Value creation through corporate restructuring: The influence of media coverage

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Executive summary

The dissertation provides insight into corporate restructuring transactions and identifies performance drivers of equity carve-out (ECO) and spin-off. The objective of the dissertation is to determine whether ECO and spin-off transactions create value and to evaluate whether the financial press has a relevant role in the value creation process.

Using the design of an event study, the results show that the announcement of an ECO or spin-off transaction in North America or Europe is value-creating at the time of the announcement. These are new results since very few studies exist which cover the period following the 2007/08 financial crisis. The findings suggest that investors expect a positive value effect with the separation of a business unit. The results expand the findings of previous studies, which covered transactions announced in the second half of the last century up to the financial crisis.

An entirely new aspect assessed in this dissertation is whether ECO and spin-off transactions reported in the financial press show significantly higher abnormal returns at the time of announcement than transactions that were not reported in the financial press. The results confirm the hypothesis that spin-off transactions reported in the financial press show higher returns than transactions not reported in the financial press. The results indicate that the financial press has an important role in the distribution of share price relevant information. Unfortunately, for ECO transactions not enough observations exist to obtain statistically relevant results.

Additionally, the dissertation examines whether the reasons for a transaction cited in the financial press, i.e., why a transaction was made, affect the level of realized abnormal returns at the time of announcement. The results show that the level of abnormal returns varied among the reasons cited, but there are no statistically significant results.

The present dissertation generated a new data set of ECO and spin-off transactions that describes not only financial data of the transactions but also variables for reporting the transactions in the financial press. The dissertation extends the value creation results of previous studies for the period after the 2007/08 financial crisis and provides a completely new view of the importance of financial press coverage in divestiture announcements.

Executive summary (Deutsch)

Das vorliegende Dissertationsprojekt gibt Einblicke in Unternehmensrestrukturierungen und identifiziert Leistungstreiber von Equity Carve-Out (ECO) und Spin-off. Ziel der Dissertation ist es, zu verifizieren, ob ECO- und Spin-off-Transaktionen Unternehmenswert schaffen und zu evaluieren, ob die Finanzpresse im Wertschöpfungsprozess eine relevante Rolle innehat.

Die Ergebnisse unter Nutzung des Designs einer Event-Studie zeigen, dass mit Verkündung einer ECO- und Spin-off-Transaktion in Nordamerika und Europa zum Zeitpunkt der Bekanntgabe ein positiver Wertschöpfungseffekt einhergeht. Für die Periode nach der Finanzkrise von 2007/08 sind dies neue Erkenntnisse. Es lässt sich ableiten, dass Investoren mit einer Unternehmensabspaltung einen positiven Werteffekt erwarten. Weiterhin erweitern die vorliegenden Resultate die Erkenntnisse existierender Studien für Transaktionen seit den 1950er Jahren.

Eine weitere Fragestellung der Dissertation, die in bisherigen Studien nicht behandelt wurde, ist, ob ECO- und Spin-off-Transaktionen, über die in der Finanzpresse berichtet wird, zum Zeitpunkt der Ankündigung signifikant höhere anormale Renditen aufweisen als Transaktionen, über die nicht in der Finanzpresse berichtet wird. Für Spin-off-Transaktionen, über die in der Finanzpresse berichtet wird, werden höhere abnormale Renditen identifiziert als für Spin-off-Transaktionen, über die nicht in der Finanzpresse berichtet wird. Die Ergebnisse für Spin-off-Transaktionen lassen darauf schliessen, dass die Finanzpresse eine relevante Rolle in der Distribution aktienkursrelevanten Informationen hat. Für ECO-Transaktionen hingegen, gibt es nicht genügend Beobachtungen, um statistisch relevante Ergebnisse zu erzielen.

Darüber hinaus untersucht die Dissertation, ob die in der Finanzpresse genannten Transaktionsgründe, d.h. warum eine Transaktion durchgeführt wurde, die Höhe realisierter anormaler Renditen zum Ankündigungszeitpunkt beeinflusst. Die Resultate zeigen, dass die Höhe anormaler Renditen zwischen den Transaktionsgründen variiert, es jedoch keine statistisch signifikanten Resultate gibt.

Die Dissertation hat damit einen neuen Datensatz an ECO- und Spin-off-Transaktionen generiert, der nicht nur Finanzdaten der Transaktionen, sondern auch Variablen zur Berichterstattung der Transaktionen in der Finanzpresse beschreibt. Die Dissertation erweitert die Ergebnisse früherer Studien für die Periode nach der Finanzkrise von 2007/08 und eröffnet einen neuen Blickwinkel auf die Wichtigkeit der Finanzpresse in der Distribution aktienkursrelevanter Informationen.

Part I: Theoretical foundation – fundamentals, models and empirical studies

1 Introduction

In mathematics, both sides of an equation must balance each other for the whole always to be equal to the sum of its parts. In finance, this equation does not consistently hold true: the whole may be equal to the sum of its parts but it also may be greater or smaller than the sum of its parts. In a corporate merger, for example, the combination of two similar businesses creates cost synergies through joint use of administration, distribution channels or procurement. Consequently, assuming equal or higher returns, the economic value of two combined entities (the whole) is greater than the sum of parts. Similarly, the separation of a business activity from a whole may allow management to better grow the individual core activities leading to a higher value of the sum of the separated businesses.

For publicly listed entities, the evaluation of whether the sum of parts is bigger or smaller than the entity as a whole is determined by investors and measured through a firm's stock price. Following new information, for example a merger or demerger announcement, investors update their expectations leading to buying and selling of shares and the updated share price expresses the expected value creation or dilution. Companies themselves inform investors and the stock market through press releases and the financial press disseminates the information to its subscribers and the wider public. To determine if the separation of an existing subsidiary is value creating it is therefore of interest (i) how investors update their expectations based on new information, (ii) how new information is disseminated and (iii) the value of the new information actually is. The present thesis builds upon these ideas and aspires to contribute to an answer to whether a separation of an existing subsidiary from its parent creates value to shareholders and to evaluate the role of the financial press in the process.

Corporate managers continually aim to improve and develop the business entrusted to them. The development of a business includes the restructuring of organizational setups and even more disruptive decisions such as the change of business structure. The change of business structure like the separation of a business unit can be executed in various ways. A unit may be sold to a third party in a Mergers & Acquisitions (M&A) transaction, it can be listed on a public exchange and shares can be

distributed to existing shareholders (spin-off) or it can be sold partially or in full through a stock exchange listing (ECO) which brings in new shareholders and money. The impact of the announcement of these transactions on the parent company valuation can be measured as long as the parent company's shares are listed and traded on a stock exchange.

Both spin-off and ECO are interesting as they release the business unit into a standalone entity. There are two main differences between a spin-off and an ECO. First, in a spin-off transaction the ownership does not change through the transaction while during an ECO transaction new shareholders enter the shareholder base. Second, in a spin-off no cash is exchanged while in an ECO transaction, the new shareholders buy shares and a cash inflow to the parent or subsidiary is recorded.

Prior research on spin-off and ECO concludes that an abnormal positive reaction of the parent company's stock price is observable on the announcement date of the transaction. However, prior research focuses on samples from the 1970s up to the financial crisis while the coverage after the financial crisis is comprehensive neither in geographical coverage nor in coverage of the transaction type (ECO and spin-off). Most importantly, until today the impact of financial press coverage has not been investigated in the analysis of spin-off and ECO transactions. The present dissertation addresses the gaps with a comprehensive coverage of geography and transaction type since the financial crisis and investigates the role of the financial press.

1.1 Relevance

On the one hand, the economic importance, especially in recent years following the global financial crisis, and, on the other hand, the diverse multi-layer aspects of ownership restructuring and financing render ECO as well as spin-off transactions interesting from an academic point of view.

From an economic point of view, equity carve-out and spin-off transactions constitute a sizable portion of the global IPO market and have been instruments of corporate restructuring since the 1970s. For example, in 2014 the NYSE announced a record year of 23 spin-offs and 19 ECO with a total value of USD 104.1 billion (market cap) out of 129 initial public offerings (IPO; NYSE, 2014). The continued importance of the ECO and spin-off transactions is also highlighted

through frequent coverage in the financial press. For example, in 2017 The Wall Street Journal stated, "*Among corporate executives, spin-off of divisions have come in and out of favor over the years, but with one group they have been a steady crowd-pleaser: investors."* (WSJ, 2017). These citations highlight the importance of the transaction types to the business community and provide motivation for this study to provide relevant information to academia and business professionals as well.

To provide further detail on the economic importance of ECO and spin-off investigated in this study, based on my data set Table 1 and Table 2 below present the ten largest ECO and spin-offs that took place in North America and Europe following the global financial crisis during the years 2000 to 2013.

Largest ECO transactions

Subsidiary	**Parent**	**Year**	**Country**	**Value** (USD m)
Kraft	Philip Morris	2001	US	8,680
Infineon Technologies	Siemens	2000	Germany	5,852
Orange	France Telecom	2001	France	5,761
Agere Systems	Lucent	2001	US	4,140
Telefonica Moviles	Telefonica	2000	Spain	2,810
T-Online	Deutsche Telekom	2000	Germany	2,733
Zoetis	Pfizer	2013	US	2,574
Vivendi Environment	Vivendi	2000	France	2,311
Terna	Enel	2004	Italy	2,064

Source: Thomson Reuters

Table 1: Ten largest ECO transactions between 2000-2013

Largest spin-off transactions				
Subsidiary	**Parent**	**Year**	**Country**	**Value** (USD m)
Nortel Networks	BCE	2000	Canada	59,974
AbbVie	Abbottt Laboratories	2011	US	55,513
Liberty Media	AT&T	2001	US	41,865
CBS	Viacom	2005	US	32,098
Mondelez	Kraft Foods	2011	US	26,085
Phillips 66	ConocoPhillips	2011	US	21,529
Fiat Industrial	Fiat	2010	Italy	18,490
Spectra Energy	Duke Energy	2006	US	17,963
Western Union	First Data	2006	US	14,638

Source: Thomson Reuters

Table 2: Ten largest spin-off transactions between 2000-2013

The combination of ownership restructuring and financing make ECO and spin-off interesting while it is also the differences in ownership restructuring and financing that distinguish ECO and spin-off transactions from each other. Most literature on ECO and spin-off investigates the stock price effect following the transaction announcement. However, these studies fail to investigate how information of a transaction is disseminated and to account for the information content that is disseminated. Investigations include the explanation of observed stock price movements through the stock and operating performance of the parent company as well as external factors such as the market environment. The present study extends the existing research by taking into account which transactions were reported in the financial press and what information was disseminated. For example, financial media may report a transaction and comment that the separation allows the parent company to reinforce its concentration on its core business or it may comment that the parent company hopes for a better stock market valuation through the separation, as it will be easier for investors to evaluate each company individually. This kind of analysis does not yet exist for ECO and spin-off transactions in academia.

From the perspective of corporate management, investors and academics, it is insufficient to identify a correlation between stock price and an announcement without identifying prior causal relationships. Previous research does not use available deal motivations as expressed in the financial press which are a piece of the theoretical explanation of the relationship between transaction announcement and stock price reaction. The present dissertation project attempts to do so.

1.2 Contribution and research questions

Research on corporate restructurings should help practitioners and academics understand relationships between motivations for corporate restructuring and subsequent observed performance. The objective of the present dissertation project is to (i) build a new dataset covering the post-financial crisis era of North American and European ECO and spin-off transactions and (ii) use this data set to examine both existing and newly developed hypotheses on value creation of ECO and spin-off transactions. To accomplish (i) and (ii), this study will (a) review both theoretical and empirical findings in the existing literature to build a profound basis (b) collect and derive hypotheses based on the theoretical and empirical findings, (c) test these hypotheses with the newly built dataset and (d) present and discuss obtained results and derive implications for managers and academics.

Figure 1 provides a summary of the main research questions for this dissertation project.

Research questions
1. Does corporate management create value for shareholders through divesting subsidiaries in spin-off and ECO transactions?
2. Does media coverage of spin-off and ECO transactions influence shareholder value creation?
3. What are motivations (deal rationales) presented through media coverage and does the content (deal rationale) of the news coverage of spin-off and ECO transactions influence shareholder value creation?

Figure 1: Summary of research questions

To address these research questions, this study is structured in two parts. Part I provides background on corporate restructuring transactions, lays the theoretical foundation and sheds light on existing empirical studies. Part II derives specific hypotheses for this study, describes the methodology and the identified data sample and concludes.

Chapter 1 introduces the problem statement and research objective. Chapter 2 provides an overview of existing transaction types available to corporations to use to divest a subsidiary. Chapter 2 includes a definition of spin-off and equity carve-out transactions. Chapter 2 defines spin-off and ECO transactions, and provides an overview…

Chapter 3 discusses theoretical concepts for understanding potential reactions of capital markets to the announcement of ECO and spin-off. Notably, shareholder value orientation is identified as the foundation for corporate decision-making: principal-agent theory, moral hazard and adverse selection. Theoretical concepts of corporate diversification relevant to ECO and spin-off are provided. Chapter 4 summarizes the status of empirical research on ECO and spin-off.

Chapter 5 derives specific hypotheses to be tested in this study. All hypotheses are derived based on the theoretical and empirical considerations summarized in chapters 3 and 4. Chapter 6 describes the (event study) methodology and detailed test procedures, and introduces the analyzed data set.

Chapter 7 contains the detailed results for all hypotheses: starting with descriptive statistics, all hypotheses from chapter 5 are analyzed. Finally, chapter 8 addresses the research questions raised in chapter 1, reflects on the relevance of results for academics and business practitioners and provides an outlook for further studies.

The proposed dissertation project is to assess whether equity carve-out and spin-off create value for shareholders, to assess the role of financial media in corporate restructuring and to identify drivers of the potentially identified value creation. The study is not a manual on how to successfully conduct equity carve-out and spin-off or how to game capital markets, nor is it an investment guide for investors. Investors as well as corporate management should continue to consult professional advice (legal, tax, business, corporate finance) appropriate to their individual context.

2 Corporate restructuring transactions

2.1 Transaction types

In business practice, shareholder value focus and executive compensation arrangements force corporate management to continuously improve, adapt and change the existing business entrusted to them. Consequently, restructuring is an ever-present topic in business. Restructuring can be done within a given organizational setup or require a disruption of the existing organizational and management setup. If management opts for a disruptive change, it must decide whether to pursue a private or public transaction.

Private transaction types consist of (i) joint ventures, (ii) the sale of the existing business to a strategic buyer (M&A transaction), (iii) the sale of the business to a financial buyer (LBO) or (iv) the sale of the business to management (MBO). A public transaction involves the listing of a part of the business on a public market, a stock exchange. The advantage of a public transaction for researchers is that it produces publicly available data that can be used for empirical evaluation. The two main public transaction types are equity carve-out (ECO) and spin-off transactions. ECO are defined as majority and minority initial public offering (IPO) of stock of a subsidiary. The difference between a majority and a minority IPO is if controlling interest is transferred: the question is if new shareholders hold the majority of voting power or only a minority. In practice, almost all transactions are minority IPO given that controlling interest remains with the parent company. In spin-off transactions the parent company distributes shares of the subsidiary which is being spun off to its existing shareholders. Through a spin-off transaction, the controlling interest in a subsidiary is usually transferred. In the following, the two main public transaction types are explained in detail.

2.2 Definition of an equity carve-out (ECO)

Schipper and Smith (1986) define an ECO as the “initial public sale of shares in a previously wholly-owned subsidiary”. Thomson Reuters defines an ECO as “the initial distribution of shares (IPO) by a company representing ownership in a division or subsidiary of the company that will now trade separately from its parent. All spin-offs in the “New Issues Database” are offered to the public and the parent

must own at least 50% of spin-off company prior to the issue" (Thomson Reuters, 2017). Thomson Reuters thereby relaxes the definition of Schipper and Smith (1986) that the subsidiary must not be wholly owned but owned at least 50%, which is a condition of control, and which is also applied in the existing studies of ECO.[1] Another underlying prerequisite of the definition is that the shares of the parent company must be publicly traded on a stock exchange. In summary, the main attributes of an ECO transaction are the existence of new shareholders and the inflow of cash from new shareholders.

2.3 Definition of a spin-off

A spin-off is the divestiture of a subsidiary. Thomson Reuters defines a spin-off in their M&A database as "the tax-free distribution of shares by a company of a unit, subsidiary, division, or another company's stock, or any portion thereof, to its shareholders" (Thomson Reuter, 2017). A spin-off can be fully or only partially owned by the parent company prior to the spin-off. As with an ECO, in a spin-off a new, separate share class for the subsidiary is publicly traded as the result of the transaction. However, in a spin-off the existing parent shareholders usually receive subsidiary shares in the form of a special dividend proportional to the number of shares they hold in the parent company (Schipper and Smith, 1986).

Based on the definition, there are several differences between an ECO and a spin-off transaction. Most importantly, in an ECO capital is raised through the sale of shares, while there is no cash flow in a spin-off transaction. Furthermore, in an ECO new investors are added to the existing shareholder base. In a spin-off transaction, the pro-rata distribution assures that the shareholder base, at least initially, is not altered. Another difference highlighted by Méndez (2003) is the usually strict full divestiture of the subsidiary by the parent, including cutting control over the subsidiary.

[1] For comparable studies applying the same threshold please see Vijh (1999) or Junker (2005)

2.4 Demarcation to other main transaction types

In the following, IPOs, seasoned equity offerings and tracking stocks are discussed and delineated from ECO and spin-off transactions. The demarcation is important to distinguish other public transactions from the objects analyzed in this thesis. The difficulty arises as the other types all share some commonalities with ECO or spin-off transactions.

2.4.1 Initial public offering (IPO)

An IPO, sometimes referred to as taking a firm public or flotation, is the public listing of a company´s shares on a stock exchange. Investors usually offer shares on a stock exchange with the object of raising equity capital for future investment and expansion, but an IPO is also an opportunity for founders and investors to exit and liquidize part of their investment. Besides the cash generation for the firm and investors, an IPO also creates a new, wider shareholder base for the firm and establishes a market value. However, a public listing entails some initial hurdles and creates new permanent standards on transparency, such as the quarterly publication of results, for a firm. For example, prior to the listing a firm must file a registration statement containing general information about the firm's activity, financial statements, details on the proposed security and information about the underwriters with the regulator, e.g., the Securities and Exchange Commission (SEC) in the US. All information becomes publicly available and recorded. Also, following the IPO the firm must adhere to all requirements set out by national regulators as well as those set by the exchange it is listed on. Most importantly, the publication of quarterly and full-year results is required. In addition, regulators and stock exchanges require a firm to publicly communicate to investors any material events relevant to the firm and its shareholders. This discussion is relevant to both ECO and spin-off.

While spin-offs are listed on capital markets, the shares are not sold to the wider public but distributed to existing shareholders of the parent company. While for a spin-off the same requirements on transparency apply as for an ECO, no new shareholders are participating in the IPO and, consequently, no cash is exchanged. Therefore, the spin-off is a subsidiary IPO with the objective of adapting to the existing organizational setup of the company.

2.4.2 Seasoned equity offering

A seasoned equity offering (SEO) is defined as the sale of additional shares of a company that is already listed on a public stock exchange. These transactions are sometimes referred to as capital increases or add-ons and have the goal of raising additional equity capital for the firm (Grinblatt and Titman, 1998).

The clear objective, to raise funds for the firm, distinguishes SEO from spin-off. No capital is raised in a spin-off transaction. While an ECO does have a financing character, the dominant aim is not to raise capital but to reorganize the operational setup. One should note that the cost of an SEO relative to an IPO is substantially lower – if an already publicly listed company predominantly wants to raise capital, it is better done through an SEO than an ECO (LEE ET AL., 1996). A further important difference is that ECO shares are not previously listed: therefore, a market value in a public market is not established.

2.4.3 Tracking stock

Tracking stock constitute a separate class of shares issued by the parent firm; they pay dividends based on the performance of a subsidiary or separate business activity of the firm. While tracking stocks are traded independently of the parent company's stock, they do not provide a legal claim on the firm's assets and usually do not provide voting rights to its shareholders (Downes and Goodman, 1998). Moreover, the issuance of tracking stock does not alter the shareholder base of the parent company nor does tracking stock change the organizational setup. Tracking stocks can be issued through sale in public markets in which case the transaction has a clear financing goal. This is performed for assets with a stable profit generation. In this case, tracking stock is used to lower financing costs. Alternatively, tracking stock is distributed pro-rated to existing shareholders as is done in the distribution of a spin-off (Bühner, 2004). However, as there is no independence of the underlying assets and no voting rights associated with the spin-off, this is rather an opportunity for existing shareholders to sell part of their pro-rata distribution and realize their investment.

3 Theoretical concepts

To adequately investigate and assess the value creation of ECO and spin-off transactions, the analysis must be based on a sound theoretical framework. The subject of analysis is spin-off and ECO, both transactions list shares on a stock exchange and profoundly change the organization setup. Consequently, a theoretical concept of a firm is required to capture the organizational changes and a concept of valuation is needed to capture the evaluation of a firm on a stock market. The requirements on a theory are to be unambiguous, not be biased and testable.

Most of the existing literature on ECO and spin-off is in form of shorter journal style articles, which rather focus on empirical results than theoretical frameworks. Some of the existing contributions including the discussion of a theoretical framework are provided in scope of dissertation projects published mostly in German in Germany and Switzerland. However, these discussions vary in approach significantly.[2] In this study, a theoretical foundation is laid upon which the empirical analysis is built. Therefore, the present chapter provides the theoretical foundation for shareholder value and organization setup change.

This chapter is organized in two sections. Section 3.1. provides background on shareholder value orientation as the main evaluation metric of a firm. Section 3.2. sets the organizational concepts of the firm in the context of ECO and spin-off.

3.1 Shareholder value orientation

Before discussing why a firm may reorganize and how a reorganization affects firm value, the measurement of corporate success that is the concept of firm value needs to be clarified. Because this study only investigates publicly listed entities, shareholder value has been identified as the dominant concept in measuring corporate success and firm value in both academia and financial markets (Heinemann and Gröninger, 2005 and Vollmar, 2014).

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[2] For example, Langenbach (2001) provides rational market arguments to the analysis, Rüdisüli (2005) and Junker (2005) perform an analysis in scope of positive agency theory and Nick (1994) applies integrated theory across various disciplines. A detailed discussion of various theories is done by Baltim (2007). Vollmar (2014) bases his analysis on diversification theory.

The shareholder value school of thought was introduced and defined by Alfred Rappaport, who initiated the discussion of value measurement in his 1981 article "Selecting Strategies that Create Shareholder Value" (Rappaport, 1981). In 1986, Rappaport (1986) extended his explanations for integrating the of theory of finance in strategic management in his book "Creating Shareholder Value". His publication established the maximization of shareholder value as the ultimate goal in managing a business (Rappaport, 1981).

The following sections 3.1.1 and 3.1.2 provide an explanation of the measurement of shareholder value and its application in the context of ECO and spin-off, respectively.

3.1.1 Measuring shareholder value

First, this chapter presents the theories of measuring shareholder value as well as methods applied in practice. Second, it identifies a useful method applied within the scope of this study. While a valuation can be event-driven (e.g., for taxation purposes), this discussion focuses on the basis for ownership changes as the stock price reflects the price at which investors would buy or sell shares.

Academic research early on recognized that there is no one single true value of a business (Melleroxicz, 1952; Sieben, 1983). In any transaction subjective interests influence a potentially objective value, so there is no actual objective value. A value called objective will always be theoretically open to criticism (Born, 2003). Therefore, academics have developed a number of concepts with which to derive theoretical shareholder value.

Rappaport (1986) describes shareholder value as the value of the enterprise minus the value of debt, but it is unclear how the enterprise value is determined. Vollmar (2014) based on Schutze (2001) and Ernst, Schneider and Thielen (2010) derive the overview as shown in Figure 2. Academics generally distinguish between individual valuation (Einzelbewertung), mixed valuation (Mischverfahren) and total valuation (Gesamtbewertungsverfahren).

