0000248
Target_Unlis~d |   .0343941   .0084628     4.06   0.000      .01777    .0510181
Payment_Cash |  -.0002057   .0072396    -0.03   0.977    -.0144269    .0140154
  Acquirer_US |  -.0005671   .0082488    -0.07   0.945    -.0167707    .0156365
  Acquirer_CA |  -.0024554   .0074794    -0.33   0.743    -.0171477    .0122368
  Acquirer_GB |  -.0040157   .0140026    -0.29   0.774     -.031522    .0234906
  Acquirer_AU |   .0092606   .0203135     0.46   0.649    -.0306427    .0491638
        _cons |  -.0126902   .0105172    -1.21   0.228    -.0333499    .0079695
------------------------------------------------------------------------------

. r2_a
Adj R-square = 0.0205

. regress BHAR24 Upsurge Cross_border Large_Cap Target_Unlisted Payment_Cash Acquirer_NA, robust

Linear regression                               Number of obs     =        375
                                                F(6, 368)         =       2.86
                                                Prob > F          =     0.0099
                                                R-squared         =     0.0346
                                                Root MSE          =     .74054

------------------------------------------------------------------------------
             |               Robust
      BHAR24 |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
     Upsurge |   .2758595   .0915874     3.01   0.003     .0957593    .4559597
Cross_border |  -.0791031   .1023589    -0.77   0.440    -.2803848    .1221787
   Large_Cap |   .1115677   .0629279     1.77   0.077    -.0121757     .235311
Target_Unlis~d |   .0305795   .0849044     0.36   0.719    -.1363792    .1975382
Payment_Cash |   .0050018   .0767842     0.07   0.948     -.145989    .1559926
  Acquirer_NA |  -.0994862   .1246242    -0.80   0.425    -.3445513    .1455788
        _cons |  -.1712859   .1288522    -1.33   0.185    -.4246649    .0820931
------------------------------------------------------------------------------

. r2_a
Adj R-square = 0.0188

. regress BHAR36 Upsurge Cross_border Large_Cap Target_Unlisted Payment_Cash Acquirer_NA, robust

Linear regression                               Number of obs     =        375
                                                F(6, 368)         =       3.53
                                                Prob > F          =     0.0021
                                                R-squared         =     0.0249
                                                Root MSE          =     1.0426

------------------------------------------------------------------------------
             |               Robust
      BHAR36 |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
     Upsurge |   .2550047   .1327721     1.92   0.056    -.0060826     .516092
Cross_border |    .007149   .1183035     0.06   0.952    -.2254867    .2397846
   Large_Cap |   .1691573   .0826332     2.05   0.041     .0066648    .3316498
Target_Unlis~d |   .0586826   .0968645     0.61   0.545    -.1317947    .2491599
Payment_Cash |   .0768267   .1112615     0.69   0.490    -.1419613    .2956148
  Acquirer_NA |  -.1902932   .1515933    -1.26   0.210    -.4883909    .1078045
        _cons |    -.21299   .1538607    -1.38   0.167    -.5155464    .0895665
------------------------------------------------------------------------------

. r2_a
Adj R-square = 0.0090
```

APPENDIX O: Stata output – Cross-sectional regression with oil price

```
. regress CAR3 Upsurge Oil_price3 Cross_border Large_Cap Target_Unlisted Payment_Cash Acquirer_NA, robust

Linear regression                               Number of obs     =        550
                                                F(7, 542)         =       3.49
                                                Prob > F          =     0.0011
                                                R-squared         =     0.0360
                                                Root MSE          =     .07764

------------------------------------------------------------------------------
             |               Robust
        CAR3 |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
     Upsurge |  -.0059639   .0069799    -0.85   0.393    -.0196749     .007747
  Oil_price3 |  -.0000818   .0001356    -0.60   0.547    -.0003481    .0001846
Cross_border |  -.0048048   .0078191    -0.61   0.539    -.0201642    .0105545
   Large_Cap |  -.0109883   .0057141    -1.92   0.055    -.0222127    .0002362
Target_Unlis~d |  .0346571   .0082303     4.21   0.000     .0184899    .0508244
Payment_Cash |  -.0003895   .0071628    -0.05   0.957    -.0144598    .0136807
  Acquirer_NA |  -.0024358   .0082615    -0.29   0.768    -.0186644    .0137927
        _cons |  -.0057423    .01617    -0.36   0.723    -.0375059    .0260212
------------------------------------------------------------------------------

. r2_a
Adj R-square = 0.0235

. regress CAR11 Upsurge Oil_price11 Cross_border Large_Cap Target_Unlisted Payment_Cash Acquirer_NA, robust

Linear regression                               Number of obs     =        550
                                                F(7, 542)         =       2.80
                                                Prob > F          =     0.0072
                                                R-squared         =     0.0248
                                                Root MSE          =     .12522

------------------------------------------------------------------------------
             |               Robust
       CAR11 |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
     Upsurge |  -.0030779   .0127156    -0.24   0.809    -.0280558    .0219001
  Oil_price11 |  -.0002326   .0002083    -1.12   0.265    -.0006417    .0001765
Cross_border |  -.0070651   .0140673    -0.50   0.616    -.0346982    .0205679
   Large_Cap |  -.0129206   .0087932    -1.47   0.142    -.0301935    .0043523
Target_Unlis~d |  .0465136   .0119625     3.89   0.000     .0230151     .070012
Payment_Cash |  -.0052836   .0110646    -0.48   0.633    -.0270184    .0164511
  Acquirer_NA |   .0006845   .0139221     0.05   0.961    -.0266634    .0280324
        _cons |  -.0041737   .0245821    -0.17   0.865    -.0524617    .0441142
------------------------------------------------------------------------------

. r2_a
Adj R-square = 0.0122

. regress CAR21 Upsurge Oil_price21 Cross_border Large_Cap Target_Unlisted Payment_Cash Acquirer_NA, robust

Linear regression                               Number of obs     =        550
                                                F(7, 542)         =       1.21
                                                Prob > F          =     0.2941
                                                R-squared         =     0.0084
                                                Root MSE          =     .16716

------------------------------------------------------------------------------
             |               Robust
       CAR21 |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
     Upsurge |   .0020724   .0165839     0.12   0.901    -.0305042     .034649
  Oil_price21 |  -.0001182   .0002903    -0.41   0.684    -.0006884     .000452
Cross_border |  -.0076291    .018227    -0.42   0.676    -.0434332    .0281751
   Large_Cap |  -.0096382   .0123532    -0.78   0.436    -.0339043    .0146279
Target_Unlis~d |  .0271536   .0159006     1.71   0.088    -.0040807    .0583879
Payment_Cash |   .0111993   .0151493     0.74   0.460    -.0185592    .0409577
  Acquirer_NA |   .0099723   .0196184     0.51   0.611    -.0285651    .0485097
        _cons |  -.0218989   .0364984    -0.60   0.549    -.0935945    .0497968
------------------------------------------------------------------------------

. r2_a
Adj R-square = -0.0044
```