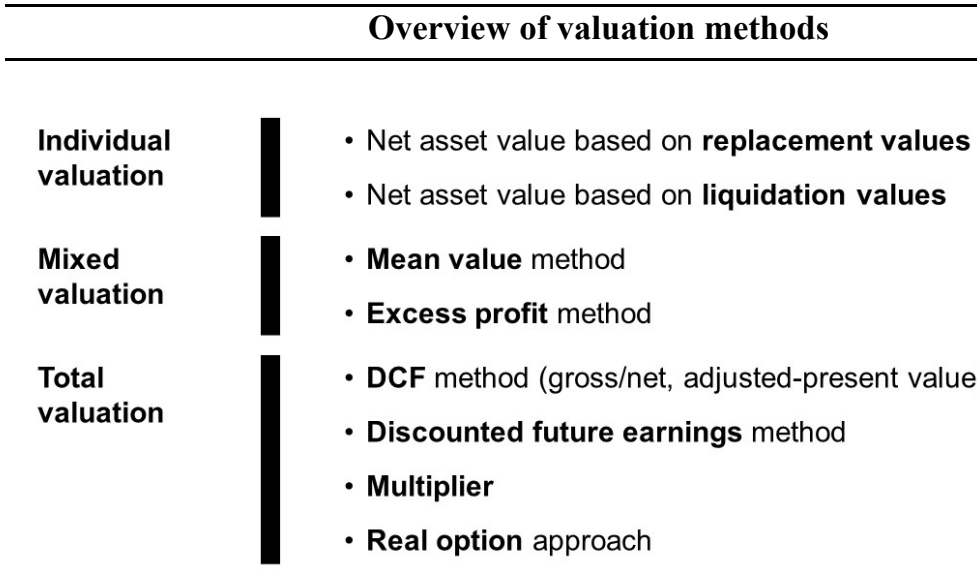

Figure 2: Overview of valuation methods based on Schutze (2001)

The individual valuation is derived by calculating the value of assets net of debt. First, individual asset values are determined. These values can be based on replacement value - under the assumption that the business is run as going concern - or liquidation value - under the assumption that the business is liquidated (Ernst, Schneider and Thielen, 2010). All individual assets are summed to comprise the asset value. The value of debt is then deducted from the asset value to derive the net asset value of a company (Moxter, 1983). The net asset value calculated under the assumption of liquidation generally results in a low valuation and should only be applied if a liquidation is seriously considered (Ernst, Schneider and Thielen, 2010). From an investor perspective, the net asset value at a given point in time is likely less interesting than the value that can be derived from the use of the present asset going forward (Moxter, 1983). During the kinds of restructuring transactions investigated in this study, the considered companies are regarded as going concerns; therefore, individual valuation is not a suitable method.

Mixed valuation methods are comprised of the mean value and excess profit calculation. These can be regarded as an evolution of the individual valuation method; they consider both the individual valuation and total valuation (Ernst, Schneider and Thielen, 2010). More precisely, the equity value as part of the mixed valuation is derived through weighting of individual value and total value. The mean value assumes equal weight between individual value and total value, e.g., 0.5 times individual plus 0.5 times total value. The excess profit valuation assigns weights

differently to 0.5.[3] As the mixed valuation methods always include the individual valuation, it is not a suitable method for evaluation of ECO and spin-off announcements.

Total valuation aims to calculate the value of a firm based on the sum of potential future profits that can be obtained utilizing that firm's assets. The replacement or liquidation value are not relevant for valuation purposes as these do not describe the firm as a going concern. The value relevant for a buyer is the value the buyer can derive from the use of the assets in the future (Moxter, 1983; Ballwieser and Leuthier ,1986). Modigiliani and Miller (1961) in their study on "Dividend policy, growth, and the valuation of shares" provide the basic mechanics of applying net present value calculation to value a business. Their study shows that the enterprise value is dependent on the risk and distribution over time of cash flows that are derived not only from individual assets but also from the company as a whole.

The total valuation methods further include the discounted future earnings method, the discounted cash flow (DCF), the multiplier and the real option approach. Due to the similarity in deriving equity values, the DCF and discounted future earnings method are not discussed separately.

The value of a company is determined by the discounting of expected future cash flows – while different cash flows can be used for discounting: Practitioners distinguish between the entity approach, equity approach and adjusted present value approach (Schultze, 2001; Ostrowski, 2007). However, the DCF valuation is complex due to the required in-depth estimation of expected future cash flows as well as the estimation of the company's relevant discount factor (WACC based on proposed capital structure). In practice, the method is too complex to be applied for a broad evaluation of ECO and spin-off announcements.[4] In contrast, the use of multiples enjoys great popularity in business applications due to the easy application and broad availability. However, multiples are not an instrument based on a sound theoretical foundation. Multiples are used to estimate enterprise or equity value based on peer comparison. Transaction multiples are calculated using recent transaction values of companies with a risk profile/industry affiliation similar to that of the company to be valued. Using them, the sold companies' sales relative to the

[3] For a discussion of mixed valuation methods see Matschke and Brösel (2006)
[4] Vollmar (2014) page 73-78 provides a detailed discussion on the individual factors to be estimated and concludes that an application in scope of an event study is not suitable

transaction value provides a multiple, which then can be multiplied with the sales of the company to be valued to derive an enterprise value. Comparable company multiples are trading multiples of comparable companies traded on a stock exchange. By application of the multiple, the value of the company to be estimated is assumed to be at the same multiple (for example multiple times the earnings to obtain the equity value) as that of comparable companies. In the context of this study, the valuation based on multiples is not practical.

Real option valuation, also called real option analysis, is an analytical concept used to assess actual investment options for management. An option is a right which can be exercised but need not be. The investment in a new factory, for example, can be a real option. It is an additional method to quantify managerial options but does not find a wider application in business.[5] Therefore, due to the lack of relevance in business, the valuation method is not considered here.

Given the theoretical approaches thus far did not yield a practical useful approach for this study. The next chapter describes a practical approach as defined by Rappaport (1986).

3.1.2 Relevance of shareholder value in ECO and spin-off transactions

The market capitalization of a company is defined as the number of its shares outstanding multiplied by its current share price. The result is the value of the company shares and can be regarded, according to Rappaport (1986), as the equity value of the firm. The shareholder value of a listed company is therefore its market value of equity that can easily be read through its share price (Ostrowski, 2007). The share price and in consequence the market value of the equity is the aggregated result of all daily buy and sell transactions of all investors. Subjective expectations of individual investors differ; the aggregate expressed through the share price can be regarded as objective and efficient consent of all investors. In this sense, the market is superior to the theoretical concept of a DCF that, even from an academic point of view, will always contain a subjective expectation (Friedrich von den Eichen, 2002).

[5] Matschke and Brösel (2006) page 539 provide a detailed discussion of the valuation method

Therefore, the open question of how to measure shareholder value shall be answered within the scope of this study by using market prices. Friedrich Hayek recognized in the mid-1950s that stock markets have proven to be excellent information processing systems, "to be a more efficient mechanism for digesting dispersed information than any that man has deliberately designed" (Hayek, 1945; Hayek, 1974). Despite the previously discussed challenges in valuation for each individual investor, it is highly unlikely that significant deviations from the fundamental value of a firm persist over time. This is because in aggregate, the individual investors' valuations balance each other (Schredelsecker, 2003).

The use of market values in the evaluation of ECO and spin-off announcements is convincing, as stock price, adjusted for dividends and stock splits, is the adequate return measure to evaluate for investors. The market price is the result of the individual DCF of market participants; in this sense it is also a constant evaluation of management actions (Hachmeister, 1999). Davis and Stout (1992) formulate this as "the financial economic approach to the firm, [for which] the firm's share price provides the only objective indicator of management performance". Brealey and Myers (1991) summarize it this way: "the share price of a company represents an objective measure of success that cannot be manipulated."

3.2 Organizational theory of firms

This chapter discusses the theories developed in academia defining the organizational theory of a firm. While ultimately not all of the theories are used in this study, the discussion is of advantage as it provides transparency on existing literature and serves to let us fully understand ECO and spin-off transaction rationales. The theories discussed are principal-agent theory including moral hazard and adverse selection and diversification theory.

The use of principal-agent theory as a theoretical foundation is appropriate as it allows investigation of both the ownership restructuring and the financing components of spin-off and ECO. The theory is discussed in section 3.2.1. Similarly, diversification theory is interesting as it broadly discusses the underlying integration and divestment rationales of ECO and spin-off. Diversification theory is discussed in section 3.2.2. The present chapter does not perform a broad review of advantages and disadvantages of existing corporate finance theories and concepts. as

this can be found in other studies, for example in Baltim (2007)[6]. This section discusses the underlying theory used for derivation of hypotheses. This approach, including the selection of principal-agent theory and diversification theory as the theoretical foundation to derive hypotheses, is in line with other existing studies[7].

3.2.1 Principal-agent theory

Early studies of firms rely on a number of assumptions in their models. For example, Modigliani and Miller (1958) assume information equality among all participants[8]. These assumptions are overly simplistic and do not adequately describe reality. However, principal-agent theory allows a better account of information inequality. Therefore, this section describes the conflict inherent in a principal-agent setting.

The principal-agent theory applies to the reality within publicly traded companies where one party (called the principal) hires another party (called the agent) to act on his or her behalf. For ECO and spin-off, the shareholders constitute the principal and the firm's management is the agent. The main differences between the principal and the agent are their access to information (asymmetric information) and their divergence in interest. Asymmetric information describes the difference in information access by the principal and the agent. While the agent has direct information access, the principal must rely on the information produced and delivered by the agent. Moreover, it is difficult for the principal to observe whether the agent is acting in the best interest of the firm and as agreed within his contract. As the agent's decision-making process is not fully transparent to the principal, moral hazard may exist if the agent does not act as contractually agreed. Divergence in interest describes the difference in motivation by owner and manager where the

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[6] Baltim (2007) provides a more general review of various corporate finance theories from neoclassical models to contractual theories based on rules or arrangements. He concludes that the principal-agent theory is the most suitable for this type of analysis.

[7] Rüdisüli (2005) or Baltim (2007), for example, have also chosen principal-agent theory as the theoretical framework for their analysis of spin-off and ECO.

[8] Additional assumptions are highly competitive markets with all participants being price-takers, no transaction costs, borrowing and lending on the same terms, equal tax rate on all sources of income, the independence of a firm's financing and operating decisions, and the absence of bankruptcy risk, meaning the firms can meet their debt obligations in every state of the world (Modigliani and Miller, 1958).

agent's self-interest is not in the best interest of the principal. While the principal relies on the agent's specialized knowledge, it is difficult for him to identify this specialized knowledge and the agent's motivation prior to entering into a contract with him. In such a scenario, the agent cannot distinguish between “good” and “bad” managers, which may lead to adverse selection. In practice, the asymmetric information problem may not be fully solved. The principal's challenge is to align the agent's interest as close to his as possible.

Researchers approach the principal-agent problem by focusing on the contracting relationship to better align the preferences of principal and agent, to reduce uncertainty over the agent’s behavior and to reduce the information asymmetry. However, most measures increase costs for a firm: for example, the cost to compile and distribute information or the cost to implement mechanisms to monitor the agent. Therefore, researchers have focused on solutions to maximize overall utility in the principal-agent relationship. The results obtained demonstrate that the extent of the conflict can be mitigated but cannot be fully overcome. Spence and Zeckhauser (1971) conclude in their analysis of the insurance market that only a second-best solution can be achieved. The existence of adverse selection risk, moral hazard, and limited monitoring capability render a first-best solution impossible. The difference between a first-best and second-best solution represents the agency costs. Theoretical models vary in setting but mostly follow similar basic principles[9].

Jensen and Meckling (1976) first apply the principal-agent theory to corporate finance and thus to the organizational and capital structure of a firm. They analyze a setting in which an owner-manager may issue either equity or debt. The argument for (i) equity and (ii) debt is as follows: (i) If the owner-manager issues equity, he or she no longer assumes all the risks associated with the equity holding but still enjoys the full benefits of manager compensation, which increases divergence of interests. This compensation reduces firm value which is anticipated by future equity holders, who will only acquire the stock at a discount. To control the manager, the new equity owners may also start monitoring the manager, which further increases costs and the required equity discount. (ii) When debt financing is chosen over equity financing the owner-manager enjoys all the benefits of firm enhancing decision, thus is adequately motivated from a shareholder perspective. However,

[9] Gibbons (1998) provides a good explanation of an agency relationship model.

as risks are now partially transferred to debt holders, the owner-manager has incentives to conduct higher-risk projects. This behavior is anticipated by bondholders and reflected in the pricing of debt. Overall, when issuing equity, the owner-manager is sharing the same risk as other equity holders but does not have the same incentive as before. The associated value loss of the equity is counted as equity agency costs. When issuing debt, the risk appetite of debt and equity holders differs, leading to debt agency costs.

Jensen and Meckling (1976) further classify the cost of (i) monitoring and search costs, (ii) signaling and bonding costs, and (iii) a residual loss. (i) Monitoring and search costs are costs associated with the control of the manager through established control systems, budget mechanisms, audits or the implementation of incentive compensation. The principal must pay these costs. (ii) Signaling and bonding costs are actions by the agent to demonstrate his ability and interest. These costs are borne by the agent. (iii) Residual losses are the difference between the actual value and the value under perfect monitoring and bonding. That is because the first best solution cannot be realized, as explained above (Spence and Zeckhauser, 1971).

In spin-off transactions, the ownership structure remains unchanged but management changes. In an ECO transaction, both ownership structure and management change. The aspects of principal-agent theory comprise an organizational perspective as well as a financial market view making this theory ideal for studying ECO and spin-off. In the following, the most important aspects in a principal-agent setting and their relevance for ECO and spin-off are discussed following the costs introduced according Jensen and Meckling (1976). Monitoring, search costs through moral hazard, signaling, and bonding costs through adverse selection are discussed. Residual costs are not separately discussed as these can only be influenced indirectly. The following discussion also describes potential solutions to some of the tensions that arise.

3.2.1.1 Divergence of interests: Moral hazard

Moral hazard describes the problem where the principal cannot measure the effort undertaken by the agent. The principal may observe the results but results are not only influenced by the manager's effort but also dependent on external factors. Typically, the manager will try to take credit for good results but blame external factors and not a lack of effort on his side for bad results. While principals want to compensate the agent for effort and not external factors, his inability to measure effort unambiguously leaves him only with the option to compensate relative to the result obtained. The decision to pay based on result obtained increases uncertainty to the agent's payoff. A risk averse agent will thus require a higher potential salary. In the above context of Jensen and Meckling (1976), higher equity financing decreases manager incentive while an increase in debt increases appetite for higher risk projects. Overall, they conclude that minimizing agency cost financing mix contains both equity and debt financing.

Examples of interest misalignment of principal and agent comprise the motivation of managers to acquire other firms to increase their empire, typically called empire building. Interestingly, Berg (1997) shows that acquisitions primarily motivated by managerial interest are retained, ceteris paribus, more often than other acquisitions. Other researchers such as Aron (1988) argue that the acquisition of other businesses diversify the agent's business risk and thereby mitigate the incentive problem. The public listing of an ECO and spin-off form a new set of principal and agent and thereby increase overall agency costs. However, the public listing also increases the amount of available information that contributes to the reduction of agency costs. In addition, more information permits agents to better align their incentives with the principal.

Aligned incentives

One intent to reduce agency costs is to try to provide agents with incentives similar to those of shareholders so they act in the best interest of shareholders. Typically, part of the agent's salary is based on shares or stock options to provide agents with a high incentive to increase the value of the firm as expressed through its share value. Moreover, the wider use of employee stock option plans in total compensation aims for making employees shareholders so that they in fact act like shareholders. However, in bigger organizations the individual's actions, including the actions of subsidiary managers, may have little impact on the overall performance

of the firm. Consequently, the incentive alignment may only work for the immediate top management which has the ability to actually influence overall corporate performance.

In the case of a spin-off as well as the subsidiary, the public listing of the subsidiary creates a new share class specific to the subsidiary activity. In the new security, subsidiary management can be better incentivized through stock option compensation of the specific business. Subsidiary management can directly influence the value of the firm through their actions after the transaction. In addition, as the number of business units or subsidiaries decreases, opportunities of cross-subsidization of one unit by another ultimately decreases further alignment of shareholder and management interest. Finally, through the decrease in firm size, the size of the internal capital market decreases, and less internal funding (free cash flows) increases pressure on investment decisions, potentially reducing over-investment.

From the parent company's point of view, an argument against the interest alignment according to Junker (2005) is the use of the offer proceeds by the parent firm, which may lead to overinvestment or for subsidization of remaining business units. Last, stock-based compensation plans in the case of an ECO may be subject to significant management influence if the parent retains control, as it usually does. This is because links between subsidiary management and parent company management may be strong.

Availability of information

Another means to reduce agency cost is to improve the availability of information in the market. With better information, the principal's ability to monitor is increased, and at the same time the transparency increases pressure on the agent to do his best effort. The amount of available information and required disclosures is defined through statutory financial regulation and exchange requirements.

In case of both spin-off and ECO, the separation of a business activity allows parent companies to focus on the remaining business in their shareholder reporting, thus increasing transparency for shareholders of the parent company's shares. Similarly, the newly required separate reporting of the spun off business activity increases the amount of available information. The spun off or carved-out company also must now separately inform shareholders on corporate events. However, Kim and Verrecchia (1994) argue that the amount of information available post spin-off

or post ECO does not increase. They argue that a public listing of a subsidiary creates another line between private and public information leading to a new information asymmetry between shareholders and subsidiary management.

Monitoring mechanisms

In the highly developed financial markets of North America and Europe investors and stock market analysts exercise a high level of scrutiny of publicly listed firms. For example, stock market analysts provide market updates following earnings announcements or other market events leading to buy or sell recommendations depending on management performance. In addition, regulators, through statutory regulations, and stock exchanges, through stock exchange listing requirements, further impose a high level of transparency on publicly listed firms.

The level of scrutiny and control varies with the dispersion of the shareholder base. For example, Shleifer and Vishny (1986) indicate that large block holders of a firm have particular incentives to monitor its performance. In contrast, Burkart et al. (1997) conclude that excessive monitoring may demotivate management or lead to excessive monitoring costs. Fama (1980) identifies an additional control mechanism for managers: the job market. Managers with a poor track record are likely to get replaced. Moreover, the poor performance on their record will make it more difficult for these managers to find new employment. The threat of unemployment consequently incentivizes managers to put their best effort. The argument in this section shows that an improved monitoring environment likely reduces agency costs.

3.2.1.2 Adverse selection

During the carve-out of a subsidiary asymmetric information between the parent firm as a seller of the subsidiary and new shareholders in that subsidiary can lead to adverse selection. Using the classic explanation from Akerlof (1970), the buyer of a used car may not be able to distinguish between good and bad cars. Consequently, a buyer will offer the same amount of money to a good or bad seller. This leads to a "pooling equilibrium" where the conditions for bad and good sellers who chose to transact are the same. A seller will only receive the average of the good and bad types in the market and may choose not to transact. As a result, assuming

that rational individuals buy, only bad cars end up being offered in the market. If this is applied to the divestment setting, management (and implicitly current shareholders) may have information that the new shareholders do not have. New shareholders will account for this risk by adjusting their offering price. To avoid systematic underpricing, firms follow the pecking order theory of Myers and Majluf (1984). According to the pecking order, the securities least information-sensitive are first issued as these are least underpriced.

Another problem can be overinvesting or credit rationing. Using the example of Rüdisüli (2005, page 60) "*this can be best explained based on an example of two projects; a good and a bad one, leading to overinvesting or credit rationing: Although the bad project's value is negative, overinvestment means that both projects are financed as the average value of the two projects is positive. Credit rationing means that neither type of project is financed. This can result if the average value is negative, even though the good project's value can be positive*".

To avoid selling underpriced securities, firms engage in signaling to the market to demonstrate they are the "good" type. Leland and Pyle (1977) explain that in an owner and buyer setting the owner can send a credible signal to the market while keeping a large equity stake in his firm. This is because a large equity stake represents significant concentrated risk for the owner, given the lower diversification. Should the equity lose value, the owner faces significant downside risk. Leland and Pyle (1977) further argue that the risk is too high for bad owners while good owners prefer the risk exposure rather than selling underpriced equity. Rational investors can anticipate this behavior and consequently identify good owners.

Applying the logic from Leland and Pyle (1977) to ECO, if a parent company maintains a significant stake in the carve-out subsidiary it can signal to investors who are able to sell an adequately priced security. An additional argument that "good securities" are sold is provided by Boot (1992) who argues that parent firm management avoids selling losing business units as this would indicate that a previously taken decision to build this business was wrong.

In summary, the theoretical analysis of a principal-agent relationship indicates positive and negative impacts on agency costs for ECO and spin-off but the net effect cannot be definitely ascertained. The alignment of shareholders and management is improved through a separately publicly traded subsidiary share available to set incentives. However, parent management's retaining share in an ECO or using the ECO proceeds for their own best interest raise agency costs. In addition, a separate

listing brings more required disclosure and reporting for a subsidiary but also establishes a clear difference between public and private information regarding the subsidiary. Lastly, more public information forms the basis for better control mechanisms; however, the large stakes often retained by parents in equity carve-out open the possibility for parent management to pursue its own agenda.

3.2.2 Diversification theory

The existence of more or less diverse businesses has changed over time and with it the theory of benefits and disadvantages of diversification has also changed. The starting point is the beginning of the last century, when single business firms dominated (Friedrich von den Eichen and Hinterhuber, 2000; Fichtner, 2008; Simmonds, 2009). Single business firms are those generating sales and profit predominantly from one business activity. In the 1920s and 1930s, the number of firms entering a secondary business activity increased (Hungenberg, 2002). These multi-business firms mostly operated two distinct business separately from a common central unit. The number of multi-business firms increased until the 1970s (Friedrich von den Eichen, 2002; Hungenberg, 2002; Fichtner, 2008). However, in the 1980s, the rise of multi business firms stopped and in turn a decrease began. Lichtenberg (1990) empirically demonstrates that the number of multi-business firms decreased sharply in the second half of the 1980s.[10] Further research in the 1990s finds a small increase in diversified businesses and the 2000s reverse this trend yet again.[11] Research has demonstrated that the number of diverse business has changed over time. The theoretical trends underlying this change are discussed in this chapter.

Diversification is measured on the stock markets by observing prices. Highly diversified conglomerates may trade at a premium or a discount. Whereas corporate and financial synergies favor the existence of a premium, dis-synergies in the same areas also weaken the hypothesis of a premium and thus favor a discount. The theoretical discussion in favor of and against diversification is inconclusive: “In

[10] See Lichtenberg (1990), William, Paez and Sanders (1988), Lee and Cooperman (1989), Markides (1990), Liebeskind and Opler (1993) and Comment and Jarrell (1995)

[11] Whittington and Mayer (2000) and Gantenbein (2010) identify an increase in multi-business firms during the 1990s. Khorana et al. (2011) identify in their sample from 2000-2010 as evidence of a global decrease in multi-business firms.

the last decade there has been no clear consensus of whether there is a discount or even a premium on firm value" (Erdorf et al., 2012). Erdorf et al. (2012) as well as Vollmar (2014) provide an extensive overview on the development over the last century.

Corporate synergies

Corporate synergies are based on efficiency gains and associated cost savings (Levy and Sarnat, 1970). These corporate synergies are the result of economies of scale, economies of scope and market power.[12]

Economies of scale are realized if input factor costs remain constant with increasing output numbers (Chandler, 1990). In addition, utilization of fixed costs increases with higher output numbers. Lower costs per unit allow a firm to offer a good at a lower price or to realize higher benefits.

Economies of scope are synergies resulting from the joint use of resources of different products. For example, raw material may be bought at a lower price or finished goods be sold at a higher price.Hill, Hitt and Hoskisson (1992) describe this as „*Resource sharing and skill transfers enabling the diversified firm either to reduce overall operating costs in one or more of its divisions, and/or to better differentiate the products of one or more of its divisions* (thus enabling a higher price to be charged)."

Market power is the result of size. With increasing market share (buy-side or sell-side), firms can increasingly realize better prices.

Corporate dis-synergies

Given the reduction in the number of diversified firms in the 1980s and 2000s, the academic literature has identified a number of costs associated with diversification. Like corporate synergies, corporate dis-synergies are identified as dis-economies of scale and dis-economies of scope.

Dis-economies of scale constitute higher costs of increased inefficiencies in allocation of production factors due to an increasingly big and complex organizational

[12] See Teece (1980); Panzar and Willig (1981); Baumol, Panzar and Willig (1983); Scherer and Ross (1990). Picken (2003)

structure (Ostrowski, 2007; Gildemeister, 2008). The main explanations for the inefficiencies are bureaucratic rigidity and higher transaction costs for internal service provisioning (Shin and Stulz, 1998). According to the theory of dis-economies of scale, as the size and complexity of the overall organizational structure increases. The head office of a diversified company may no longer succeed in distributing resources efficiently (dis-economies of decision management) or the cost of gathering or combining information (dis-economies of decision control and managerial monitoring) are disproportionately high.

Another corporate dis-synergy is described as dis-economies of scope. These result from the bundling of unrelated business, which may create negative value (Lechner, 2007). The negative value is the result of combining unrelated businesses without an overarching strategic priority (referred to as strategic misfit). Negative value may also result if unrelated businesses block one another in operational excellence (Achleitner and Wahl, 2003). For example, the aggregation of unrelated firms may create an additional layer of management without any realization of synergies or firms may block each other when they compete within the same business.

Financial synergies

Financial synergies result from the building of an internal capital market within a diversified firm. The main synergies are categorized as smart money effect, more money effect, reduction in financing costs and utilization of tax benefits (Fichtner, 2008).

The smart money effect is based on the assumption that capital can be better allocated in internal capital markets than through external capital markets (Funk, 2008). Stein (2007) explains this as due to better monitoring within a smaller, more transparent internal capital market as well as better selection of investment projects (winner picking). Consequently, the argument is based on the availability of an internal capital market and the lower transaction cost within this market.

The more money effect is the ability of diversified firms to attract more money than single business firms. The underlying rationale is based on the co-insurance hypothesis formulated by Lewellen (1971). Using a theoretical model of imperfectly correlated cash flows, he shows that a firm benefits from an increasing debt capacity. Simply put, the probability of two cash flows decreasing at the same time is lower when the capacity for one to support the other exists.

The reduction in financing costs is most often attributed to increased size: “Borrowing costs decline with size of firm, other things equal, even in idealized markets under uncertainty where information itself is an economic good because of ‘lot size’ scale economies in credit investigations and security issue costs as well as ‘marketability’” (Lintner, 1971).

Last, the increased use of relatively cheap debt increases the resulting tax shield lowering the diversified firm’s tax burden (Lewellen, 1972 and Berger and Ofek, 1995). Moreover, losses in one business can be altered with the profits in a different business, lowering the overall tax burden.

Financial dis-synergies

Financial dis-synergies are the other side of the synergies,;they are also referred to as the “dark side of internal capital markets” (Stein, 2003). The main argument is that the capacity of a central unit to gather and process information efficiently can be limited and can result in inefficient capital allocation decisions (Stein, 2003; Liebeskind, 2000).

Synergies and dis-synergies were discussed assuming that corporate management acts in the best interest of shareholders. However, chapter 3.2.1 on the principal-agent theory highlights the challenge in aligning interest between management and shareholders.

The principal-agent conflict between shareholders and management in diversified firms is stronger than in single business firms. Using a theoretical model Matsusaka and Nanda (2002) as well as Inderst and Müller (2003) show that managers pursue diversification with the objective of lowering idiosyncratic risk and of maximizing personal benefits. Idiosyncratic risk exists due to management often being invested and employed in the same firm. Private benefits are expressed through prestige and empire building. Empirical research similarly suggests a higher information asymmetry between insiders and outsiders (Aggarwal and Samwick, 2003).

The principal-agent conflict on the level of central and business unit management is value-destroying due to: (i) internal power struggles between business units and (ii) lower incentives for business unit management.

Internal power struggles lead business unit management to overinvest in their re-

lationship (lobbying activities) at the central unit thus wasting potentially productive resources. Meyer, Milgrom and Roberts (1992) using a theoretical model, show that the possibility of lobbying for financial resources at a central unit is sufficient to incentivize management of low profit business units to engage in influence activities at central. Overall, successful lobbying leads to inefficient capital allocation within diversified firms and to subsidization of less profitable business units.

Lower incentives of business unit management is explained by Gertner, Scharfstein and Stein (1994) by the expectation of business unit management that all business unit (excess) profits are used and re-distributed by the central unit. Consequently, no discretionary levy to act or invest is provided.[13]

In summary, empirical and theoretical research results show benefits and disadvantages of diversification suggesting an optimal level of diversification. A less than optimally diversified single business firm likely gains from diversification while an over diversified multi-business may benefit from divestiture.

[13] Besides Gertner, Scharfstein and Stein (1994), Stein (2002), Brusco and Panunzi (2005), Gautier and Heider (2005), Inderst and Laux (2005) and Funk (2008) build on the same arguments

4 Existing empirical studies

The previous chapter on principal-agent theory and diversification theory provides explanations of why managers execute ECO and spin-off transactions. Empirically, however, studies have failed to use the theoretically-identified rationale as a driver for analysis of ECO and spin-off. Chapter 3 shows that spin-off rationales are related to reduction of information asymmetry and asset substitution. The asset substitution rationale is based on the assumption that part of the firm (collateral) transfers into the subsidiary and thus transfers risk from equity holders to debt holders (Galai and Masulis, 1976). Information asymmetry reduction, according to Habib, Johnsen and Naik (1997), is based on the increased available information in the market place following a spin-off. Information on two listed securities decrease investor uncertainty and corporate management proprietary information and thus increases the value of the firms. Stated differently, firms beyond a certain size or with distinct business activities may be difficult for investors to value. More publicly available information reduces uncertainty, decreases implied risk and equity return expectations, which leads to higher valuations. Consequently, corporate management engages in a spin-off to increase firm value.

Empirical research also identifies two main concepts for equity carve-out and both characterize carve-out mainly as a financing transaction. One branch of studies identifies existing information asymmetries, similarly to the way spin-off is seen as motivation for carve-out. In particular, a company finances itself through a seasoned equity offering if it is overvalued and only if it is perceived as undervalued by management; an ECO may be used as a financing instrument that signals to the market the perceived undervaluation of the company. This can lead to a positive announcement effect (Nanda, 1991 and Nanda and Narayanan, 1999).

The second branch of research focuses on transaction timing or an opportunity window to perform a transaction. In particular, Baker and Wurgler (2000; 2002) show that corporate management, when performing corporate restructuring transactions, is also taking advantage of optimistic investor perceptions in the market and going beyond the firm's real financing or restructuring needs. Zingales (1995) develops a model to demonstrate how entrepreneurs may maximize their proceeds out of a company sale by using a two-stage transaction of a carve-out followed by a spin-off or sale. However, an empirical study using the information published in the financial press or assessing whether a transaction was reported in the financial

press does not yet exist. In the following, the existing event study literature is summarized; the first section provides a detailed review of existing empirical research on ECO and the second one the review for spin-off.

4.1 Empirical research on ECO

To measure the success of ECO as well as spin-off, the market value of equity expressed by a firm's stock price was identified in section 3.1 as a valid investigation subject. The efficient market hypothesis underlying this study suggests that an announcement of a corporate restructuring transaction such as an ECO or spin-off is reflected in the change in the parent company's stock price (Fama, 1970). Therefore, the event study methodology is the adequate measure with which to investigate divestiture announcements empirically.

In the 1980s, event study methodology had evolved to include stock market reaction to the announcement of an event and it became a popular method for researching corporate events. While research began by investigating initial public offerings (IPO), sell-offs and seasoned equity offerings, eventually spin-off and later ECO were also investigated using the event study methodology. The popularity of the method came with the focus on shareholder value creation. Rappaport (1986) describes how shareholder value creation for publicly listed firms is defined through the change in market value. Event studies measuring the stock market return to shareholders on the announcement date indicate shareholder value creation.

Schipper and Smith (1986) were the first to investigate the stock price reaction to the announcement of an ECO. Their event study identified a positive stock price effect on the parent stock price on the day of announcement. This result is of interest given the contrasts to the negative stock price effect identified in event studies of other financing transactions such as seasoned equity offerings. However, the results are less surprising considering the dual character of ECO as a financing and ownership restructuring transaction.

Overall, the findings of the existing empirical research on ECO and spin-off are similar to the theoretical research discussed in section 3.2, not yielding clear results on the effects of diversification. A number of studies from the 1990s find a negative correlation between corporate diversification and valuation. First, empirical evidence supporting the hypothesis that transactions reducing diversification result in

positive stock price reactions for parent companies is identified.[14] Second, much empirical research supports the finding that transactions increasing corporate diversification induce a valuation discount.[15] However, other studies support a positive correlation between corporate diversification and valuation.[16]

[14] See Comment and Jarrell (1995), John and Ofek (1995), Daley, Mehrotra and Sivakumar (1997), Berger and Ofek (1999), Desai and Jain (1999) and Krishnaswami and Subramaniam (1999)
[15] See Morck, Shleifer and Vishny (1990), Agrawal, Jaffe and Mandelker (1992) and Morgan, Nail and Megginson (2000)
[16] See Schipper and Thompson (1983), Bradley, Desai and Han Kim (1988), Matsusaka (1993), Hubbard and Palia (1999), Hadlock, Ryngaert and Thomas (2001), Chevalier (2004) and Akbulut and Matsusaka (2010)

Overview of event studies on ECO						
Year published	**Author(s)**	**Geography**	**Period**	**Sample size**	**Event window**	**Abnormal returns**
1986	Schipper and Smith	US	1965-83	76	t_{-1} to t_{+1}	0.7%
1995	Michaely and Shaw	US	1981-88	28	t_{-2} to t_{+2}	0.4%
1997	Ahlers	DE	1984-96	23	t_{-10} to t_{+10}	-1.0%
1998	Allen, McConnell	US	1970-93	186	t_{-1} to t_{+1}	1.9%
1998	And Bühner*	US/EU	1993-97	10	t_0	-0.2%
2000	Blanton et al.	US	1997-00	64	t_{-2} to t_{+1}	2.6%
2000	Chemmanur and Paeglis	US	1991-98	19	t_0	0.4%
2000	Gibbs	EU	1999-00	47	t_{-1} to t_{+1}	2.5%
2000	Mullherin and Boone	US	1990-98	125	t_{-1} to t_{+1}	2.3%
2001	Elsass and Löffler	DE	1984-00	39	t_0	1.1%
2001	Haushalter and Mikkelson	US	1994-96	31	t_{-1} to t_{+1}	2.2%
2001	Langenbach	DE	1984-99	32	t_{-1} to t_0	1.4%
2002	Fu	US	1993-01	94	t_{-1} to t_{+1}	1.9%
2002	Hullburt et al.	US	1981-94	185	t_{-1} to t_{+1}	1.9%
2002	Vijh	US	1980-97	336	t_{-1} to t_{+1}	2.0%
2005	Rüdisüli	EU/US	1990-03	803	t_{-1} to t_{+1}	1.0-3.0%
2006	Pojezny	EU	1984-04	100	-	-
2009	Otsubo	US	-	201	-	-
2018	Dasilas/Leventis	EU	1997-11	83	t_0	1.7%

The **event window** describes the period examined in the event study with **t** denoting the announcement date and the number of days before and after. **Abnormal return** is the parent company stock price return realized during the event window above the firm's estimated normal return, that is, the return which would have been realized in the absence of the announcement.
*BÜHNER (1998) investigates 34 transactions, 24 spin-off and 10 carve-out

Table 3: Overview of existing ECO studies

When discussing the long-term effect for ECO, the dual character of the transactions is particularly relevant: giving away minority ownership in exchange for financing. While the stock market reaction at the time of announcement (announcement effect) is positive for spin-off, the effect for financing transactions such as seasoned equity offerings and other types of financing transactions on the share price at announcement is negative (Masulis and Korwar, 1986; Mikkelson and Partch, 1986). Therefore, a priori, different research results may be expected. The first study investigating ECO dates back to 1986 where Schipper and Smith (1986) find a positive stock price effect following the announcement of an ECO. The positive stock price reaction at announcement is confirmed by other studies covering a US sample. The stock price reactions at announcement are always corrected for returns that could have been expected in the absence of any announcement. The difference between actual return and expected return is called abnormal return. For example, Vijh (2002) finds a 2% abnormal return using a sample of 336 transactions covering the 1988 to 1997 period. In comparison to spin-off, the announcement effect for ECO is less strong (for spin-off see section 4.2). Short-term results using European samples are consistent with the US findings, yet research is very scarce, with only two major publications. Fucks (2003) uses a sample of 103 ECO between 1994 and 2004 and finds a statistically significant positive abnormal return around the announcement date of 1.11%. Bühner (2004) uses a smaller sample of 66 transactions in the 1984 to 2002 period and finds a 1.64% positive abnormal return around the announcement date. Consequently, results appear to be consistent but evidence on European samples remain scarce.

The long-term evidence of US ECO performance was first investigated by Klein, Rosenfeld and Beranek (1991) who find, based on their sample of 52 transactions from 1966 to 1983, that ECOs produce a significantly positive abnormal return. Other studies do not identify unambiguous results but show a trend towards value destruction by the parent and value creation by the subsidiary (Vijh, 1999). Also, Powers (2001) documents negative value creation for both parent and subsidiary in the year after the transaction using a sample of 181 ECOs in the time period between 1981 and 1998. Long-term ECO performance in Europe remains largely unaccounted for with some studies existing for Germany. Overall, the results are less consistent than for spin-off (discussed in section 4.2) and further research using a wider sample will contribute to the academic discussion of European ECO.

4.2 Empirical research on spin-off

The first studies of spin-off samples from the 1960s and 1970s were performed by Miles and Rosenfeld (1983) and Schipper and Smith (1983). Their sample covered US spin-off and both studies find a positive announcement effect of 3.3% and 2.8%, respectively. The positive announcement effect is confirmed for the 1980s and 1990s (Gertner, Powers and Scharfstein, 2000 and Mulherin and Boone, 2000), who find a positive abnormal return of 3.9% and 4.5%, respectively. A later study by Ruedisueli (2005) reconfirms the results for the 1991 to 2003 period. Other studies obtain similar results, observing economically positive abnormal returns for parent companies following a spin-off. The average positive abnormal return effect identified is greater than 3% for the US and approximately 2% for European samples.

The biggest sample including the coverage of European transactions was investigated by Rüdisüli (2005). He investigated a total of 1074 transactions covering both Europe and the US in the 1991 to 2003 period. He finds positive abnormal returns of roughly 1.0% to 3.0% of firms announcing a spin-off of a subsidiary (Rüdisüli, 2005). His results confirm the 2004 results of Veld and Veld-Merkoulova (2004) showing a 2.6% positive abnormal return with a sample comprising 156 transactions during the 1987 to 2000 period.

Overview of event studies on spin-off

Year published	Author(s)	Geography	Period	Sample size	Event window	Abnormal returns
1983	Miles and Rosenfeld	US	1963-80	55	t to t_{+1}	3.3%
1983	Schipper and Smith	US	1963-81	93	t_{-1} to t	2.8%
1983	Hite and Owers	US	1963-81	123	t_{-1} to t_0	3.3%
1987	Copeland et al.	US	1962-83			3.0%
1994	Vijh	US	1964-90	113	t_{-1} to t	2.9%
1995	Allen et al.	US	1962-91	94	t_{-1} to t	2.2%
1995	Michaely and Shaw	US	1981-88	9	t_{-2} to t_{+2}	4.5%

Overview of event studies on spin-off						
Year published	**Author(s)**	**Geography**	**Period**	**Sample size**	**Event window**	**Abnormal returns**
1997	Daley et al.	US	1975-91	85	t_{-1} to t	3.4%
1998	Bühner*	EU	1993-97	247	t_0	0.7%
1999	Desai and Jain	US	1975-91	155	t_{-1} to t_{+1}	3.8%
1999	Krishnaswami and Subramaniam	US	1979-93	118	t_{-1} to t	3.2%
2000	Blanton et al.	US	1997-00	68	t_{-2} to t_{+1}	3.6%
2000	Bühler	EU	1989-99	42	t_{-1} to t_{+1}	2.6%
2000	Chemmanur and Paeglis	US	1991-98	19	t_0	2.2%
2000	Gertner et al.	US	1981-96	160	t_{-1} to t_{+1}	3.9%
2000	Jannsens de vroom and Frederikslust	EU	1990-98	34	t_{-1} to t_0	0.5%
2000	Mulherin and Boone	US	1990-98	106	t_{-1} to t_{+1}	4.5%
2003	Kirchmaier	EU	1989.99	48	t to t_{+1}	4.1%
2004	Vled/ Veld-Merkoulova	EU	1987-00	156	t_{-1} to t_{+1}	2.6%
2005	Rüdisüli	EU/US	1991-03	1074	t_{-1} to t_{+1}	1.0-3.0%
2007	Sudarsanam and Qian	EU	1987-05	157	t_{-1} to t_{+1}	4.8%
2008	Veld and Veld-Merkoulova	US	1995-02	91	t_{-1} to t_{+1}	3.1%
2014	Vollmar	EU	2000-12	83	t_{-10} to t_0	4.8%
2015	Prezas and Simonyan	US	1980-11	378	t_{-1} to t_0	3.2%

The **event window** describes the period examined through the event study with **t** denoting the announcement date and the number of days before and after. **Abnormal return** is the parent company stock price return realized during the event window above the firm's estimated normal return, that is, the return which would have been realized in the absence of the announcement.
*BÜHNER (1998) investigates 34 transactions, 24 spin-off and 10 carve-out

Table 4: *Overview of existing spin-off studies*

The long-term stock market effect considering parent as well as subsidiary performance is well investigated for US transactions. Papers covering US transactions in the 1970s and 1980s show a combined positive abnormal return of parent and subsidiary of 4.7% to 7.7% following the spin-off (Cusatis, Miles and Woolridge, 1993 and 1994, Desai and Jain, 1999). Results for the subsequent three years show even higher positive abnormal returns. Later papers by McConnell, Ozbilgin and Wahal (2001) as well as Powers (2001) indicate a decline of abnormal returns during the 1980s and 1990s period. Research on the 2000s is rather scarce and the questions remain of whether abnormal returns beyond the investigated 3 year period can be sustained and whether the decline in abnormal returns continues. The long-term performance of European spin-off remains largely uninvestigated: Veld and Veld-Merkoulova (2004) find no significant long-term abnormal return while Kirchmaier (2003) finds positive abnormal return.

Part II: Hypotheses and empirical results

5 Derivation of hypotheses

This chapter covers the deriving of theory-based and empirically testable hypotheses relevant to answering the research questions raised in Chapter 1. The underlying theoretical foundation and existing empirical research for derivation of hypotheses is provided in Chapter 4. The insights contributed through prior research are considered holistically, combined, integrated and used as potential explanation of capital market reactions to equity carve-out and spin-off announcements.

Chapter 5 is divided into two sections: Section 5.1 defines the main hypothesis of this thesis to test the value creation of ECO and spin-off transactions and section 5.2 postulates expected reaction of further control variables potentially influencing value creation. Thereby, this study follows the approach chosen in earllier literature including Veld and Veld-Merkulouva (2004), Rüdisüli (2005) and Vollmar (2014). Here the main theoretical concepts are diversification theory and principal-agent theory. How the hypotheses are tested and the relevant data therefore are described and presented in chapter 6.

5.1 Main hypothesis

5.1.1 Value creation effect

Hypothesis 1 is derived from the previously discussed empirical findings on ECO and spin-off. It is also supported by principal-agent theory as well as diversification theory[17]. Following the announcement of an ECO or spin-off, investors update their expectations, revaluing the stock price. Therefore, the announcement is regarded as relevant to shareholder value (Fama, 1970). The hypothesis is worded as follows:

[17] See Veld and Veld-Merkoulova (2004) page 1112 providing a comprehensive literature review

Hypothesis 1: The announcement of an ECO or spin-off creates positive abnormal stock returns for parent companies

The hypothesis is supported by prior research from Kirchmaier (2003), Veld and Veld-Merkoulova (2004), Bühner (2004), Rüdisüli (2005), Sudar-Sanam and Qian (2007) and Vollmar (2014) who all identify positive stock price reaction following a corporate divestiture announcement. Given that a newly listed entity is subject to individual reporting requirements, generally principal-agent theory suggests a reduction in agency costs and consequently a positive stock price reaction. Diversification theory equally predicts a positive stock price reaction because a divestment reduces corporate and financial "dis-synergies".

For testing of hypothesis 1, stock price data and market index prices from Thomson Reuters Datastream are used. Announcements of equity carve-out and spin-off are obtained via Thomson Reuters. Announcement dates are verified via Factiva and Lexis/Nexis.

5.1.2 Media coverage

The existing academic literature reporting positive abnormal return reactions following the announcement of divestitures has increased the attention of investment professionals and media to relevant media announcements. The increasing attention raises the question of media influence on investor behavior and abnormal return reactions.

The semi-strong form of market efficiency assumes that markets react to new public information. Consequently, investment professionals update their expectations and adjust their buying and selling decisions for individual stocks. It is undisputed that media plays a key role in the dissemination of information (Graziano, 2016). Consequently, the question of influence arises: does coverage of a transaction through a major news outlet influence the level of abnormal returns realized? The hypothesis is as follows:

Hypothesis 2: The reporting of an ECO or spin-off announcement through a major news outlet positively influences the abnormal stock returns realized by parent companies.

Empirical evidence for hypothesis 2 is scarce. Graziano (2016) provides support with a sample of 179 listed companies that "newspapers can influence stock trends without even providing any new information" (Graziano, 2016).

The testing of hypothesis 2 is operationalized through the creation of the variable News. News indicates if a transaction was reported by a major news outlet such as the New York Times, Wall Street Journal, Los Angeles Times, Washington Post, Financial Times (FT), Handelsblatt, Les Echos or Reuters within 2 weeks of the transaction announcement. If a transaction is reported through a media outlet the variable News takes on the value {1}, and {0} otherwise. News coverage is identified through Factiva and Lexis/Nexis. Based on the classification of {0,1}, two sub-samples are derived for analysis.

5.1.3 Media content

Section 5.1.3 demonstrates how investors update expectation, that is, the valuation of a firm, following an announcement. Information of the announcement is provided through corporate press releases as well as the financial media. Therefore, financial media can disseminate information (reach) as well as interpret information. The role of the financial press (media) is addressed in this section.

Existing cognitive studies from Baumeister et al. (2001) and Rozin and Royzman (2001)[18] stress that the way information is communicated significantly influences individual's perception of the information itself. The existing literature (Fiske and Taylor, 1991) investigates how individuals are affected by the content of news and finds negative news to have a bigger impact on individuals than positive news. This leads to the conclusion that media has an impact on the reaction of investment professionals. Hypothesis 3 captures this conclusion:

[18] Additionally Gibson and Zillmann (1994), Reeve (1992) and Brief and Motowidlo (1986) provide further details on individuals' perception of information processing

Hypothesis 3: The deal rationale assessed in a major news outlet significantly influences the abnormal stock returns realized by parent companies through the announcement of an ECO or spin-off.

Empirical evidence for hypothesis 3 is scarce. Graziano (2016) is the only existing study investigating spin-off that support the "semantic aspect of the news, cumulative average abnormal returns (CAAR) proves to be amplified around the announcement date when the press speaks positively of the operation".

The testing of hypothesis 3 is operationalized through classification of News within categories. For spin-off, the categories identified are "Concentration on Core business", "Achieve better valuation" and "No reason specified". For each category a variable "Core", "Value" and "NR" takes the value {1} if true and {0}, otherwise. For ECO, categories are identified as "Concentration on Core business", "Growth financing", "Debt reduction", "WC and general purposes" and "No reason specified". For each category a variable "Core", "Growth", "Debt", "WC" and "NR" takes on the value {1} if true and {0} otherwise. Based on the classification of {0,1}, sub-samples are derived for analysis.

5.1.4 Sector focus

This section covers the parent companies involved in the divestment of a business unit operating in a different sector (industry) from the parent company. Up to the 1980s, capital markets and corporate management believed operations within different sectors support business resilience against cyclicality and increase efficiency through joint use of resources. In contrast, theory thereafter underlines that only diversification into a sector closely related to the ongoing business activity allows an efficient use of joint resources (Teece, 1982). Most recent theory stresses that not only business sector adjacency but the ability of a business to use the same resources rely on the same know how (capabilities). Also, competencies are key in leveraging synergies across business sectors. As Wan (2011) puts it: „From the perspective of resource-based theory, diversification research posits that related

diversification can lead to superior firm performance, compared to that of a focused strategy“ (Wan, 2011).

While Wan argues for using resource-based theory, principal-agent theory equally predicts an increase in corporate value through sector focus. This is due to the decrease of the internal capital market in both size and complexity, which reduces misallocation of capital within a firm. McKelvey (2005) summarizes: „What you’re seeing is increasingly companies focusing on their knitting and what they’re good at […] Investors have clearly shown unrelated businesses are better off separated. What sounds theoretically interesting together ... doesn’t live up to the hype”.

In business, the second half of the last century was marked by capital markets urging companies with operations in multiple sectors to break up and focus on core business activity. And until today, the focus on core business activity is the most frequent justification provided by companies or identified through financial press for conducting equity carve-out or spin-off transactions[19]. Based on the theoretical and practical factors discussed, the hypothesis as follows:

Hypothesis 4: Divestiture of a subsidiary operating in a different business sector than the parent company through an ECO or spin-off transaction leads to a sector focus of the parent company and thus positively influences the abnormal return realized

Empirical results from Markides (1992), Daley, Mehrotra and Sivakumar (1997), Krishnaswami and Subramaniam (1999), Desai and Jain (1999), Veld and Veld-Merkoulova (2004), Rustige and Grote (2009), Veld and Veld-Merkoulova (2009) and Vollmar (2014) support hypothesis 4.

Existing literature approaches operational testing of hypothesis 4 in different ways. Early papers by Rumelt (1974), Hite and Owers (1983) and Johnson, Klein and Thibo-Deaux (1996) use subjective factors such as the rationales identified through corporate announcements (press releases) as indicators of concentration on core

[19] See chapter 7.2. for details of justifications provided. Furthermore, Weston, Mitchell and Mulherin (2004), Hauer (2008) and Depamphilis (2012) mention that the concentration on core business is the most frequent justification for corporate divestiture provided.

business activity. However, later papers intend to use measures that are more objective. For example, Daley, Mehrotra and Sivakumar (1997) in their analysis of spin-off announcements rely on the SIC-Code classification to measure business activity. [20] SIC-Codes are a US industry classification system, the "1987 STANDARD INDUSTRIAL CLASSIFICATION", released by the US Department of Labor assigning a 4-digit industry code to companies.[21] In the use of the SIC-Code classification, an ECO or spin-off transaction is considered as sector focus supporting, if the divested entity is operating in a different SIC-Code than the parent company. To be precise, the "Major Group" (major industry) is indicated through the first 2 digits of the 4-digit SIC-Code; a divested entity is operating in a different industry if it is operating in a different Major Group. This approach is in line with other studies such as Montgomery (1982), Haleblian and Finkelstein (1999), Eckbo and Thorburn (2000), Veld and Veld-Merkoulova (2004) and Bartsch and Börner (2007) and Vollmar (2014).

In practice, if the first two digits of the divested entity's code differ from the first two digits of the parent company's SIC-Code the variable INDUSTRIAL FOCUS is defined as {1}, and {0} otherwise. SIC-Code information of the parent company and divested entity are based on Thomson Reuters. Missing data is adjusted through the use of ORBIS. Based on the classification of {0,1}, two sub-samples are derived for analysis.

5.1.5 Geographical focus

This section covers the geographical focus of parent companies divesting a business unit that is operating in a different geography than its parent company. The separation of a business unit focusing primarily on a different geography than its

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[20] In addition to SIC-Codes, a newer industry classification – the NORTH AMERICAN INDUSTRY CLASSIFICATION SYSTEM (NAICS) - exists. However, SIC-Codes are used in Europe as well as the US and main data sources such as Thomson Reuters support the use of SIC-Codes. Given the geography covered in this study (EU, North America) as well as to allow cross-study comparison, the SIC-Codes are used. See also Daley, Mehrotra and Sivakumar (1997), Markides and Williamson (1996) and Silverman (1999) for a description of usage of SIC-Codes in research.

[21] Other methods to objectively measure industry focus comprise: (i) reduction of the HERFINDAHL-INDEX, (ii) reduction in number of reporting segments in sector reporting. See also DESAI/JAIN (1999) for more explanation. The HERFINDAHL-Index (also known as HERFINDAHL-HIRSCHMAN-Index) is a common index for measuring concentration in business studies. Besides market concentration, business concentration is measured through the index. See Bleymüller, Gehlert and Gülicher (2002) for further details including calculation.

parent company consequently increases the geographical focus of the parent company. Thus, the value increase or decrease resulting from a higher geographical focus must be analyzed.

Resource-based theory argues that the divestiture of a subsidiary decreases both the size and complexity of a firm's internal capital market. A smaller, less complex internal capital market reduces the risk of misallocation of capital, thus contributing positively to a firm's value. Moreover, resource-based theory argues that two businesses can use the same resources jointly only if they use the resources in a similar way.[22] Consequently, a firm with subsidiaries in different countries can only realize synergies if both can use the same resources jointly.

Existing theoretical research does not yield a clear answer but provides various argumentative strings.[23] In particular, Veld and Veld-Merkoulova (2004) emphasize realizable economies of scale in production through geographical diversification. Literature argues that these potential synergies in production and finance may be eroded in the case of divestiture of foreign subsidiaries. However, critics argue that geographical diversification may also result in dis-synergies. Operating a foreign entity may increase coordination between parent company and subsidiary, require monitoring of activities executed in the foreign entity, or require funding and subsidization from the parent company. From that perspective, the divestiture of a foreign entity decreases agency costs: less coordination and less monitoring are required between subsidiary and parent company.

Efficiency losses, according to Shrivastava (1986), increase with diversification in geographically more distant markets (Penrose (1959), Shrivastava (1986) and Lenhard (2009)). Another dimension determining efficiency loss is based on cultural differences, e.g., language barriers ((Buckley and Casson (1976)). Lenhard (2009) additionally mentions increased complexity for management when operating a subsidiary, e.g., monitoring of local management or taking into account cross-border implications of management decisions. Following Rüdisüli (2005) and Vollmar (2014) the hypothesis as follows:

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[22] See chapter 3

[23] See Bodnar, Tang and Weintrop (2000) and Denis, Denis and Yost (2000) for a summary of theoretical research on equity value and geographical diversification.

Hypothesis 5: Divestiture of a subsidiary operating in a different geography than the parent company in scope of an ECO or spin-off transaction leads to a geographical focus of the parent company that positively influences the abnormal return realized.

Hypothesis 5 is empirically consistent with results obtained by Montgomery and Wernerfeld (1988), Eckbo and Thornburn (2000) Park et al. (2002). However, later studies by Rüdisüli (2005), Lenhard (2009) and Vollmar (2014) reject the hypothesis.

Practical analysis of the hypothesis is executed using the country location in which the parent company and subsidiary are headquartered. If both are headquartered within the same country, the transaction does not lead to a geographic focus and the variable Geo Focus takes on the value {0}, and {1} otherwise. Based on Geo Focus, sub-samples for statistical analysis are assembled. Data of headquarter domicile for both parent company and subsidiary is obtained from Thomson Reuters.

5.1.6 Degree of diversification

Thus far, the discussion of diversification has covered sector or geographical diversification. However, the question of whether a firm is highly diversified, that is, operating in many different business activities, or only operates in one or two different business activities was not considered. The previous discussion on diversification in Chapter 3.2.2 demonstrates that an optimal level of diversification of a firm exists. Therefore, with an increasing number of different business activities a firm is operating in, the likelihood it will realize dis-synergies from diversification increases (Markides, 1992 and 2005). Stated differently, the reduction of "over-diversification" can reduce dis-synergies. Therefore, the hypothesis as follows:

Hypothesis 6: Subsidiary divestitures as ECO or spin-off transactions performed by a conglomerate parent company positively influence the abnormal return realized.

Hypothesis 6 is empirically supported by results obtained through Vollmar (2014). However, no other empirical evidence is known.

In order to test the hypothesis, SIC-Codes are used. Thomson Reuters provides SIC-Codes for up to eight different business activities. As in hypothesis 4, the analysis relies on the first 2 digits, which classifies the major group (main industry classification). Following previous studies, parent companies operating in three or more different major groups are considered as having a conglomerate structure.[24] The variable Conglomerate takes on the value {1} if a business is operating in three or more different major groups and {0} otherwise. Statistical analysis is based on Conglomerate sub-samples.

5.1.7 Valuation discount

In 1965, Ansoff[25] published an article describing a strategic approach to diversification planning within a firm. His theory explains corporate diversification strategies from the 1950s to 1970s, a period in which many businesses expanded their beyond their original activity. However, the perception of diversification changed over time, with academics and capital markets seeing conglomerates as inefficient. This led to favoring single-segment companies over diversified companies that are traded at a discount.[26] Milano, Treadwell and Hopson (2011) summarize the academic view as follows: „The conglomerate discount arises from the sum-of-parts valuation, and it is the reason why many conglomerates spin-off or divest subsidiary holdings. Investors often point to the conglomerate discount as a market inefficiency and view the discount as a way to buy undervalued stocks“. Based on the theory of undervalued stock, the hypothesis is as follows:

[24] This definition follows Milano, Treadwell and Hopson (2011). In contrast, Khorana et al. (2011) consider companies operating in two or more different major groups as having a conglomerate structure.
[25] Ansoff (1965) was first in applying and formalizing the approach to strategic decision-making: His growth vector components matrix shows that diversification is the strategy that intends to sell new products based on a new mission. Hitt, Ireland and Hoskisson (1999) provide a good introduction.
[26] Berger and Ofek (1995) identify a 13% to 15% value loss from diversification. Results are similar to Wernerfelt and Montgomery (1988), Lang and Stulz (1994), Servaes (1996) and Maksimovic and Phillips (2002).

Hypothesis 7: Subsidiary divestitures as ECO or spin-off transactions performed by parent companies trading at discount positively influence the abnormal returns realized.

Empirical results for hypothesis 7 are scarce; Vollmar (2014) tests the hypothesis with results that are not significant.

To operationalize testing, the market-to-book-value obtained through Thomson Reuters is used. The variable TOBIN is defined as {1} if the market-to-book-value is less than 1 and {0} otherwise.[27] The market-to-book-value is based on the market capitalization relative to the book value of total equity. Based on TOBIN subsamples for statistical analysis are generated.

5.1.8 Size of parent company

Resource-based theory builds its argument on excess capacity. Excess capacity is available but not fully utilized resources. In the presence of excess capacity, value creation possibilities exist. When the size of a company's operations increases, the likelihood of underutilized resources increases. Consequently, a positive influence of divestiture on shareholder value is expected (Lenhard, 2009).

The positive and negative effects of diversification mentioned in sections 5.1.5, 5.1.6 and 5.1.7 apply equally to size and are supplemented with arguments on cost of capital. Prior literature argues that the cost of capital decreases with the size of the company, e.g., through economies of scale in credit investigations and security issues costs (Linter, 1971). However, the likelihood of principal-agent conflict increases with company size.

Overall, the rationale of benefits of size due to better access to capital and the negative effects of size due to unused capacity leave an unclear direction of the divestiture announcement. Consequently, hypothesis 8 is as follows:

[27] The variable is named after Tobin (1996)

Hypothesis 8: The size of the parent company has a significant impact on the level of abnormal returns realized through ECO and spin-off transactions.

Vollmar (2014) finds no empirical evidence supporting Hypothesis 8 for spin-off transactions. However, Hawawini and Swary (1990), Zollo and Leshchinkskii (2000) and Möller, Schlingemann and Stulz (2003) find a negative correlation between firm size and abnormal returns during M&A transactions, e.g., the smaller the buyer, the higher the positive abnormal stock price reactions are.

Testing of Hypothesis 8 is operationalized through the following proxy variables indicating the size of the parent company: Net sales USD, Market cap and Total assets USD. The more recent values prior to the announcement of a transaction are obtained through Thomson Reuters.

5.2 Expected reactions of control variables

The expected reaction of control variables is summarized in this chapter.

Equity owner control

Principal-agent conflicts are inherent in publicly listed firms, which in most cases are run by management that only owns a small part of the company. Based on Aron (1991), the incentive alignment hypothesis was developed stating that spin-off and ECO create shareholder value, as companies listing their subsidiary are better able to align interests between shareholders and management and thus to incentivize management[28] Consequently, actions reducing principal-agent conflicts and their impact on divestitures need to be considered.

One of the main determinants in management control is the shareholder structure (Löffler, 2001). Shleifer and Vishny (1988) state that shareholder interests' representation decreases with increasing free float, e.g., higher free float implies higher agency costs (Shleifer and Vishny (1988), Wenger (1987) and Granml (1996)). A high degree of shareholder control is essential to assure that management acts in

[28] Aron (1991) as well as Rappaport (1986) show the shortcomings of aligning management to accounting performance rather than stock performance.

the best interest of shareholders (Vollmar, 2014). If shareholder control is high and agency costs are low, the potential gains in an ECO or spin-off transaction through better incentives for management are low. However, Madura and Nixon (2002) identify a positive relationship between shareholder value increase and shareholder control through the presence of institutional investors; this may imply that stock prices increase more following divestiture announcements if a firm has concentrated ownership. As a result, the expected reaction is as follows:

Expected Reaction 1: Control exercised through shareholders of the parent company has a significant impact on the level of abnormal returns realized through ECO and spin-off transactions.

Annema, Fallon and Goedhart (2001), Bartsch and Börner (2007) and Vollmar (2014) empirically agree that a higher level of control exercised through equity owners (e.g., concentrated ownership) leads to higher announcement returns. However, Elsass and Löffler (2001) and Ostrowski (2007) obtain contradicting results.

Testing of Expected Reaction 1 is operationalized through the variable Owner conc and Ref Sh perc. Owner conc describes the concentration of ownership defined as the sum of the percentage of ownership of the ten biggest investors. Ref Sh perc describes the percentage of ownership of a reference shareholder, which is a shareholder ownership of at least 20% of a company. Data is obtained from Thomson Reuters.

Debt owner control

Debt is used to control and discipline management. Debt increases management control as contracts usually contain debt covenants. Debt disciplines management as it lowers free cash flow available for investing.

The use of debt capital imposes higher control on management: creditors impose control and decision rights through covenants.[29] Control is exercised by imposing reporting requirements that can allow early identification of potential problems within a company. When problems are identified, decision rights are then exercised

[29] Haghani et al. (2009) define and explain the functioning of covenants.

to protect the debt investment (external corporate governance).[30]

The free cash flow hypothesis formulated by Jensen (1986) argues that management prefers to withhold available cash to increase their discretionary options or invest available cash in negative net present value projects rather than paying it out to shareholders (Jensen, 1986). The use of debt forces management to pay out excess liquidity (Geidner, 2009) in the form of regular interest and scheduled annuity payments. Less available free cash flow imposes greater discipline on management when it is making investment decisions.

The use of debt capital within a company, however, is limited. Beyond an optimal level of debt capital, the payment schedule required by debt can lead to a very low or even negative free cash flow. These free cash flows may be too low to allow a company to realize net present value-positive projects, that is, to invest in its future (Jensen, 1986). Negative free cash flows ultimately can lead to insolvency.

Based on the previous discussion it is reasonable to assume that the use of debt decreases the discretionary options of corporate management. As ECO and spin-off transactions reduce total assets, the relative debt level of a firm likely increases. As a result, the expected reaction follows:

Expected reaction 2: A higher level of debt of a parent company has a positive significant impact on the level of abnormal returns realized in an ECO and spin-off transaction.

Empirical result from Vollmar (2014) supports Expected Reaction 2.

To operationalize testing of Expected Reaction 2, the ratio of total liabilities to total equity expressed through the debt-to-equity-ratio is used. The variable debt-to-equity is directly obtained from Thomson Reuters.

Insider vs. outsider information gap

One of the challenges for publicly listed firms is to align management behavior with the interests of shareholders that own but do not manage the company (see

[30] Graml (1996), Easterbrook (1991) and Altman and Hotchkiss (2006) explain the consequences of an excessively high level of debt.

section 3 explaining the general principal-agent theory). Management is considered an insider as they have access to all corporate information and manage the day-to-day business. Shareholders, on the other hand, are outsiders as they rely on information provided to them by corporate management. Therefore, it is reasonable to assume that management has more information than shareholders, which leads to an information asymmetry ((Akerlof (1970); Nelson (1970); Spence (1974)).

Riley (1989) states that a high level of information asymmetry can lead to a stock's being traded below its fundamental value. Bliss (1997) and Tuna (2002) identify the public listing of a firm through an ECO or spin-off as a convincing way for corporate management to reduce information asymmetry as more information (listing requirements) for the subsidiary are imposed. Consequently, the expected reaction is as follows:

Expected Reaction 3: The degree of information asymmetry (measured through higher dispersion in the EPS forecast) between the stock market and the parent company has a positive significant impact on the level of abnormal returns realized in an ECO or spin-off transaction.

Empirical evidence for Expected Reaction 3 can be found in Nanda (1991) who finds that equity carve-out transactions not only induce positive abnormal returns at announcement but that an equity carve-out is a positive signal about the value of equity of the parent company. Nanda (1991) finds that firms that carve-out a subsidiary are, on average, undervalued by stock markets (undervaluation comes with higher information asymmetry – higher uncertainty comes with valuation discount). Similarly, Krishnaswami and Subramaniam (1999) report a reduction in information asymmetry through spin-off. Interestingly, they identify companies executing a spin-off as having a higher degree of information asymmetry than other companies. Veld and Veld-Markoulova (2004) do not find a significant relationship between information asymmetry and spin-off announcement. The most recent study by Vollmar (2014) supports Expected Reaction 3.

To operationalize testing of Expected Reaction 3, this study follows the approach of Veld and Veld-Merkoulova (2004) and Vollmar (2014) in using the standard deviation of earning-per-share forecasts. A higher standard deviation in the earnings-per-share forecasts indicates higher information asymmetry (higher uncertainty among analysts). The variable SD EPS is obtained from Thomson Reuters I/B/E/S and standardized through division by the share price at announcement date.

Stock performance of parent company

The underlying assumption of this section is that shareholders value the announcement of a restructuring more during times of poor performance than during peak performance. Villonga (2003) stated this as follows: „Considered together with the findings about diversification, the findings about refocusing seem to indicate that, when firms are outperformed by their competitors, any change in their current strategy is welcome by the stock market. "[31]

Ostrowski (2007) argues differently. He says that the negative performance of the parent company increases pressure on management that reacts; however, he sees reaction as passive and not proactive management.[32] Therefore, the announcement of an ECO or spin-off is activism, not strategic management, and thus associated with a negative valuation impact. As no clear direction is given in the literature, Expected Reaction 4 is as follows:

Expected Reaction 4: There is a significant relationship between the stock performance of the parent company prior to the announcement and the level of abnormal returns realized in an ECO and spin-off transaction.

The empirical research by Rüdisüli (2005) does support a positive relationship between stock performance prior to announcement and announcement returns. In contrast, the findings of Ostrowski (2007) and Vollmar (2014) do not support Expected Reaction 4.

To operationalize testing of Expected Reaction 4, the variable Parent return is built. The variable Parent return >0 takes on the value {1} if the stock return in the year prior to the divestiture announcement was positive and {0} otherwise. The stock return is defined as the discrete average total return of the parent company in the 12 months prior to the announcement.

Economic performance of the parent company

Following above arguments as well as the empirical results of Löffler (2001),

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[31] Villalong (2003) page 4. Similarly, Friedrich von den Eichen (2002) identifies restructuring measures as general signals to act in the interest of shareholders.
[32] Similarly, Bartsch and Börner (2007) argue the same.

Bartsch and Börner (2007) and Ostrowski (2007), the economic performance of companies involved in a corporate divestiture has a significant impact on the success of the transaction. The underlying assumption of this hypothesis is that corporate management uses existing information asymmetry to time the execution of a corporate transaction. Consequently, the Expected Reaction is:

Expected Reaction 5: There is a significant relationship between the economic performance of the parent company prior to a divestiture announcement and the level of abnormal returns realized in an ECO and spin-off transaction.

The only existing empirical evidence, from Vollmar (2014), rejects a similar hypothesis for his analysis of spin-off transactions.

To operationalize testing of Expected Reaction 5, a number of variables are used – all data derived from Thomson Reuters. The Quick ratio indicates the level of liquidity of the parent company; it is defined as the ration of cash and cash equivalents to current liabilities. ROA is the return on assets that is the income before tax in relation to total assets. ROE is the return on equity defined as the profit divided by total equity. CF margin is the ratio of cash flow to sales. Last, Z-Score based on Altman (1968) is used. The Z-Score is a predictor of firm insolvency and is widely used in business. Falkenstein, Boral and Carty (2003) state: „The most well-known quantitative model for private firms […] is Altman's Z-score. Virtually every accounting or financial analysis book uses Z-score to demonstrate how financial statement data can be translated into an equation that helps predict default." The Z-Score was developed in 1968 and enhanced over time with Z'' being the latest version from Altman (2002); For this study Z'' is used and classified in 3 groups: "safe", "grey" and "distress" [33].

Timing of announcement

Testing of "timing of an announcement" consists of three steps: First, the investor

[33] See Altman (2002) page 22. The Z''-Score is defined as
Z'' = 6.56 * ((current assets – current liabilities) / total assets) + 3.26 * (retained earnings / total assets) + 6.72 * (EBIT / total assets) + 1.05 * (book value of equity / total liabilities)
With Z'' > 2.66 "safe" zone, 1.23 < Z'' < 2.66 "grey" zone, Z < 1.23 "distress" zone

sentiment and prevailing business perception of more or less diversified firms' changes over time and with it the abnormal returns. Second, the market environment, whether a period of growth or recession, may influence the level of abnormal returns. Third, management may time the announcement of a divestiture by taking advantage of a positive market environment; during periods of growth, a higher number of divestitures may be observable.

Investor sentiment and prevailing business perception is thought to be best practice at the time of announcement. While fundamental rationales may not change quickly over time, current sentiment, as voiced by financial analysts, activist investors and the financial press, is subject to changes over the years. Schulz (2011) describes that while it is not solely current trends that influence investor behavior, they are still considered when taking investment decisions. Trends change over time, which leads to different reactions to ECO and spin-off announcement. Therefore, Expected Reaction 6 is as follows:

Expected Reaction 6: The abnormal returns realized following the announcement of ECO and spin-off transactions vary significantly from year to year.

Considering the market environment, diversification theory suggests that the benefits of diversification are of greater advantage during times of recession, when access to capital markets is limited. In particular, companies prefer to issue equity during phases of expansion when market value to book value tends to be relatively high. As equity carve-out has a financing dimension, market timing is of particular interest. Thus, Expected Reaction 7 is:

Expected Reaction 7: The abnormal returns realized following the announcement of ECO and spin-off transactions vary significantly with the business cycle.

The empirical results obtained by Vollmar (2014) support Expected Reaction 6 but reject Expected Reaction 7. In related studies of the announcement of M&A transactions, both Expected Reactions 6 and 7 are supported by the finding of Böhmer and Löffler (1999) and Coakley and Thomas (2004). They find significant negative abnormal returns during recession and positive abnormal returns during expansion.

In addition to Expected Reaction 7, prior empirical research suggests that transactions are preferably announced during times of market expansion (Rüdisüli, 2005). Rüdisüli (2005, page 107) summarizes this thought as follows: „*Analyses on earnings forecasts and realizations around equity issues suggest that firms tend to issue equity at times when investors are overly enthusiastic about earnings prospects.*"

Expected Reaction 8 follows:

Expected Reaction 8: The number of ECO and spin-off transactions are higher during times of market expansion than during market downturns.

Empirically, Hand and Skantz (1999) and Powers (2003) show that the number of ECO announcements positively correlates with market expansion. Vollmar (2014) confirms these findings for spin-off transactions.

To operationalize testing of the Expected Reaction 8 for a market environment, the stock market index MSCI World, the S&P 500 and EUROSTOXX 600 are used to define periods of market expansion and market recession. Stock markets are popular and common methods for defining the business environment for both practitioners and academics.[34] In this study, the dominantly used index is the MSCI World index.

The variables Year for announcement year and Market expansion are introduced for testing. Market expansion is defined as a binary variable taking on the value {1} if the market is in expansion phase and {0} during a recession.

Relative size of divested entity

In the scope of event studies on corporate transactions covering M&A transactions, the size of the transaction object relative to its parent company is kept as a moderating variable (control variable) in explaining significant announcement returns (Lenhard (2009) and Bergh, Johnson and Dewitt (2008)). Following Veld and Veld-Merkoulova (2009), the relative size of the divested subject relative to the parent company is also used in this study as moderating variable.[35] Consequently, the expected reaction is as follows:

Expected Reaction 9: The level of abnormal returns realized in an ECO and spin-off transaction increases with the size of the divested entity relative to the parent company.

Empirical evidence supporting Expected Reaction 9 was found by Stienemann

[34] See VOLLMAR (2013) page 178 for a discussion on the use and advantages of stock indices.
[35] In addition, Hauer (2008) and Ostrowski (2007) note that the capital market focus on the relative size of the divested entity of the parent company.

(2003) who identifies a positive correlation between the ratio of subsidiary sales to parent company sales and abnormal returns realized. Ostrowski (2007) does not find supporting evidence.

To operationalize testing for ECO, the variable Relative size is introduced and defined as the USD proceeds of the sale of the divested entity in relation to the total USD assets of the parent company, while for spin-off Relative size is defined as the transaction value in USD relative to the total USD assets of the parent company. Data is obtained from Thomson Reuters.

Industry sector

Based on empirical research on capital markets, the industry sector of the participating companies is relevant to the success of the transaction (Weinter, 2010). Given different business models and profitability as well as organizational structures, industry sectors are valued differently and thus they trade on different multiples (Boston Consulting Group, 2013). Consequently, this study tests the importance of the industry in which the parent company is operating in determining abnormal return reactions. The Expected Reaction is as follows:

Expected Reaction 10: The industry sector in which the parent company is operating has a significant impact on the level of abnormal returns realized in an ECO and spin-off transaction.

Empirical evidence exists from Santalo and Becerra (2008) supporting Expected Reaction 10 while Vollmar (2014) rejects the hypothesis of industry sector having positive and significant impact on abnormal returns realized.

Operationalization of testing of expected reaction 10 is done using the SIC-Code classification with the first 2-digits representing a major group. The variable Major group representing the major group of the first 2-digits is used to list results.

5.3 Summary of hypotheses and control variables

Tables 5 and 6 below provide a summary of all introduced variables by hypotheses and expected reaction of control variables.

Hypotheses	Variable	Scale	Source
Main research questions			
H1: Abnormal stock returns following ECO or spin-off announcements	CAR[t1;t2]	Metrical	Thomson Reuters plus Factiva and LexisNexis
H2: Deal coverage in media	News	Dummy [0;1]	Factiva and LexisNexis
H3: Deal rationale as reported through media coverage	Media	Nominal	Factiva and LexisNnexis
H4: Deal supporting sector focus of parent company	Ind Focus	Dummy [0;1]	Thomson Reuters
H5: Deal supporting geographical focus of parent company	Geo focus	Dummy [0;1]	Thomson Reuters
H6: Influence of parent being a conglomerate	Conglomerate	Dummy [0;1]	Thomson Reuters
H7: Influence of parent company market-to-book-value	Tobins Q	Dummy [0;1]	Based on the market-to-book-value from Thomson Reuters
H8: Influence of parent company size	Net sales USD	Metrical	Thomson Reuters
	Market cap	Metrical	
	Total assets USD	Metrical	

Source: Own analysis

Table 5: *Summary of hypotheses*

Expected reaction	Variable	Scale	Source
Control variables			
ER1: Influence of shareholder control	Owner conc Ref sh perc	Metrical Metrical	Thomson Reuters
ER2: Influence of debt	Debt-to-equity	Metrical	Thomson Reuters
ER3: Influence of outsider insider information asymmetry	SD EPS	Metrical	Thomson Reuters
ER4: Influence of parent stock performance	Parent return Parent return >0	Metrical Dummy [0;1]	Thomson Reuters
ER5: Influence of parent operating performance	Quick ratio RoA RoE CF margin Z-Score	Metrical Metrical Metrical Metrical Metrical	Thomson Reuters
ER6: Importance of announcement year	Year	Nominal	Thomson Reuters
ER7: Importance of market environment	Market expansion	Dummy [0;1]	Based on the MSCI World total return index data from Thomson Reuters
ER8: Parent company timing of announcement	Market expansion	Dummy [0;1]	Based on the MSCI World total return index data from Thomson Reuters
ER9: Importance of size of divested entity	Relative size	Metrical	Thomson Reuters
ER10: Importance of parent company industry sector	Major group	Nominal	Thomson Reuters, supplemented by Orbis and Compustat

Source: Own analysis

Table 6: Summary of control variables and their expected reactions

6 Methodology

The objective of the study is to identify whether and under what circumstances spin-off and ECO create value based on market capitalization. Therefore, one needs to be able to measure the changes in market capitalization at and around the announcement date of a transaction. Within the field of empirical finance research, the most widely used and accepted methodology to capture these value changes is the event study methodology, which is introduced in Chapter 6.1. Chapter 6.2 describes market efficiency as underlying assumptions for an event study and Chapter 6.3 defines the detailed design of the event study methodology used in this study. Chapter 6.4 concludes with the proposed statistical tests. The event study methodology followed in this study is based on current literature, in particular, the approach used by Vollmar (2014).

6.1 Event study

A common problem in academia as well as in the business world is to understand the effects that an economic event has on the value of a firm. A commonly used tool for quantitative analysis of such a problem is event study methodology. An event study is an empirical investigation of the relationship between a stock price development and an economic event (Strong, 1992). Most academic research performing an event study investigates whether the disclosure of firm specific events results in abnormal stock price movements. The objective of these papers is to identify the change in a stock price triggered by a specific event (abnormal change) relative to the change expected if the event had not taken place (normal change). In particular, event study methodology is useful when new information is reflected quickly in security prices. This is because the event study methodology relies on the efficient market hypothesis in its semi-strong form: stock prices reflect all publicly available information and quickly adjust to new information such as corporate disclosures.

The earliest application of the methodology is found in publications dating back to the first half of the last century[36]. While the earliest application merely identified

[36] MacKinlay (1997) attributed the first published event study to Dolley (1933). Pynnönen (2005) provides a comprehensive discussion of the application and development of the event study methodology.

stock increases or decreases, developments of the methodology introduced the removal of general stock market price movements (normal return) and other simultaneous events to segregate the return attributable to the investigated event (abnormal return). The standard form as it is still in use today was defined in the publications of Ball and Brown (1968) and Fama et al. (1969). The core methodology set in these publications remains unchanged until today (Kothari and Warner, 2007) even though a number of improvements to the model were introduced over time, including the resolution and refining of statistical problems or design adjustment to accommodate particular hypotheses.

While the methodology may be used to address a number of objectives[37], the main application is to identify the information content of events. In order to identify the information content of events, the study uses the magnitude of the stock price reaction within a given period around a specific event. The magnitude is defined as the main indicator of the information content. As the objective of the present study is the identification of the information content of an announcement event, the event study methodology is deemed the adequate method. Within accounting and finance, the event study is the standard method to investigate the information content of an event.[38] To illustrate the importance of the methodology, Kothari & Warner (2007) quantified the use of event studies in academic literature and counted 565 different studies published in major academic journals in the years between 1974 and 2000. Given their focus on major academic journals, the actual use likely far exceeds this number.

While an event study can take many different forms, most studies follow a similar structure independent of their objective and the event investigated. In general, the steps are the following[39]:

1. Definition of an event
2. Identification of the event date and definition of investigation period
3. Return calculation

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[37] Categorization with different objectives was previously done in studies by Bowman (1983), Coenenberg/ Henes (1995), May (1991), Fama (1991), Lenhard (2009) and Vollmar (2013).
[38] BINDER (1998) on page 111 notes, "the event study methodology has, in fact, become the standard method of measuring security price reaction to some announcement or event".
[39] The general flow of analysis in an event study is discussed in Bowman (1983), Strong (1992), Mackinley (1997), Lenhard (2009) and Vollmar (2014).

a. Measurement of actual returns

b. Estimation of normal return

c. Identification of abnormal return

4. Definition of statistical tests

The initial step in an event study is the definition of the event itself. This defines the object of the study (1). The following and equally important step is the clear definition and identification of the event date. Statistical tests rely heavily on the accurate definition of the event date[40]. Once the event date is clearly defined, the period to be investigated must be defined. (2) This is the event window(s): The period during which the stock market reaction is expected and measured. (3) Expected or normal return estimations are a substantial challenge. First, estimation windows, periods based on which model parameters are derived to estimate normal performance, must be defined. Then, a model for calculating expected returns (returns that would have occurred had the event not happened) must be calculated. Abnormal returns result are then the difference between actual returns and expected returns. These are usually computed per day and aggregated over time for the period under review. (4) Last, statistical significance tests are used to test exante derived hypotheses.

Every individual step of the event study methodology described above contains a number of challenges and permits the application of different approaches. Chapters 6.3 and 6.4 have a detailed discussion of possibilities and the selected approach for this study. Chapter 6.2 below provides further information on efficient markets as a main condition for the application of the event study methodology.

6.2 Efficient markets as precondition

The event study methodology allows the measurement of the stock price reaction. More precisely, it determines the magnitude and direction of the reaction during a

[40] Studies performed in the 1980's by Browman (1983) and Brown and Warner (1980, 1985) demonstrate the increased effectiveness of a statistical test when the event date is accurately defined.

specified period of time following a defined event[41]. However, to capture a meaningful stock price reaction it is a necessary condition that capital markets actually incorporate information from an event in stock price development. In particular, the necessary condition is a semi-strong form of Fama's (1970) efficient market hypothesis. The following paragraphs describe the theoretical foundation in more detail.

Capital markets are a means of resource allocation with prices as its signal. Following the efficient market hypothesis, for a market to be efficient, prices must always "fully reflect" all available information (Fama, 1970 and 1991). Mathematically, the statement can be expressed as Fama hast defined it (1970):

$$E (P_{i,t+1} \mid \Phi_t) = [1 + E (R_{i,t+1} | \Phi_t)] P_{i,t}$$

where

E:	Expected value operator
$P_{i,t}$:	Price of stock i at time t
Φ_t:	Representing set of available information at time t
$R_{i,t+1}$:	One-period percentage return of stock i ($P_{i,t+1}$ - $P_{i,t}$)

In this simple model, the expected price of a stock one period from now (t+1) is a function of its current price and the set of information available at time t. As a consequence, if information changes, the expected future value changes.

The initial statement that security prices must accurately reflect all available information all the time is very strong. Moreover, this definition implies that no return above the market return is possible which is in conflict with empirically observed returns (Fama (1970), Steiner and Bruns (2002)). As a result, research distinguishes between different forms of market efficiency depending on information available. Fama (1970) introduces the most common distinctions and differentiates between three forms of efficient markets along varying subsets of information:

1. **Weak form:** Weak efficient markets are defined as markets in which only historical security prices are reflected in current prices. This implies that the study of historical prices does not allow excess returns above market return.

[41] Detailed explanations are provided in Bowman (1983), Ostrowski (2007) and Lenhard (2009)

According to the majority of empirical studies, the weak form efficient market hypothesis cannot be rejected (May, 1994).

2. **Semi-strong form:** Semi-strong efficient markets reflect not only historical information but also adjust to all other publicly available information such as corporate disclosures. The implication is that the analysis of all publicly available information including historical prices does not allow excess returns above market returns. Up to today, the hypothesis of semi-strong form of market efficiency cannot be rejected (Fama (1970), Fechtel (2001), Lo (2007)).

3. **Strong form:** Strong efficient markets reflect all publicly and privately available information. This implies that even the possession of private (inside) information does not allow excess returns above market returns.

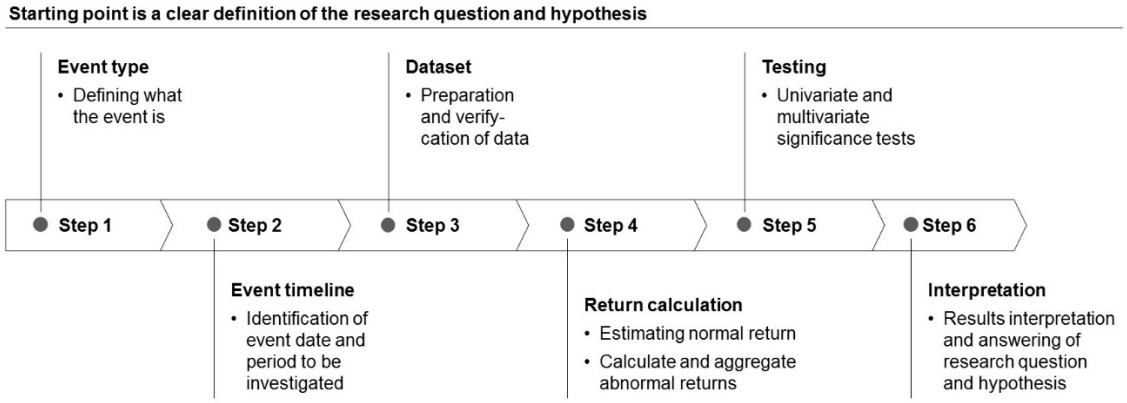
Based on the semi-strong form of market efficiency, share prices reflect all historical as well as publicly available information. Thus, no systematic realization of excess returns through evaluation of publicly available information is possible. The problem is that semi-strong efficient market hypothesis in reality cannot be unambiguously confirmed. This is because the test of the efficient market hypothesis is always a joint test of the hypothesis and the underlying pricing model generating expected returns. In academia this is referred to as the joint hypothesis problem (Campbell, Lo and Mackinley, 1997).

In 1991, Fama (1991) again reviewed the empirical evidence on market efficiency. He concludes that the empirical results "indicate that on average stock prices adjust quickly to information about (…) corporate control transactions" and that "this evidence tilts me toward the conclusion that prices adjust efficiently to firm-specific information" (FAMA 1991, page 1607). Moreover, he also concludes that "the cleanest evidence on market efficiency comes from event studies". Given Fama's conclusion as well as extensive research for the North American and the European geographies on the numeric information they contain (Picken, 2003)., it is reasonable to assume that these markets are semi-strong efficient.

6.3 Event study design

Independent of the individual objective of a study, the approach using the event study methodology follows similar steps. Figure 3 provides a schematic overview of the event study design as used in this study.

Schematic overview of event study design



Source: Own schematic description

Figure 3: *Schematic depiction of the event study approach*

The following subsections define the analyzed event (6.3.1), when it occurs (6.3.2), describe the data sample (6.3.3), explain the calculation (6.3.4), and describe the statistical test to be performed (6.4).

6.3.1 Definition of an event

The first step is to define the investigated event. Without a clear-cut event, it is not possible to measure the reaction of capital markets to the event. Academic literature distinguishes between company-specific and market-wide events (Picken, 2003). In this study, an event is defined as the announcement of a corporate divestiture – an equity carve-out or spin-off – by a company listed on a stock market in North America (USA, Canada) or Europe (for this study defined as comprising all developed markets: Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom). The announcement to execute an equity carve-out or a spin-off is a decision by a specific firm and as such the consequences are company-

specific. Therefore, the announcement of an equity carve-out or a spin-off is classified as a company-specific event (Ostrowski, 2007).

In addition to the distinction between company-specific and market-wide, events are further classified into quantitative and qualitative events based on the numeric information they contain (Picken, 2003). Quantitative events are defined as those that allow capital markets a direct numerical evaluation. Qualitative events are those that do not directly permit a revaluation of traded shares. Based on this distinction, the divestiture announcement of equity carve-out and spin-off may be considered qualitatively.[42]

The last major prerequisite for conducting a meaningful event study is the exclusion of confounding events[43]. Confounding events are those relevant to the stock price of the company announcing the divestiture and happen at the same time or close to the announcement of the divestiture[44]. For example, the simultaneous announcement of quarterly or yearly results, dividend payments or other restructuring decisions are confounding events. As confounding events may significantly influence the stock price, the abnormal returns identified cannot be clearly attributed to the divestiture announcements or the confounding events. Due to the difficulty in attributing the abnormal return to either the divestiture announcement or the confounding event(s), the present study excludes all observations for which a confounding event was identified[45].

6.3.2 Timeline of an event

In order for an event study to produce meaningful result, it is pivotal to determine the exact date of the event (Bowman, 1983). For the present study, it is therefore important to identify the initial announcement mentioning of a divestiture decision allowing the event study to be meaningful. More precisely and due to the assumption of semi-strong efficient markets, expectation is that publicly available information are quickly reflected in stock prices. Consequently, the announcement date

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[42] Previous studies of divestiture announcements by May (1994), Ostrowsi (2007) and Vollmar (2014) come to the same conclusion.
[43] McWilliams and Siegel (1997) as well as Campbell, Lo and Mackinley (1997) provide a discussion of necessary prerequisites to conduct an event study.
[44] Pauser (2007) refers to these events as overlapping events ("überlappende Ereignisse")
[45] While most studies follow the same approach ((Rüdisüli (2007); Vollmar (2014)), Foster (1980) discusses alternative approaches to dealing with confounding events.

is considered the date at which the divestiture information was first publicly available to capital markets. This definition is applied rigorously. If the announcement was already anticipated and widely discussed in capital markets, for example through newspaper articles, prior to the official announcement by the company, market prices already fully or at least partially reflect the information in stock prices (Campbell, Lo and Mackinley, 1997). In consequence, at the time of the company press release, a stock market effect may no longer be observed.

To adequately identify the event day for the announcement of a corporate divestiture, three data sources are used:

a. Public records in which companies must report stock market relevant information based on local regulation

b. National and international media covering and reporting on corporate announcements

c. Databases covering corporate events

While public records likely represent the most trustworthy data source, they may not cover rumors previously circulating. In addition, they are mostly national, so they require country-by-country analyses and may not be internationally comparable. National media likely covers market rumors but coverage of smaller transactions may not be guaranteed. Global databases covering corporate events allow for good comparison but may not guarantee the same data quality as public records. Overall, a mix of different sources represents a practical approach to having the highest data quality while maintaining good comparisons. The next chapter discusses the data set in more detail.

6.3.3 Data set

The comprehensiveness and accuracy of the data set is based on various factors discussed below. The overall data sets for both equity carve-out and spin-off are based on the Thomson One - Deals module of Thomson Reuters Eikon. The initial download of Mergers & Acquisitions – spin-off contained 1’547 announcements while Equity – subsidiary IPOs contained 1’106 announcements. The period is from January 1, 2000 to December 31, 2013. No comprehensive study covering

this timeframe is known. Both ECO and spin-off went through the following refining process:

1. The first adjustment is the exclusion of non-listed parent companies. Without a listed entity, no stock price movement can be observed. This first step reduces the number of announcements of ECO from 1'106 to 538 and of spin-off from 1'547 to 1'285.

2. Thomson Reuters distinguishes deal status as completed, rumored, intended, pending, status unknown, or withdrawn. As this study aims to investigate executed transactions, only the status completed is retained. This step reduces the number of announcements of ECO by 228 to 310 and of spin-off by 528 to 757.

3. Transactions for which the parent company is a financial institution are excluded from the sample. This approach is due to the specific characteristics of financial institutions (Lelyfeld and Know, 2009) namely the portfolio restructuring aspect (which businesses do I want to pursue as a company) of the transaction is usually not fulfilled. The approach is consistent with the approach followed in other studies. For example, Lelyfeld and Know (2009) say: „Most of the literature uses data for non-financial firms. More specifically, financials are generally excluded as for instance their leverage is of such a different magnitude". This step reduces the number of announcements of ECO by 96 to 214 and of spin-off by 123 to 634.

4. The original download already selected all transactions occurring in North America (USA, Canada) or Europe (cf. above). In this second step, only events in which the parent company is located within one of the valid countries are retained[46]. The geography was selected to reflect a comprehensive set of developed markets. No other Cross-Atlantic study covering both ECO and spin-off is known. This step reduces the number of announcements of ECO by 8 to 206 and of spin-off by 18 to 616.

5. In this step, all transactions not meeting the criteria set for this study are excluded. This comprises the elimination of transactions

[46] The domicile of the divested entity, however, is not an exclusion criteria.

a. for which no exact announcement date can be identified,

b. confounding events were identified,

c. that were double mentioned within the database,

d. that were not fully owned by the parent company at announcement or

e. that are conducted due to a regulatory requirement.

Announcement date: As companies perform multiple announcements, it is important to specify which announcement is considered to be relevant[47]. The definition of announcement date used in event studies is, as it is for this study, the date at which a transaction was first mentioned and accessible to capital market participants. That is the first time the deal was communicated to capital markets through the parent company. The information of a corporate restructuring event is material information which must be published immediately by listed entities[48]. The starting point is the announcement date as recorded in the Thomson Reuters download. However, an initial screening through internet research showed a need for a full screening of the data set using Factiva and Lexis/Nexis to verify that the first announcement date is accurately captured. If the announcement date cannot be verified unambiguously, the observation is excluded.

Confounding events: Using the corporate events calendar as well as the results of the Factiva and Lexis/Nexis search, confounding events such as earnings announcements or other corporate announcements were identified. If a stock-relevant communication was identified 10 days before or after the announcement, the observation is excluded for the data set.

Double mention: Thomson Reuters mentions a number of transactions more than once. To avoid the possibility that the same event has disproportionate influence on the event study results, double-mentioned observations are excluded from the data set.

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[47] Copeland, Legruber and Mayers (1987) identified up to 13 different announcement of a single spin-off

[48] The publication requirements of listed entities are governed through the stock exchange but also on a wider level by regulators, for example the EU Directive 2004/109 on the harmonization of transparency requirement in relation to information about issuers whose securities trade on a regulated market.

Not fully owned: Furthermore, to capture the full announcement effects, only subsidiaries that are fully owned by the parent company are retained. The analysis is performed through internet research as well as by using the available data in Thomson Reuters and through the Factiva and Lexis/Nexis search.

Regulatory requirement: Last, some transactions were executed subsequent to a regulatory requirement allowing the regulator to disintermediate production and distribution for the respective industry.

Overall, this step reduces the number of announcements of ECO by 70 to 136 and of spin-off by 98 to 518.

6. Without the availability of financial data, no event study on capital markets can be quantitatively performed. The availability and accuracy of financial data, the correct identification of the announcement date and the verification that no confounding event co-exists are factors critical to conducting a successful event study. The stock price information is obtained through Thomson Reuter Datastream, which is a common database for obtaining stock prices[49]. The availability of corporate action adjusted stock price information is crucial[50]. While closing prices reflect corporate actions, they do not account for dividends. Therefore, *Total Return* information is used. If *Total Return* information is not available, the observation is excluded from the data set.

   In this study, daily basis *Total Return* information is used. The use of daily returns can create problems if a stock is illiquid or thinly traded. In particular, shares of smaller companies are (sometimes) less frequently traded, which can lead to a return of zero over several days[51]. A clear definition of thin trading, however, cannot be found in the academic literature. Stienemann (2003) and Ostrowski (2007) assume irregular trading if more than 50% of observations in the data sample have a zero return. Bühner (2004) sets a limit at 33.33% of observations[52]. Therefore, it is not clearly defined

[49] Thomson Reuters Datastream is widely used in financial market studies. See description of Fasssnacht (2011)
[50] See also Henderson (1990) and Strong (1992) who provide further explanations of the importance of using corporate action adjusted stock price information
[51] An extensive discussion of problems associated with thin trading/illiquid shares is provided by Dimson and Marsh (1983), Mackinley (1997), Röder (1999), Ostrowski (2007) and Fassnacht (2011).
[52] See Stienemann (2003) page 158, Ostrowski (2007) page 198 or Bühner (2004) page 123

if thinly traded companies are to be excluded from the investigation. Ostrowski (2007) does not exclude observations on the grounds of thin trading to avoid distortions due to the omission of smaller companies[53]. In contrast, Stienemann (2003) and Bartsch (2005) consider keeping thinly traded observations within the sample as a misspecification in the modeling of expected returns[54]. Since such a misspecification is considered an important argument for this study as well as other studies (Vollmar, 2014), the present study chooses a conservative approach and excludes companies with thinly traded shares following the definition of Bühner (2004). Overall, this step reduces the number of announcements of ECO by 33 to 103 and of spin-off by 155 to 363.

7. While the data sample is now ready to be examined to identify abnormal returns through corporate announcements of ECO and spin-off transactions, this study investigates the effect of news coverage on abnormal returns through announcements. Therefore, a search is performed via Factiva and Lexis/Nexis to identify which transactions are covered through a major news outlet within 5 business days following the announcement. The following media are considered as major news outlets: New York Times, Wall Street Journal, Los Angeles Times, Washington Post, Financial Times (FT), Handelsblatt, Les Echos and Reuters. Overall, news coverage of 97 out of 103 ECO and 245 out of 363 spin-off were identified and classified. Classification was performed using the following criteria:

   Classification of media articles – spin-off:

   - **No reason specified:** Media article does not identify or specify any specific reason for the announced transaction
   - **Achieve better valuation:** Media article specifies that the transaction was announced by management to take advantage of a better individual valuation of subsidiary and parent company as standalone entities (sum of parts)

[53] See Ostrowski (2007) page 197
[54] See Stienemann (2003) page 158 and Bartsch (2005) page 137

- **Concentration on core business**: Media articles specifies that management wants to concentrate on the parent company's core business activity and therefore separates itself from the subsidiary

Classification of media articles – equity carve-out:

- **No reason specified:** Media article does not identify or specify any reason for the announced transaction
- **WC (working capital) and general corporate purposes**: Media article says that management executed the transaction with the objective of raising funds to improve working capital and to pay for general corporate purposes
- **Debt reduction:** Media article specifies that management disposed of the entity to raise funds for corporate debt reduction of either parent company or subsidiary
- **Growth financing:** Media article specifies that management wants to raise funds from the transaction to finance growth of either parent company or subsidiary
- **Concentration on core business**: Media article specifies that management wants to concentrate on the parent company's core business activity and therefore separates itself from the subsidiary

Summary of data set preparation				
Step	Change	#ECO	Change	#spin-off
Basic population		1’106		1’547
1. Public listed	-568	538	-262	1’285
2. Deal completed	-228	310	-528	757
3. Not financial firm	-96	214	-123	634
4. Parent located in developed market	-8	206	-18	616
5. Not meeting criteria	-70	136	-98	518
6. Financials available	-33	103	-155	363
Financials total		103		363
7. News available	-6	97	-118	245
News total		97		245

Change refers to the number of eliminated observations per step. **#** is the number of announcements. **Not meeting criteria** comprises the exclusion of data for which the announcement date could not be verified, for which confounding events were identified, which were mentioned more than once or did not meet the defined criteria (divestiture as regulatory requirement or divested entity not fully owned by parent at announcement).

Table 7: Data set derivation

6.3.4 Return calculation

This section is structured in three sub-sections: measuring actual returns (6.3.4.1), calculating expected performance (6.3.4.2) identifying abnormal returns (6.3.4.3).

6.3.4.1 Measuring actual returns

Prior to discussing the modelling of expected and deviation of abnormal returns, the general return calculation methods must be determined (Fassnacht, 2011). Two methods exist: Continuous and discrete calculation of returns[55]. The continuous return calculation is as follows:

$$r_{i,t} = \ln\left(\frac{P_{i,s}}{P_{i,s-1}}\right) = \ln(P_{i,s}) - \ln(P_{i,s-1})$$

[55] Details on the differences between continuous and discrete return calculation are provided in Poddig, Bringmann and Seiler (2009).

given

$r_{i,t}$: Continuous returns of stock i in period t (≙s-1 to s)

$P_{i,s}$: Corporate action and dividend adjusted stock price i at time s

$P_{i,s-1}$: Corporate action and dividend adjusted stock price i at time s-1

The calculation of discrete returns in contrast is defined as:

$$R_{i,t} = \frac{P_{i,s}-P_{i,s-1}}{P_{i,s-1}} = \frac{P_{i,s}}{P_{i,s-1}} - 1$$

given

$R_{i,t}$: Discrete returns of stock i in period t (≙s-1 to s)

$P_{i,s}$: Corporate action and dividend adjusted stock price i at time s

$P_{i,s-1}$: Corporate action and dividend adjusted stock price i at time s-1

The rule of approximate equality postulates that for small absolute values the return between the two calculation methods is as follows (Ahnefeld, 2007):

$$R_{i,t} \approx r_{i,t} - 1$$

Dorfleitner (2002) states that the difference between continuous and discrete returns in the interval from -10% to +10% differs by a maximum of 5%. Similarly, Fama (1970) considers the assumption of equal returns between continuous and discrete returns of up to 15% as reasonable.

Within the literature using the event study methodology for finance applications, neither return definition was continuously applied over time. While Brown and Warner (1985), Barber and Lyon (1997) as well as Cable and Holland (1999) exclusively use discrete returns, Dimson and Marsh (1983), Strong (1992), Ostrowski (2007) and Fassnacht (2011) use continuous returns. Fama et al. (1969) as well as Böhmer and Löffler (1999) use both return calculations but cannot identify a significant difference. Similarly, Henderson (1990) concludes that the choice of return calculation does not significantly influence the results of the event study.

The reason that none of the return calculation has a dominant position in the literature is that all have advantages and disadvantages that can be of use depending

on the objective of each individual study. One of the main advantages of using continuous returns in event studies is that they can be added over time (Campbell, Lo and MacKinley, 1997; Dorfleitner, 2002). Simple addition over time is possible for daily returns but not possible for discrete returns. However, discrete returns may be easily added across the portfolio, e.g., for a specific day, and returns per observation can be added together (Campbell, Lo and MacKinley, 1997; Dorfleitner, 2002). The addition of continuous returns across individual observations leads to systematic downward bias (underestimation) of portfolio return[56].

Another dimension in the selection of a return calculation is the distribution characteristics of the returns. The distribution of continuous returns tends to be rather symmetrical, thus justifying the assumption of normal distribution rather well (Granger and Morgenstern, 1970; Dorfleitner, 2002). This tendency is of use when analyzing results using a parametric statistical test, which assumes normally distributed returns. However, continuous returns do not satisfy the assumption of normal distribution by default as Dorfleitner (2002) and Poddig, Dichtl and Petersmeier (2008) point out.

The advantage of additivity across the portfolio is the main argument that can be used to the advantage of the present study. The objective is to examine the announcement effect on and around a specific day (announcement date) across a number of corporate announcements, therefore a simple aggregation of returns would be very useful. Barber and Lyon (1997), Campbell, Lo and Mackinley (1997) and Dorfleitner (2002) recommend the use of discrete returns[57], so discrete returns are used for calculation of returns in this study.

Last, a decision over the time horizon of returns is to be made. In theory, daily, weekly or monthly return data can be considered (Ostrowski, 2007). However, in practice the use of daily returns is predominant (Bartsch, 2005). This is because daily returns minimize the risk of misspecification, which can result from the choice between continuous or discrete return calculation method. In particular, as daily returns above 10% or below -10% are rather rare, the law of approximate equality applies (Fassnacht, 2011). Brown and Warner (1985) analyze the use of

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[56] An example of systematic underestimation using continuous returns across portfolio can be found in Barber and Lyon (1997) as well as in Campbell, Lo and Mackinley (1997). Nonetheless, the downward bias in adding small absolute returns together within short event windows is negligible

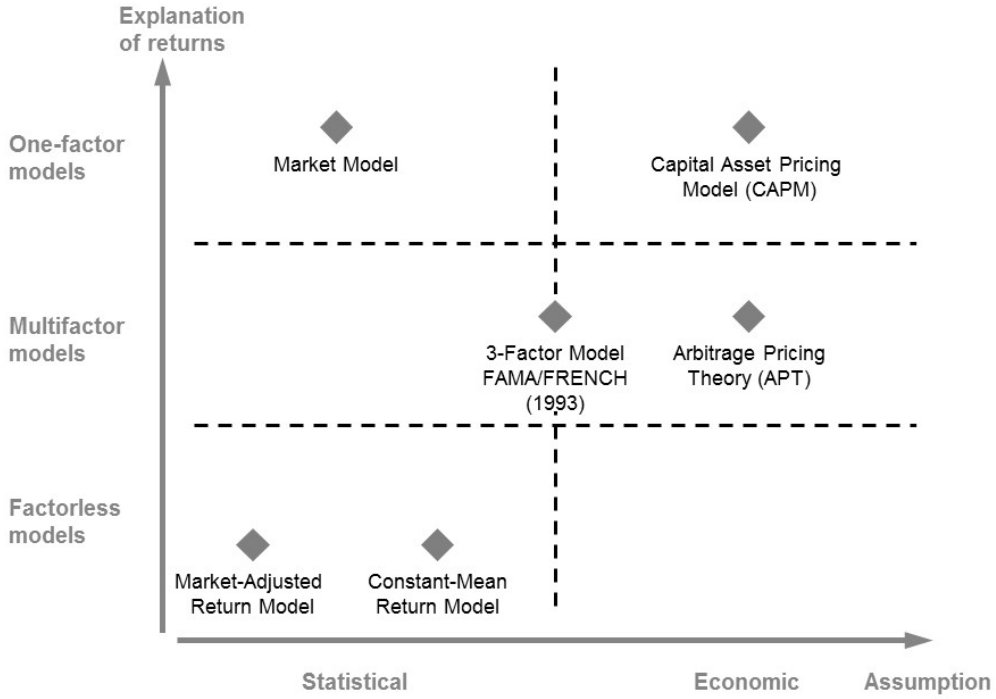
[57] The identical approach was selected by Röder (1999), Kurth (2005), Ostrowski (2007), Fassnacht (2001) and Vollmar (2014)

daily returns in event studies considering the following problems: *"(1) non-normality of returns and excess returns, (2) bias in OLS estimates of market model parameters in the presence of non-synchronous trading, and (3) estimation of the variance to be used in hypothesis tests concerning the mean excess return, and specifically the issues of autocorrelation in daily excess returns and of variance increases on the days around an event" (Brown and Warner, 1985, page 25).* Their analysis leads to the conclusion that *„the characteristics of daily data generally present few difficulties in the context of event study methodologies. Furthermore […] the use of daily data is straightforward"* (Brown and Warner, 1985 page 25). Similarly, Strong (1992) concludes that event studies based on daily returns have a higher significance. Last, given the assumption of semi-strong market efficiency, stock price reactions to a divestiture announcement are expected on the same day or within very few days. Therefore, when measuring stock price reactions during this short event window the use of daily returns is the most appropriate approach.

6.3.4.2 Calculating expected returns

Choice of Pricing Model

In order to isolate the return induced by the divestiture announcement, the return that would have occurred in the absence of the event must be estimated. This latter return is called expected return and must be estimated using a pricing model. Theoretic literature provides numerous models that are categorized as one-factor models, multi-factor models and factorless models (Brown and Warner, 1980; Ehrhardt and Koerstein, 2001; Röder, 1999; Ostrowski, 2007). Alternatively, a classification into statistical and economic models is possible (Mackinley, 1997; Bühner, 2004). Figure 4 below illustrates the pricing models most relevant for event studies.



Source: Based on Vollmar (2014) page 202

Figure 4: Pricing models - classification based on Vollmar (2014)

The most frequently used pricing model in event studies is the market model as used in Sharpe (1963)[58]. The market model postulates a linear relationship between a company's stock return and the return of a market portfolio. As the market is the only factor explaining the company's return, it is considered a one-factor model. The market model formula is as follows:

$$E[\mathrm{R_{i,t}}] = \alpha_i + \beta_i E[\mathrm{R_{m,t}}] + \varepsilon_{i,t}$$

given

$E[\mathrm{R_{i,t}}]$: Expected return of stock i in period t

[58] For an evaluation and frequency of the use of the model from Sharpe (1963), please see Strong (1992) and Zimmermann (1997)

$E[R_{m,t}]$: Expected return of market portfolio m in period t

α_i: Company return that is independent of market return

β_i: Return sensitivity of stock i relative to the market return

$\varepsilon_{i,t}$: Error term

and the following conditions:

$$E[\varepsilon_{i,t}] = 0 \text{ and } \quad Var[\varepsilon_{i,t}] = \sigma_{\varepsilon_i}^2$$

The returns estimated using the market model are referred to as market or risk-adjusted returns (Brown and Warner, 1980). Application of the market model requires the definition of an estimation window during which the estimation parameters α and β are to be estimated (Binder, 1998).

At times, data availability may limit the use of the market model, forcing the use of a more restricted version of the market model: the market-adjusted return model (Campbell, Lo and Mackinley, 1997; Bähner, 2004; Ostrowski, 2007; Fassnacht, 2011). In the market-adjusted return model, α_i takes on the value 0 and β_i takes on the value 1. The formula to estimate the expected return of stock i thus is as follows:

$$E[R_{i,t}] = E[R_{m,t}] + \varepsilon_{i,t}$$

given

$E[R_{i,t}]$: Expected return of stock i in period t

$E[R_{m,t}]$: Expected return of market portfolio m in period t

$\varepsilon_{i,t}$: Error term

and the following conditions:

$$E[\varepsilon_{i,t}] = 0 \text{ and } \quad Var[\varepsilon_{i,t}] = \sigma_{\varepsilon_i}^2$$

The expected return of a stock i in the market-adjusted return model therefore corresponds to the return of the market portfolio. No estimation window is necessary.

The constant-mean return model is probably one of the simplest models (Campbell, Lo and Mackinley, 1997) yet it yields results similar to the results obtained using more sophisticated models (Brown and Warner, 1980 and 1985). The expected returns in this model correspond to the average returns of the stock in a predefined estimation period. The implicit assumption is that average returns of a stock are constant over time and consequently the average return during the estimation period allows the prediction of the return during a future period (Mackinley, 1997). The formula for the constant-mean return model is as follows:

$$E[\mathrm{R_{i,t}}] = \mu_i + \varepsilon_{i,t}$$

given

$E[\mathrm{R_{i,t}}]$: Expected return of stock i in period t

μ_i: Average return of stock i during a predefined period prior

$\varepsilon_{i,t}$: Error term

and the following conditions:

$$E[\varepsilon_{\mathrm{i,t}}] = 0 \text{ and } \quad Var[\varepsilon_{\mathrm{i,t}}] = \sigma_{\varepsilon_i}^2$$

Following the discussion of the statistical models, the economic models Capital Asset Pricing Model (CAPM), Arbitrage Pricing Theory (APT) and the 3-factor model based on Fama and French (1993) are considered[59]. The statistical models discussed thus far do not rely on assumptions on investor behavior or other economic arguments. However, economic models such as CAPM and APT make assumptions about investor behavior and imply that markets are moving to a market equilibrium (Campbell, Lo and Mackinley, 1997). CAPM considers systematic market risk as a main economic driver. APT considers multiple economic drivers but the model itself fails to specify them. The 3-factor model based on Fama and French (1993), like APT, considers three economic drivers and specifies them as market risk as in CAPM, size measured through market capitalization and the

[59] Statistical models are only discussed briefly as neither model takes an important role in event study methodology.

book-to-market equity ratio. The model was developed with the rationale that small-cap and high-value companies regularly outperform the market.

Despite the choice of pricing model as an important determinant of abnormal return identification in event studies[60], there is no consensus within academia on which method is best (Fassnacht, 2011). Brown and Warner (1980) and Cable and Holland (1999) prefer the CAPM model as it produces better results and is more robust. However, Hauser (2003) and Pauser (2007) oppose the use of CAPM on the grounds that too-restrictive assumptions are not useful in event studies. Pauser (2007) further explains that the use of APT is unsuitable in practice as it fails to specify the relevant economic factors both in quantity and quality.

To conclude, in order to reduce the uncertainty related to the choice of model, this study uses several different models to increase robustness of results (Binder, 1998; Campbell, Lo and Mackinley, 1997). Both the market model and market-adjusted returns model are applied[61]. This approach not only reduces uncertainty related to the choice of model, but also supports consistency and comparability with other studies (Hauser, 2003; Pauser, 2007).

Choice of Event and Estimation Window

The announcement day t_0 of an equity carve-out or spin-off is the center of attention of an event study. Around day t_0, both the event as well as the estimation window need to be defined (Mackinley, 1997). The event window is the period around the announcement day during which capital markets are expected to absorb the announcement information and consequently during which the abnormal stock price reaction is expected and measured (Rauscher, 2007). The estimation window is the period prior to the event window during which model parameters for the market model are estimated (Scheller, 1999).

The literature does not provide clear guidance on the length of the estimation window[62]. The choice of estimation window has two opposing rationales. On the one

[60] The impact of the model choice on event study results increases with the length of the event window. However, for short time periods the choice of model is less relevant. See Fama (1998), Kothari (2001) and Kothari and Warner (2007)

[61] This approach is in line with previous studies by Bühner (2004), Fassnacht (2011) and Vollmar (2014)

[62] Using daily returns an estimation window of 100 to 250 trading days is used. This approach is in line with Bradley et al. (1988), Böhmer and Löffler (1999), Pauser (2007) and Vollmar (2014). For monthly returns, the

hand, the robustness of statistical models increases with an increase in the number of data points, favoring a longer estimation window. On the other hand, the longer the estimation window, the higher the risk of other factors influencing the return estimation[63]. This study uses an estimation period of 250 trading days prior to the event window in order to balance these opposing factors. 250 trading days provide sufficient stability for statistical models while limiting the risk of other company specific factors influencing model estimates (Mackinley, 1997; Binder, 1998; Wulff, 2001; Pauser, 2007).

The choice of the event window is similarly subject to two opposing factors (Rauscher, 2007). On the one hand, the probability is that the entire stock price reaction attributed to the announcement is captured with an increasingly wider time window around the announcement day. On the other hand, the risk that other information, overlapped with the announcement effect, will be reflected in the stock price reaction decreases with a shortened time window around the announcement day[64].

Furthermore, the estimation and event window should not overlap so as to insure that the event window does not influence the estimation parameter. Figure 5 below illustrates estimation and event window. Overall, this study does not let estimation and event window overlap. As previously stated, the estimation period is set at 250 trading days. For the event window, various windows are analyzed and documented throughout chapter 7.

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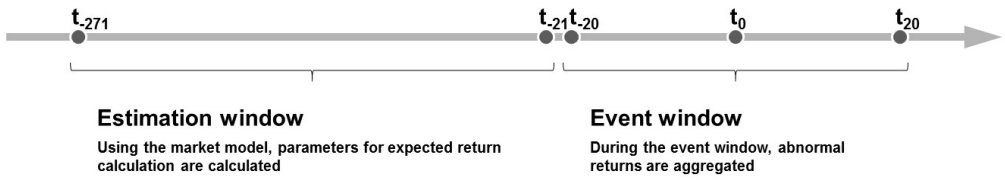
estimation period can reach from 25 to 121 months; for example, see Peterson (1989).

[63] Fassnacht (2011) provides an extensive discussion of the advantages and disadvantages related to the choice of estimation period.

[64] Jensen and Ruack (1983), Malatesta and Thompson (1985), Bradley et al. (1988), Eckbo, Maksimovic and Williams (1990), Gat and Jefferis (1991), Grandjean (1992) and Doukas (2002) provide extensive discussion of advantages and disadvantages of event window length.

Estimation and event window definition



Source: Based on Benninga (2008) and Meyer (2011)

Figure 5: Definition of estimation and event windows

Choice of Market Index

Both models used in this study, the market model and the market-adjusted returns model, require the definition and use of a market index. The models require the index to be a good predictor of stock returns of the chosen stocks within the sample (Bühner, 2004). Generally, the literature distinguishes among three characteristics of indices (Bühner, 2004; Ments, 2006; Pauser, 2007):

1. Market vs. sector index
2. Equal weight vs. market cap index
3. Price vs. performance-based index

The literature widely discusses the advantages both on a theoretical and empirical level, of the use of these different index characteristics (Roll, 1977; Winkelmann, 1980; Brown and Warner, 1980; Winkelmann, 1984; Hicks, 1987; Zimmermann, 1997; Clarke and Kassimatis, 2006).

A market index is a broad index covering all listed companies of a market while a sector index only contains a sub-selection based on activity or geographic location. Sector indices have the advantage of being more accurate in predicting stock returns of a specific industry or geography. However, one or a few dominating players in an index may influence the indices too heavily. Consequently, predictions based on the use of the index are biased. Therefore, sector indices usually lack greater applicability and studies rather rely on broad, diversified market indices (Mackinley, 1997; Veld and Veld-Merkulouva, 2004). This study therefore prefers a market index.

Equally weighted indices take all index constituents equally into consideration. Marked capitalization-weighted indices are weighted based on the market capitalization of each index constituent. However, market cap-weighted indices can be biased towards bigger companies or even be dominated by a few large cap constituents. Therefore, studies (and this study) usually rely on an equal weighted index in which small companies are used as much as large caps.

Performance indices capture corporate actions such as dividends, capital increase or stock splits and thus are based on total return (Strong, 1992). In contrast, price indices mirror the prices on a stock exchange. As event studies usually try to capture return in its entirety, performance indices are usually retained. This study therefore prefers a performance (total return) index.

For this event study, the MSCI World Index as equal weighted total return index is used. This is because the sample is drawn from all western developed markets across all industries and the MSCI World Index comprises equities from various countries and industries. Therefore, it represents the stock performance of the sample constituents for both equity carve-out and spin-off most accurately[65].

6.3.4.3 Identification of abnormal returns

Logically, the stock return brought about through an equity carve-out or spin-off is defined as the difference between the actual stock return as observed in the market and the normal return that would have been expected in the absence of the divestiture event. This difference is called abnormal return and contains the change in valuation of the company through the divestiture induced[66]. The formula is as follows (Brown and Warner, 1985; Campbell, Lo and Mackinley, 1997):

$$AR_{i,t} = R_{i,t} - E(R_{i,t})$$

given

$AR_{i,t}$: Abnormal return of stock i at time t

[65] The MSCI World Index has been produced since 31.12.1969 through the Morgan Stanley Capital International and is considered one of the most important indices. See http://www.mscibarra.com (2010)

[66] Fama et al. (1969) were the first to use the concept and terminology of abnormal return. Later studies by Brown and Warner (1980), Böhmer and Löffler (1999) and Bartsch and Börner (2007) rely on the same or similar terminology (in German: "Abnormale Renditen oder Überrenditen")

$R_{i,t}$: Return of stock i at time t

$E(R_{i,t})$: Expected (normal) return of stock i at time t

The average abnormal returns (AAR) of a data sample is subsequently calculated as follows:

$$\mathrm{AAR_t} = \frac{1}{N}\sum_{i=1}^{N} AR_{i,t}$$

given

$\mathrm{AAR_t}$: Average abnormal return of the sample at time t

$AR_{i,t}$: Abnormal return of stock i at time t

N: Number of data sample observations

To capture the change in share price of a company due to the announcement of an equity carve-out or spin-off, the abnormal returns must be aggregated over time for the period of the event window (Mackinley, 1997). The aggregation over time is computed by cumulating individual abnormal returns to one sum called Cumulative Abnormal Return (CAR) (Fassnacht, 2011). The formula for calculation is as follows:

$$\mathrm{CAR_{i,t_1-t_2}} = \sum_{t=t_1}^{t_2} AR_{i,t}$$

given

$\mathrm{CAR_{i,t_1-t_2}}$: Cumulative abnormal return of stock i in time window $[t_1;t_2]$

$AR_{i,t}$: Abnormal return of stock i at time t

To derive results considering all announcements of equity carve-out and spin-off, individual CAR is aggregated for the portfolio of equity carve-out announcements and spin-off announcements, respectively. The aggregation results in a Cumulative Average Abnormal Return (CAAR) that displays the abnormal return effect per transaction time for the event window (Mackinley, 1997). The formula for calculation is as follows:

$$\text{CAAR}_{t_1-t_2} = \frac{1}{N}\sum_{i=1}^{N} CAR_{i,t_1-t_2}$$

given

$\text{CAAR}_{t_1-t_2}$: Cumulative average abnormal return in time window [t_1;t_2]

CAR_{i,t_1-t_2}: Cumulative abnormal return of stock i at time [t_1;t_2]

N: Number of observations

6.4 Significance tests

This study relies on parametric as well as non-parametric tests of the statistical significance of the observed stock price changes. These are leveraged to test whether the observed stock price changes are random or can actually be attributed to the investigated event. This is performed using univariate tests of the importance of individually hypothesized explanatory variables. The statistical level of significance thereby expresses the level of confidence, e.g., the probability of rejecting a null hypothesis by a test when it is really true. In addition, multivariate statistical tests are executed to test the importance of multiple factors that can explain the observed stock price reactions simultaneously.

6.4.1 Univariate tests

The univariate tests performed in this study can be characterized as either parametric or non-parametric. Parametric tests rely on specific distribution assumptions; non-parametric tests do not rely on any assumptions. The null hypothesis generally assumes that the event has no effect on the stock return of a company. This is in contrast with the hypothesis of this study. The general null and alternative hypothesis for the tests performed in this study is as follows:

H_0: $\text{CAAR}_{t_1-t_2} = 0$

H_1: $\text{CAAR}_{t_1-t_2} \neq 0$

given

$\text{CAAR}_{t_1-t_2}$: Cumulated average abnormal return in the event window [t_1; t_2]

In the comparison of CAAR of two sub-sets the null and alternative hypothesis are as follows:

H_0: $\text{CAAR}_{1,t_1-t_2} = \text{CAAR}_{2,t_1-t_2}$

H_1: $\text{CAAR}_{1,t_1-t_2} \neq \text{CAAR}_{2,t_1-t_2}$

given

CAAR_{i,t_1-t_2}: Cumulated average abnormal return of sub-sample I in the event window [t_1; t_2]

Parametric test

The standard parametric test widely used in event studies is the one-sample t-test (Brown and Warner, 1980 and 1985; Peterson, 1989; Ostrowski, 2007; Pauser, 2007; Lenhard, 2009). Most parametric tests – including the t-test – assume a normal distribution of abnormal returns (Anderson et al., 1997; Serra, 2002). Specifically, the one-sample t-test determines whether the mean value of the sample is different from a test value. The test formula for this is as follows:

$$t = \frac{\bar{X} - \mu_0}{\sigma}\sqrt{N}$$

given

$\bar{X}$: Mean value of sample

μ_0: Hypothetical mean value of population (test value)

σ: Standard deviation of sample

N: Sample size

The specific test formula in the context of equity carve-out announcements or spin-off is the following:

$$t = \frac{\mathrm{CAAR}_{t_1-t_2}}{\hat{\sigma}(\mathrm{CAR}_{t_1-t_2})}\sqrt{N}$$

given

$\mathrm{CAAR}_{i,t_1-t_2}$: Cumulated average abnormal return in the event window [t_1; t_2]

$\hat{\sigma}(\mathrm{CAR}_{t_1-t_2})$: Estimated standard deviation of cumulated abnormal returns in the event window [t_1; t_2]

N: Sample size

The assumption that abnormal returns are normally distributed cannot always be validated. However, if abnormal returns of the sample are independent of each other and equally distributed, it can be assumed that the CAAR_t are normally distributed following the central limit theorem. Therefore, it is reasonable to assume a normal distribution as within the scope of this study.

A different challenge is the assumption of constant variance of the abnormal returns. Often the variance of returns during the event and estimation period differs and ultimately leads to an increasing variance during the event window (Beaver, 1968; Patell, 1976; Patell and Wolfson, 1979; Dann, 1981; Brown and Warner, 1985; Kalay and Lowenstein, 1985; Rosenstein and Wyatt, 1990). Small differences in variance can lead to a situation in which the null hypothesis is not rejected sufficiently based on the standard t-test (Boehmer et al., 1991). Therefore, academic literature suggests a standardization of variances to render the t-test useful (Serra, 2002). Patell (1976) developed a test statistic accounting for an increase in variance during the event window.

A further problem may be a collinearity of returns if events have an industry-wide or global reach. While this should not be the case for equity carve-out or spin-off announcements, the test statistic of Patell (1976) was further developed by Boehmer, Masumeci and Poulsen (1991) to account for collinearity of returns (across the portfolio) as well as changes in variance. Under their methodology, abnormal returns are standardized based on the variance of residuals from the estimation period (Boehmer et al., 1991). The formula is as follows:

$$SAR_{i,t} = \frac{\mathrm{AR_{i,t}}}{\hat{\sigma}_i(\mathrm{AR}_T)\sqrt{1 + \frac{1}{T} + \frac{(R_{M,t} - \bar{R}_M)^2}{\sum_{t=1}^{T}(R_{M,t} - \bar{R}_M)^2}}}$$

given

$\mathrm{SAR}_{i,t}$:	Standardized abnormal returns of stock i at time t
$\mathrm{AR}_{i,t}$:	Abnormal return of stock i at time t
$\mathrm{R}_{M,t}$:	Market return at time t
$\bar{R}_M$:	Average market return in estimation window
$\hat{\sigma}_i(\mathrm{AR}_T)$:	Estimated standard deviation of abnormal returns of stock i in the estimation window
T:	Number of days in the estimation window

Given N companies in the sample, the test statistic is as follows:

$$z = \frac{\frac{1}{N}\sum_{i=1}^{N} SAR_{i,t}}{\hat{\sigma}_i(\mathrm{AR}_T)\sqrt{\frac{1}{N(N-1)} + \sum(SAR_{i,t} - \sum_{i=1}^{N}\frac{SAR_{i,t}}{N})}}$$

With z following the student-t-distribution with T-2 degrees of freedom. With increasing sample size, z follows a standard normal distribution (Boehmer et al., 1991). Mikkelson and Partch (1988) developed a method to calculate the z for $\mathrm{CAAR}_{t,.}$ This study follows their standardization and calculates the following:

$$SCAR_{i,t_1-t_2} = \frac{\mathrm{CAR}_{t_1-t_2}}{\hat{\sigma}_i\sqrt{T_s + \frac{T_s^2}{T} + \frac{\sum_{t_1}^{t_2}(R_{M,t} - T_s(\bar{R}_M))^2}{\sum_{t=1}^{T}(R_{M,t} - \bar{R}_M)^2}}}$$

given

$SCAR_{i,t_1-t_2}$: Standardized cumulated abnormal returns of stock i in event window

$CAR_{t_1-t_2}$: Cumulated abnormal return of stock i in event window

$R_{M,t}$: Market return at time t

$\bar{R}_M$: Average market return in estimation window

$\hat{\sigma}(CAR_{t_1-t_2})$: Estimated standard deviation of cumulative abnormal returns in the estimation window

T: Number of days in the estimation window

T_s: Number of days in the event window

The test statistic for $SCAR_{i,t_1-t_2}$ is identical to the test statistics of the underlying methodology following Boehmer et al. (1991).

The problem with the Boehmer et al. (1991) standardization and Mikkelson and Partch (1988) is that they both rely on the assumption that stock returns yielding during the event window are proportional to the return during the estimation window and that these are being identical between companies. Consequently, both methodologies are only applicable if a change in variance between estimation and event window occurs (Serra, 2002). If this is not the case, the results are systematically biased and the null hypothesis is rejected too often. Consequently, Brown and Warner (1985) conclude that standardization is not necessary in most event studies and requires an unjustified higher amount of work. Moreover, the standardization renders the comparison between studies difficult. For these reasons the standardization of variances is not used in this study (Lenhard, 2009; Vollmar, 2014).

For testing of overarching success factors ECO and spin-off, the samples are sometimes divided in subsamples. This is the case for binary success factors such as whether or not a transaction was reported through the media, for example. In these cases, the CAAR of the subsamples are compared using a parametric t-test for two independent subsamples (independent two-sample t-test/ test of differences of mean.

The difference of mean between the CAAR ($CAAR_{Diff}$) for each event window is computed through simple deduction of the CAAR of the two subsamples (Hawawini and Swary, 1990; Beitel, Schiereck and Warhenburg, 2004). The formula is as follows:

$$\mathrm{CAAR}_{Diff} = \mathrm{CAAR}_{1,t_1-t_2} - \mathrm{CAAR}_{2,t_1-t_2}$$

given

CAAR_{Diff}: Difference in cumulated average abnormal returns between sub-samples in the event window

$\mathrm{CAAR}_{i,t_1-t_2}$: Cumulated average abnormal return of sub-sample i in the event window [t_1; t_2] with $i \in \{1,2\}$

The test statistic is t-distributed and takes the following form:

$$t = \frac{\mathrm{CAR}_{Diff}}{\sqrt{\left(\frac{(N_1-1)\hat{\sigma}_1^2 + (N_2-1)\hat{\sigma}_{21}^2}{N_1+N_2-2}\right) * \left(\frac{N_1+N_2}{N_1*N_2}\right)}}$$

given

CAAR_{Diff}: Difference in cumulated average abnormal returns between subsamples in the event window

N_i: Number of companies in subsamples i, $i \in \{1,2\}$

$\hat{\sigma}_i^2$: Estimated variance of cumulated abnormal returns in subsamples i, $i \in \{1,2\}$

The two-samples t-test assumes a normal distribution of abnormal returns as well as homogeneity of variances. To verify that the assumption of homogeneity of variance remains valid, a LEVENE-Test is performed (Levene, 1960; Janssen and Laats, 2007). If the assumption of homoscedasticity, that is, the equality of variances, is rejected at the 5%-significance level, the WELCH-Test for independent

samples is performed instead of the two-samples t-test since the WELCH-Test provides robust results in the case of heteroscedasticity. The WELCH-Test is as follows:

$$T = \frac{\mathrm{CAR}_{Diff}}{\sqrt{\left(\frac{\hat{\sigma}_1^2}{N_1}\right) + \left(\frac{\hat{\sigma}_2^2}{N_2}\right)}}$$

given

CAAR_{Diff}: Difference in cumulated average abnormal returns between subsamples during the event window

N_i: Number of companies in subsamples i, $i \in \{1,2\}$

$\hat{\sigma}_i^2$: Estimated variance of cumulated abnormal returns in subsamples i, $i \in \{1,2\}$

In this case, T is not being t-distributed but approximated through the t-distribution. To do that, the degrees of freedom v must be modified through the following formula:

$$v = \frac{(\frac{\hat{\sigma}_1^2}{N_1} + \frac{\hat{\sigma}_2^2}{N_2})^2}{\frac{(\frac{\hat{\sigma}_1^2}{N_1})^2}{N_1 - 1} + \frac{(\frac{\hat{\sigma}_2^2}{N_2})^2}{N_2 - 1}}$$

given

N_i: Number of companies in subsamples i, $i \in \{1,2\}$

$\hat{\sigma}_i^2$: Estimated variance of cumulated abnormal returns of subsamples i, $i \in \{1,2\}$

Non-parametric test

In cases in which the distribution assumption of non-parametric t-test is not met, the null hypothesis is rejected too often[67]. The rejection continues with increasing sample size despite the fact that the robustness of the t-test actually increases with increasing sample size[68]. Therefore, Fama (1976) states that the assumption of normal distribution is regularly violated. Additionally, Serra (2002) finds abnormal returns to be correlated over time (autocorrelation) leading to a violation of the assumptions underlying parametric tests. Due to the aforementioned possible violations of the assumptions underlying the t-test, non-parametric tests are performed in this study. This is because non-parametric tests impose only minimal assumptions on the distribution of abnormal returns (Mentz, 2006). Non-parametric t-tests are based on the median (not the mean) value of abnormal returns which renders the distribution secondary (Serra, 2002).

The most well-known and most effective non-parametric test is the WILCOXON-signed-rank-test (Blair and Higgins, 1980). The WILCOXON-signed-rank-test assesses if the population median between two samples differs. In event studies, the question is whether the median of the abnormal returns is different from zero. Therefore, the difference between the abnormal returns and median of the null hypothesis (Med_0=0) is first calculated. This calculation provides adjusted abnormal returns:

$$AR'_{i,t} = AR_{i,t} - Med_0$$

In the next step, the $AR'_{i,t}$ are sorted in descending order and ranked accordingly. The highest value of $AR'_{i,t}$ is given the highest rank. Consequently, the sum S_N is the sum of all ranks r_i^+ with positive value out of N samples elements:

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[67] This is due to the central limit theorem: see Pauser (2007) and Lenhard (2009). Moreover, Brown and Warner (1985) state that a deviation from the normal distribution has no significant impact if the sample size is greater than 50.

[68] Serra (2002) page 7 states that: *"Zur Überprüfung, ob die abnormalen Renditen der Untersuchungsstichprobe normalverteilt sind, wird der KOLMOGOROV-SMIRNOV-LILLIEFORS-Test herangezogen. Der KOLMOGOROV-SMIRNOV-LILLIEFORS-Test untersucht die Häufigkeitsverteilung der Daten einer Stichprobe auf Abweichungen von der Normalverteilung. Er basiert auf einer Modifizierung des KOLMOGOROVSMIRNOV-Tests, bei dem es sich um einen allgemeinen Anpassungstest handelt. Für den speziellen Anwendungsfall der Normalitätstestung ist der KOLMOGOROV-SMIRNOV-LILLIEFORS-Test besser geeignet als der KOLMOGOROV-SMIRNOV-Test. [See also LILLIEFORS (1967)] Die Normalverteilungsannahme kann auch mithilfe weiterer Testverfahren, u. a. dem SHAPIRO-WILK-Test, dem JARQUE-BERA-Test sowie dem χ^2-Anpassungstest überprüft worden"*. See also Poddig, Dichtl and Petersmeier (2003) page 333 and following

$$S_N = \sum_{i=1}^{N} r_i^+$$

In the case of a sufficiently high sample size, S_N is approximately normally distributed. The test value z is formally described as:

$$z = \frac{S_N - \frac{N(N+1)}{4}}{\sqrt{\frac{N(N+1)(2N+1)}{24}}}$$

Despite the less restrictive assumption underlying non-parametric tests, non-parametric tests are inferior to parametric tests (Serra, 2002). This is because non-parametric tests reject the null hypothesis too often for negative abnormal returns but not often enough to confirm positive abnormal returns. Therefore, the non-parametric tests are used in conjunction with parametric test and serve as robustness test. This is consequently done in this study.

For testing of principal success factors of equity carve-out and spin-off, the samples are at times divided in subsamples. As previously stated, this is for binary success factors such as whether or not a transaction was reported in the media, for example. As the distribution assumptions using parametric test are relatively strict, this study also applies the MANN-WHITNEY-U-Test following MANN/WHITNEY (1947) to derive robust results[69].

The MANN-WHITNEY-U-Test is a rank sum test and is the equivalent to the WILCOXON-RANKSUM-Test. First, the values of both groups are summed, then ordered and ranked. Lastly, the sum of all ranks r_i is calculated (rank sum):

$$S_{N_1,N_2} = \sum_{i=1}^{N_1} r_i$$

[69] Brown and Warner (1980) demonstrate that the t-test on average is a better approximation of the actual distribution of abnormal returns than non-parametric tests.

Based on the above rank sum, the null hypothesis that both subsamples are identically distributed (median) is tested. Given a sufficiently large sample, the test statistic is approximated through the normal distribution:

$$z = \frac{S_{N_1,N_2} - \frac{N_1(N_1 + N_2 + 1)}{2}}{\sqrt{\frac{N_1 * N_2 * (N_1 + N_2 + 1)}{12}}}$$

6.4.2 Multivariate tests

The univariate tests described in chapter 6.4.1. are used to identify the relationship between abnormal returns and individual variables. However, this isolated analysis omits potential relationships between individual variables (Albrecht, 1994; Kaup, 2008). To account for potential dependencies, multivariate analyses are used to simultaneously analyze the influence of various variables on abnormal returns (Pauser, 2007).

Through the literature review and the derivation of hypotheses, a number of drivers of equity carve-out announcements and spin-off announcements have been identified. These variables are used as independent variables in multiple linear regressions. Multiple linear regressions are widely used in academia and deemed appropriate to simultaneously investigate multiple variables (Binder, 1985; Mackinley, 1997).

The central condition for application of multiple regressions is the existence of a causal relationship between the dependent and independent variables. In this case, the variables must have a causal relationship with abnormal returns. The basic econometric model for linear regression of cumulated abnormal returns is as follows (Poodig, Dichtl and Petersmeier, 2003):

$$CAR_{i,t_1-t_2} = \propto + \sum_{j=1}^{J} \beta_j \, x_{i,j} + \varepsilon_{i,t_1-t_2}$$

given

CAR_{i,t_1-t_2}: Cumulated abnormal returns of stock i in event window [t_1;t_2]

α: Regression constant

β_j: Regression coefficient of variable j

$x_{i,j}$: Value of variable j of abnormal return of company i

ε_{i,t_1-t_2}: Error term

The estimation of regression parameter is done using the method of ordinary least squares (OLS)[70]. For the significance testing of the individual regression coefficient, a t-test is used (Poddig, Dichtl and Petersmeier, 2003; Pauser, 2007). The t-value is calculated as follows:

$$t = \frac{\hat{\beta}_j}{\hat{\sigma}(\hat{\beta}_j)}$$

given

$\hat{\beta}_j$: Estimated regression coefficient of variable j

$\hat{\sigma}(\hat{\beta}_j)$: Estimated standard error of $\hat{\beta}_j$

To assess the quality of a multiple regression model, usually the coefficient of determination R^2 and F-statistic are examined (Toutenburg and Heuman, 2006; Lenhard, 2009). Following Lenhard (2009), the coefficient of determination measures how well the regression function fits the sample or, differently stated, it specifies the share of variance which is explained in the model. It takes a value between 0 and 1. However, the coefficient of determination increases with the number of independent variables included in the model resulting in oversized models. To adjust for this positive relationship, this study uses the corrected coefficient of determination: Adjusted R^2. The inclusion of additional variables does not automatically increase the adjusted R^2 (Poddig, Dichtl and Petersmeier, 2003; Ostrowski, 2007). In contrast, the F-statistic is a measure specifying if the model as a whole is significant in explaining the dependent variable and its calculation accounts for sample size, sample dispersion and number of independent variables included (Backhaus, 2003; Lenhard, 2009).

[70] Toutenburg and Heuman (2006) page 175 provide an extensive explanation of the OLS-method

For a multiple linear regression to produce meaningful results, a number of conditions must be met. First, linear correlation between independent variables (multicollinearity) can render regression coefficients inaccurate and unstable (Pauser, 2007; Lenhard, 2009). To test for multicollinearity, the tolerance and variance inflation factors (VIF) are examined. The tolerance (VIF being the inverse of the tolerance) indicates the share of variance that is not explained through other factors within the model – a small tolerance indicates that the variables have little explanatory value. The tolerance of the jth-variable is calculated as follows (Backhaus, 2003):

$$TOL_j = 1 - R_j^2$$

The inverse of the tolerance is the VIF:

$$VIF_j = \frac{1}{TOL_j} = \frac{1}{1 - R_j^2}$$

Consequently, low tolerance values (or high VIF) indicate multicollinearity while high tolerance (or low VIF) indicate linear independence of independent variables (Poddig, Dichtl and Petersmeier, 2003).

Another challenge is autocorrelated residuals, as they bias regression coefficients and consequently lower the meaningfulness of the regression results (Pauser, 2007; Lenhard, 2009). To identify potentially autocorrelated residuals, the DURBIN-WATSON-Test is applied. The DURBIN-WATSON-Test can take a value between 0 and 4 and is calculated as follows (Pauser, 2007):

$$d = \frac{\sum_{t=2}^{t=N} (\hat{u}_t - \hat{u}_{t-1})^2}{\sum_{t=1}^{t=N} \hat{u}_t^2}$$

given

$\hat{u}$: Estimates of the residuals following the least square method

N: Number of observations during estimation window

If $d \in [1.76; 2.24]$, then the null hypothesis that the residuals are correlated can be rejected on the 5%-significance level.

Another problem is whether the variance of the residuals is heterogeneous. Simply put, heteroscedasticity occurs if the variability abnormal returns is unequal across

the range of values for one of the independent variables. This is also called heteroscedasticity (Poddig, Dichtl and Petersmeier, 2003). Heteroscedasticity renders estimates inefficient and leads to errors in the standard error of the regression coefficients. The existence of heteroscedasticity can be identified best through scatter plots (Pauser, 2007).

The explanatory variables used in this study include non-metrically scaled independent variables. To assess their influence on abnormal returns ANOVA analysis (analysis of variance) is performed. The analysis of variance examines the influence of one or more independent variables on the dependent variable[71]. The F-value is calculated as follows:

$$F = \frac{\frac{1}{k-1} * \sum_{i=1}^{k} N_j (\bar{x}_i - \bar{x})^2}{\frac{1}{k(N-1)} \sum_{i=1}^{k} \sum_{j=1}^{N_j} (\bar{x}_{i,j} - \bar{x})^2}$$

given

k:	Number of factor levels
N:	Number of returns across all factor levels
N_j:	Number of returns in factor level i
$\bar{x}_i$:	Mean value of returns in factor level i
$\bar{x}_{i,j}$:	jth shape in factor level i
$\bar{x}$:	Mean value of return across the sample

The F-value is F-distributed with k-1 degrees of freedom in the denominator and k(N-1) degrees of freedom in the numerator.

The analysis of variance, similar to the independent two-sample t-test, assumes normally distributed residual as well as homogeneity of variance between factor levels. Therefore, if the KOLMOGOROV-SMIRNOV-LILLIEFORS-Test indicates a violation of the normal distribution assumption (Backhause et al., 2003), the KRUSKAL-WALLIS-Test is performed, as it does not rely on the normal dis-

[71] Backhause et al. (2003) provides a comprehensive review of the analysis of variance

tribution assumption. The KRUSKAL-WALLIS-Test is a rank sum test and is performed through first ranking of all values of the different samples and then testing the null hypothesis that the mean rank sums of the individual factor levels are equal. The test value is $X^2$and is calculated as follows:

$$X^2 = \frac{12}{N(N+1)} \sum_{i=1}^{k} \frac{r_i^2}{N_i} - 3(N+1)$$

given

k:	Number of factor levels
r_i:	Ranksum of factor level i
N:	Number of returns across all factor levels
N_i:	Number of returns in factor level i

The test value is chi-squared-distributed with k-1 degrees of freedom.

7 Empirical results

Chapter 7 describes empirical results. Section 7.1 deals with descriptive statistics and the subsequent sections with univariate test results: 7.2 describes the testing of value creation effect, 7.3, univariate test results of principal success factors, and 7.4 univariate test results of control variables. Section 7.5 presents multivariate test results while Section 7.6 summarizes results.

7.1 Descriptive statistics

Descriptive statistics provide transparency on the observations and characteristics of the data sample. Table 8 below shows the distribution of the data sample for ECO and spin-off (announcements per calendar year). The ECO sample shows a great deal of activity in the years 2000, 2004, 2012 and 2013. Following the 2007/08 financial crisis, no ECO was announced in 2009 with the number of transactions increasing since 2010. This is in line with overall economic development, e.g., decreasing numbers of announcements following the burst of the internet bubble post-2000 as well as the 2007/08 financial crisis. Similarly, spin-off deal activity decreased post-2000 as well as after the height of the financial crisis. Peak years include 2000, 2005 to 2007 and 2011.

Sample over time				
Year	#ECO	% of sample	#spin-off	% of sample
2000	25	24.27	42	11.57
2001	5	4.85	13	3.58
2002	6	5.83	17	4.68
2003	5	4.85	17	4.68
2004	15	14.56	25	6.89
2005	6	5.83	36	9.92
2006	4	3.88	30	8.26
2007	3	2.91	34	9.37
2008	3	2.91	21	5.79
2009	0	0.00	15	4.13
2010	2	1.94	22	6.06
2011	6	5.83	43	11.85
2012	11	10.68	28	7.71
2013	12	11.65	20	5.51
Total	N = 103	100.00	N = 363	100.00

Year refers to the announcement year of an ECO or spin-off. # is the number of announcements. Source: Thomson Reuters

Table 8: Distribution of ECO and spin-off announcements over time

To better understand the type of business in which divesting companies are mainly active, the Standard Industrial Classification (SIC) Codes as they are disseminated through the parent company's EDGAR filings are shown in Table 9 for both ECO and spin-off parent companies in the data sample. More precisely, the first 2-digit-SIC-Code of the main SIC-Code affiliation of the parent company is shown. For ECO, the majority of transactions was announced within the Manufacturing sector (39.25%), followed by the Transportation, Communications, Electric, Gas, and Sanitary Services sector (28.97%), Services sector (11.21%) and Retail Trade sector (10.28%). For spin-off, the vast majority of transaction was announced in the Construction industry (39.67%). The second industry apparently using spin-off is the Mining industry, accounting for 20.39% of the sample. In relative terms, almost twice as many transactions were announced in the Construction industry compared to Mining. The third most transactions were announced within the Services industry (17.63%) followed by the Transportation, Communications, Electric, Gas, and

Sanitary Services sector with 13.77%. All other industries announced significantly fewer announcements.

Sample by sector				
Major SIC Group	#ECO	% of sample	#spin-off	% of sample
Mining	8	7.77	74	20.39
Construction	2	1.94	8	2.20
Manufacturing	43	41.75	144	39.67
Transportation, Communications, Electric, Gas, and Sanitary Services	27	26.21	50	13.77
Wholesale Trade	1	0.97	4	1.10
Retail Trade	11	10.68	19	5.23
Services	11	10.68	64	17.63
Total	N = 103	100.00	N = 363	100.00

Major SIC Group refers to the industry sector classification following the 1987 STANDARD INDUSTRIAL CLASSIFICATION-Code. See also US Department of LABOR (undated). # is the number of announcements. Source: Thomson Reuters

Table 9: Distribution of ECO and spin-off announcements across industry sectors

An overview of the number of ECO and spin-off announcements per country is provided in Table 10. It shows that more than half of the ECO announcements in scope occurred in the United States (52.34%) followed by Canada, France, and Germany (each 6.54%). Differently stated, North America constitutes ~60% of the sample, Europe ~40%. Similarly, North American spin-offs account for 59% led by the United States with 152 announcements, representing roughly 42% of the entire sample, and Canada following with 62 announcements (17%). In Europe, 42 spin-offs were announced in the UK between 2000 and 2013 representing 12% of the sample. In Continental Europe, 107 spin-offs were announced (30%), and 20 announcements were made in Sweden, 18 in Norway and 13 in Germany.

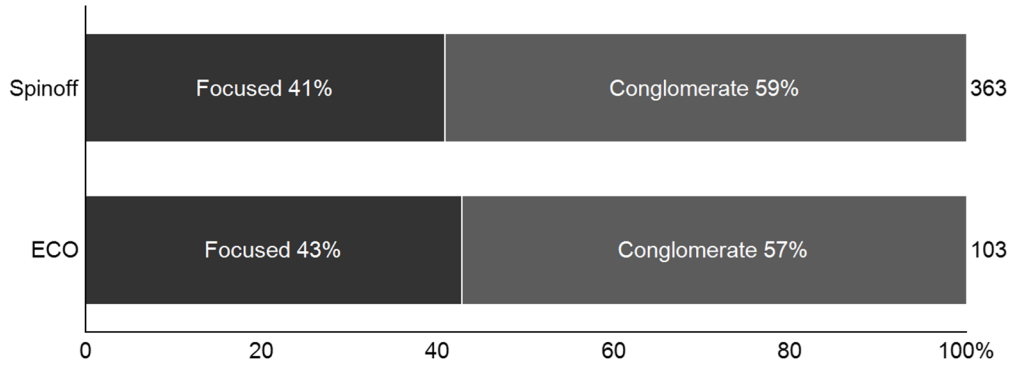
Geographical distribution				
Country	#ECO	% of sample	#spin-off	% of sample
Austria	-	-	2	0.55
Belgium	-	-	2	0.55
Canada	7	6.80	62	17.08
Finland	2	1.94	8	2.20
France	7	6.5480	11	3.03
Germany	7	6.80	13	3.58
Greece	-	-	1	0.28
Ireland	-	-	6	1.65
Italy	4	3.88	9	2.48
Luxembourg	-	-	1	0.28
Netherlands	-	-	3	0.83
Norway	3	2.91	18	4.96
Portugal	1	0.97	4	1.10
Spain	7	6.80	1	0.28
Sweden	4	3.88	20	5.51
Switzerland	4	3.88	8	2.20
United Kingdom	5	4.85	42	11.57
United States	52	50.49	152	41.87
Total	N = 103	100.00	N = 363	100.00

Country refers to the country in which the headquarter of the parent company is located. **#** is the number of announcements. Source: Thomson Reuters

Table 10: Distribution of ECO and spin-off announcements across countries

The 2-digit-SIC-Code classification is also used to analyze the degree of diversification of the firms in the sample. Parent companies operating in three or more different 2-digit-SIC-Codes, that is if three or more affiliations are registered, are considered conglomerates. Figure 6 below shows that about 40% of all announced spin-offs were done by focused firms whereas around 60% were announced by conglomerates.

Conglomerates within the sample

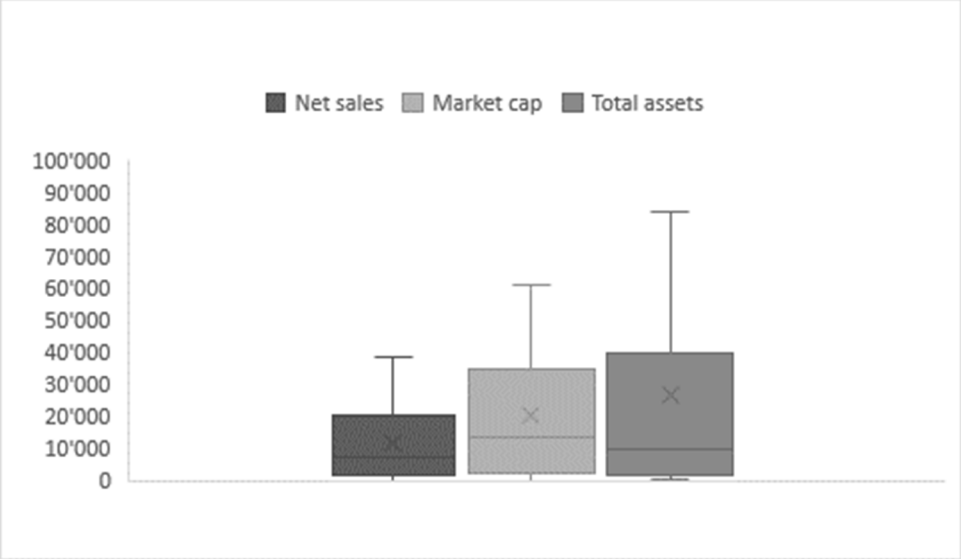


Conglomerate indicator is derived if the number of 2-digit-SIC affiliations of the parent company is >2.
Source: Thomson Reuters

Figure 6: Parent company diversification – conglomerate indicator

Figures 7 and 8 show further details on revenue, market capitalization and total assets of the firms within the sample.

ECO

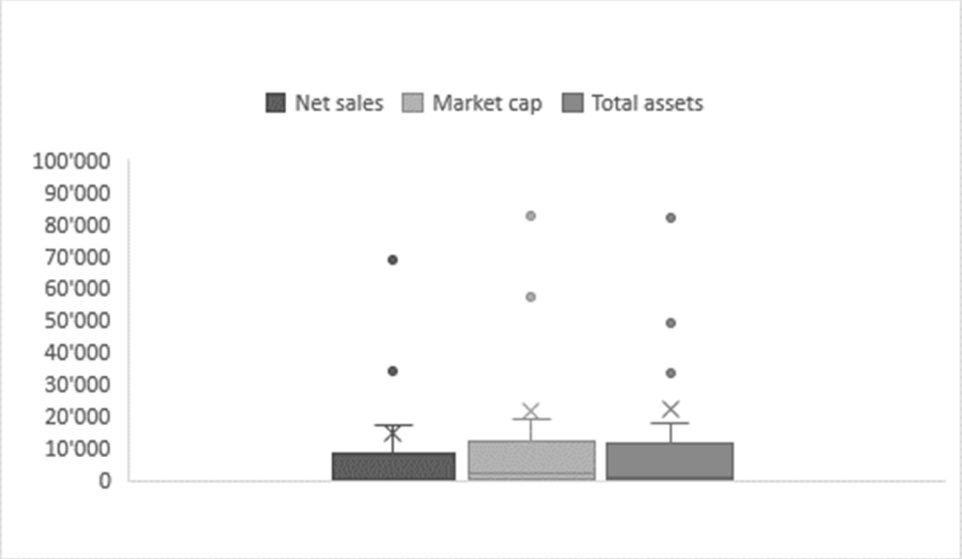


In USD M.	75%	Max	Min	25%	Mean	Median
Net sales	26,953	390,200	0,000	2,435	24,500	9,234
Market cap.	30,543	335,777	0,002	1,550	29,067	7,170
Total assets	32,800	656,000	0,004	2,464	42,400	11,500

Country refers to the country in which the headquarter of the parent company is located. # is the number of announcements. Source: Thomson Reuters

Figure 7: Sample descriptive statistics net sales, market cap and total assets (ECO)

Spin-off



In USD M.	75%	Max	Min	25%	Mean	Median
Net sales	6,865	236,500	0,000	167	10,692	1,421
Market cap.	6,848	216,947	0,001	99	10,503	916
Total assets	7,970	281,100	0,092	93	13,733	1,048

Country refers to the country in which the headquarter of the mother company is located. # is the number of announcements. Source: Thomson Reuters

Figure 8: Sample descriptive statistics net sales, market cap and total assets (spin-off)

In addition, Table 11 and 12 below provide descriptive statistics by ECO and spin-off for all variables used within the study.

Eco transactions							
Variable	Scale	#Obs.	Mean	Median	Min	Max	STD
CF margin	Metrical	100	14.692	14.645	-83.150	70.800	17.733
Conglome-rate	Dummy [0;1]	103	0.573	1	0	1	0.497
Debt-to-equity[72]	Metrical	98	1.217	0.879	0.148	3.969	1.477
#Employ-ees	Metrical	97	63,047	22,965	15	447,000	90,814
Geo Focus	Dummy [0;1]	103	0.825	1	0	1	0.382
Ind Focus	Dummy [0;1]	103	0.437	0	0	1	0.498
News	Dummy [0;1]	103	0.942	1	0	1	0.235
Owner conc	Metrical	25	25.7%	27.0%	5.0%	57.0%	13.12%
Parent re-turn	Metrical	103	0.188	0.084	-0.496	2.040	0.415
Parent re-turn >0	Dummy [0;1]	103	0.748	1	0	1	0.437
Quick ratio	Metrical	101	1.175	0.910	0.070	6.600	1.102
Ref Sh perc	Metrical	42	19.55%	9.7%	0.4%	100%	21.8%
Relative size	Metrical	102	0.000	0.000	$1.58e^{-6}$	0.001	0.000
RoA	Metrical	101	4.988	5.280	-45.780	23.060	8.022
RoE	Metrical	100	12.943	13.195	-151.57	136.56	34.941
SD EPS[73]	Metrical	91	0.254	0.122	0.022	1.388	0.351
Tobins Q	Dummy [0;1]	93	0.097	0	0	1	0.284
Z-Score	Metrical	97	2.424	2.022	-5.334	22.841	3.304

Table 11: Descriptive statistics of variables of ECO transactions

[72] Winsorized at 5% level

Spin-off transactions							
Variable	Scale	#Obs.	Mean	Median	Min	Max	STD
CF margin	Metrical	305	-1,884.890	9.860	-292,317.1	22,200	22,821.1
Conglome-rate	Dummy [0;1]	355	0.408	0	0	1	0.492
Debt-to-equity[73]	Metrical	318	0.677	0.453	0	2.843	0.773
#Employ-ees	Metrical	292	29,632	5,373	1	446,800	62,178
Geo Focus	Dummy [0;1]	341	0.944	1	0	1	0.230
Ind Focus	Dummy [0;1]	333	0.429	0	0	1	0.496
News	Dummy [0;1]	363	0.766	1	0	1	0.424
Owner conc	Metrical	185	42.4%	41.8%	0.4%	97.0%	22.4%
Parent re-turn	Metrical	363	0.360	0.198	-1.164	5.479	0.765
Parent re-turn >0	Dummy [0;1]	363	0.725	1	0	1	0.447
Quick ratio	Metrical	331	4.986	0.970	0.030	840.67	46.484
Ref Sh perc	Metrical	105	15.8%	10.0%	3.2%	69.5%	15.3%
Relative size	Metrical	232	0.001	0.000	$3.89e^{-6}$	0.055	0.004
RoA	Metrical	333	-5.712	4.310	-592.770	73.490	51.267
RoE	Metrical	323	-10.441	9.640	-2,011.770	185.970	147.045
SD EPS[74]	Metrical	247	0.927	0.183	0.023	6.863	1.807
Tobins Q	Dummy [0;1]	363	0.132	0	0	1	0.339
Z-Score	Metrical	320	1.592	2.616	-448.680	306.927	37.793

Table 12: Descriptive statistics of variables of spin-off transactions

7.2 Value creation effect testing

The announcement of ECO results in positive abnormal returns in both the market model and the market-adjusted return model. Table 13 highlights the results. Considering the day before and after the announcement (event window [-1;1]), the market model shows abnormal return of 2.71%. The market-adjusted return model estimates CAAR of 2.83%, both being significant at the 1%-significance level.

[73] Winsorized at 5% level

Overall, positive and significant abnormal returns are observable across all event windows with abnormal returns ranging from 1.26% in the market model to 6.4% in the market-adjusted return model.

The parametric tests confirm that the CAAR results as well as the median CAR results are significantly different from 0. Given the sample size (>100), all tests can be considered robust. In addition, the non-parametric Wilcoxon-sign-rank-test is considered if the Kolmogorov-Smirnov-Lilliefors-test indicates non-normal distribution, which is the case for some event windows. The Wilcoxon-sign-rank-test confirms all parametric test results.

ECO						
	Event window					
	[-10;0]	[-1;0]	[-1;1]	[-5;4]	[-10;10]	[-20;20]
Panel 1 : Market Model						
N	**103**	**104**	**104**	**104**	**103**	**103**
CAAR	2.69%	1.26%	2.71%	2.59%	5.01%	4.13%
t-test	3.48***	2.62**	3.78***	3.07***	3.52***	2.85***
p-value (one sided)	0.001	0.010	0.000	0.003	0.001	0.005
min	-11.19%	-14.09%	-19.42%	-31.25%	-19.83%	-34.92%
max	40.89%	20.89%	39.93%	44.66%	86.35%	63.46%
std. dev.	7.85%	4.92%	7.29%	8.62%	14.44%	14.61%
%>0	57.28%	57.69%	61.54%	63.46%	57.94%	59.22%
Median CAR	1.83%	0.35%	1.07%	1.73%	3.16%	2.09%
WILCOXON Z	3.03**	2.52**	3.93***	3.38***	3.35***	2.42**
	[-10;0]	[-1;0]	[-1;1]	[-5;4]	[-10;10]	[-20;20]
Panel 2 : Market-Adjusted Return Model						
N	**107**	**107**	**107**	**107**	**107**	**107**
CAAR	3.26%	1.35%	2.83%	3.27%	5.73%	6.4%
t-test	3.96***	2.79***	3.97***	3.88***	3.95***	3.84***
p-value (one sided)	0.000	0.006	0.000	0.000	0.000	0.000
min	-12.11%	-14.10%	-19.55	-31.60%	-21.83%	-35.72%
max	54.10%	20.77%	40.42%	40.47%	81.10%	111.43%
std. dev.	8.51%	5.02%	7.38%	8.72%	14.99%	17.24%
%>0	57.94%	59.81%	65.42%	64.49%	64.49%	64.49%
Median CAR	2.01%	0.51%	1.25%	2.16%	2.60%	3.26%
WILCOXON Z	3.60***	2.69**	4.28***	4.26***	3.79***	3.93***

N is the number of observations. **CAAR** correspond to the cumulated average abnormal return during the event window. **t-test** is the one-sided t-test with **p-value** being based on the one-sided t-distribution. **Min, max, and std. dev.** are the minimum, maximum and the standard deviation of CAAR. **%>0** is defined as the percentage of CAAR of all observations. **Median CAR** is the median of CAAR in the event window. WILCOXON Z shows the standardized test result of the Wilcoxon-sign-rank-test of the median CAAR. *, **, and *** highlight the 10%-, 5%-, and 1%- significance level. If the assumption of normal distribution is rejected based on the KOLMOGOROV-SMIRNOV-LILLIEFORS-TEST at the 1%-significance level the event window is marked with Φ.

Table 13: ECO event study test results for CAAR by event window

For spin-off, the announcement of the transaction results in positive abnormal returns in both market model and market-adjusted return model. Table 14 provides an overview of the results across different event windows. The strongest abnormal positive return in the market model can be observed in the event window [-1;1] with 7.65%; during the same window the market-adjusted return model shows a return of 4.46%. In total, positive significant abnormal returns between 2.23% and 7.65% across the event windows were identified in the market model, while returns in the market-adjusted return model range from 3.61% to 6.70%.

Spin-off						
	Event window					
	[-10;0]	[-1;0]	[-1;1]	[-5;4]	[-10;10]	[-20;20]
Panel 1: Market Model						
N	**363**	**363**	**363**	**363**	**363**	**363**
CAAR	3.55%	3.45%	4.15%	4.24%	2.90%	2.25%
t-test	5.56***	7.41***	7.65***	5.91***	3.41***	2.23**
p-value (one sided)	0.000	0.000	0.000	0.000	0.001	0.026
min	-29.68%	-32.07%	-32.84%	-37.59%	-45.06%	-43.04%
max	59.51%	66.14%	65.95%	62.31%	105.47%	96.30%
std. dev.	12.15%	0.09%	10.34%	13.65%	16.17%	19.23%
%>0	62.26%	65.56%	68.87%	59.23%	58.13%	55.10%
Median CAR	2.16%	1.81%	2.44%	1.84%	2.34%	1.78%
WILCOXON Z	5.57***	7.85***	8.02***	5.13***	3.14***	2.01**
	[-10;0]	[-1;0]	[-1;1]	[-5;4]	[-10;10]	[-20;20]
Panel 2: Market-adjusted Return Model						
N	**368**	**368**	**368**	**368**	**368**	**368**
CAAR	4.89%	3.61%	4.46%	5.36%	5.32%	6.70%
t-test	7.34***	7.78***	8.10***	7.01***	5.94***	6.77***
p-value (one sided)	0.000	0.000	0.000	0.000	0.000	0.000
min	-28.34%	-27.52%	-32.69%	-37.50%	-50.40%	-38.03%
max	61.56%	66.22%	66.62%	78.14%	107.78%	98.21%
std. dev.	16.74%	8.89%	10.56%	14.67%	17.18%	18.98%
%>0	67.66%	65.49%	68.21%	63.59%	63.86%	63.04%
Median CAR	2.97%	2.10%	2.51%	3.20%	4.26%	3.77%
WILCOXON Z	7.63***	8.39***	8.51***	6.84***	6.11***	6.21***

N is the number of observations. **CAAR** correspond to the cumulated average abnormal return during the event window. **t-test** is the one-sided t-test with **p-value** being based on the one-sided t-distribution. **Min, max, and std. dev.** are the minimum, maximum and the standard deviation of CAAR. **%>0** is defined as the percentage of CAAR of all observations. **Median CAR** is the median of CAAR in the event window. WILCOXON Z shows the standardized test result of the Wilcoxon-sign-rank-test of the median CAAR. *, **, and *** highlight the 10%-, 5%-, and 1%- significance level. If the assumption of normal distribution is rejected based on the KOLMOGOROV-SMIRNOV-LILLIEFORS-TEST at the 1%-significance level the event window is marked with Φ.

Table 14: Spin-off event study test results for CAAR by event window

The next four tables below show the daily average abnormal returns of the individual days for both the market model as well as the market-adjusted returns model, for ECO and spin-off respectively, in the event window [-10;10]. For both ECO and spin-off, the significant abnormal returns on the announcement day and thereafter are clearly observable.

ECO – Market Model

Day	N	AAR	Min	Max	Std. Dev.	%>0	t-test	p-value	Median	Wilcoxon Z
-10	103	-0.04%	-8.07%	11.56%	2.73%	40.78%	-0.14	0.891	-0.19%	-1.51
-9	103	0.73%	-5.77%	31.33%	3.80%	61.17%	1.95*	0.054	0.37%	2.00**
-8	103	0.04%	-13.29%	7.72%	2.39%	50.49%	0.17	0.862	0.01%	0.18
-7	103	0.54%	-7.30%	18.95%	3.59%	46.60%	1.54	0.128	-0.11%	0.24
-6	103	0.14%	-5.50%	10.26%	2.47%	51.46%	0.57	0.570	0.07%	0.19
-5	103	-0.19%	-6.43%	5.37%	1.99%	44.66%	-0.97	0.336	-0.15%	-1.02
-4	103	0.16%	-5.83%	8.89%	2.27%	50.49%	0.72	0.473	0.06%	0.40
-3	103	-0.17%	-5.40%	5.81%	2.15%	43.69%	-0.78	0.435	-0.23%	-1.29
-2	103	0.16%	-9.83%	10.17%	2.39%	53.40%	0.69	0.492	0.05%	0.54
-1	103	-0.04%	-5.72%	6.35%	1.93%	45.63%	-0.20	0.843	-0.08%	-0.27
0	103	1.34%	-16.24%	18.42%	4.64%	58.25%	2.93***	0.004	0.33%	2.82***
1	103	1.41%	-10.05%	30.34%	5.78%	54.37%	2.48**	0.015	0.24%	2.13**
2	103	0.23%	-16.76%	42.05%	5.05%	48.54%	0.47	0.640	-0.05%	-0.45
3	103	0.07%	-12.50%	13.30%	2.76%	44.66%	0.24	0.808	-0.26%	-0.26
4	103	-0.32%	-8.94%	6.42%	2.28%	54.37%	-1.42	0.160	-0.17%	-2.04**
5	103	0.21%	-6.00%	11.89%	2.50%	48.54%	0.86	0.394	-0.02%	0.19
6	103	0.01%	-9.05%	9.69%	2.58%	44.66%	0.02	0.980	-0.08%	-0.38
7	103	0.27%	-13.80%	12.38%	2.74%	53.40%	0.99	0.325	0.14%	0.99
8	103	-0.60%	-11.09%	5.90%	2.26%	28.16%	-2.67***	0.009	-0.53%	-3.39***
9	103	0.94%	-8.92%	31.86%	5.27%	54.37%	1.82*	0.072	0.13%	1.02
10	103	0.10%	-10.36%	9.22%	2.71%	45.63%	0.38	0.703	-0.11%	-0.39

Day is the day count before (-)/ after (+) the announcement day. **N** is the number of observations. **AAR** is the average abnormal return. **Min**, **max, and std. dev.** are the minimum, maximum and the standard deviation of AAR. **%>0** is the percentage of AAR of all observations. **t-test** is the one-sided t-test. **Median** is median of AAR of all observations. **WILCOXON Z** shows the standardized test result of the WILCOXON-SIGN-RANK-TEST of the median AAR. *, **, and *** highlight the 10%-, 5%-, and 1%- significance level.

Table 15: ECO event study test results (Market Model)

ECO – Market-adjusted Return Model

Day	N	AAR	Min	Max	Std. Dev.	%>0	t-test	p-value	Median	Wilcoxon Z
-10	107	0.01%	-7.94%	10.25%	2.62%	43.93%	-0.05	0.961	-0.10%	-1.56
-9	107	0.76%	-6.09%	31.39%	3.75%	57.94%	2.09**	0.039	0.35%	2.27**
-8	107	0.12%	-12.93%	9.39%	2.35%	54.21%	0.53	0.596	0.13%	0.67
-7	107	0.53%	-6.60%	19.43%	3.57%	49.53%	1.55	0.124	-0.06%	0.26
-6	107	0.18%	-5.61%	10.08%	2.44%	52.34%	0.78	0.438	0.11%	0.57
-5	107	-0.07%	-5.20%	5.16%	1.91%	48.60%	-0.38	0.706	-0.05%	-0.50
-4	107	2.62%	-5.71%	10.53%	2.30%	48.60%	1.18	0.241	-0.07%	0.72
-3	107	-0.07%	-6.18%	5.73%	2.24%	45.79%	-0.30	0.763	-0.18%	-0.79
-2	107	0.19%	-7.78%	10.41%	2.28%	54.21%	0.88	0.380	0.11%	0.73
-1	107	0.07%	-6.29%	6.87%	1.99%	50.47%	0.38	0.708	0.02%	0.21
0	107	1.28%	-16.26%	18.41%	4.65%	56.07%	2.85***	0.005	0.46%	2.61***
1	107	1.48%	-10.18%	40.50%	5.72%	58.88%	2.67***	0.009	0.34%	2.67***
2	107	0.27%	-17.05%	41.06%	4.92%	48.60%	0.56	0.578	-0.09%	-0.20
3	107	0.20%	-8.39%	11.46%	2.67%	44.86%	0.79	0.430	-0.22%	-0.38
4	107	-0.36%	-9.41%	7.00%	2.33%	42.99%	-1.58	0.117	-0.18%	-2.23**
5	107	0.23%	-6.00%	12.67%	2.59%	50.47%	0.90	0.368	0.04%	0.237
6	107	0.10%	-9.35%	9.94%	2.56%	45.79%	0.39	0.699	-0.11%	-0.205
7	107	0.24%	-12.05%	12.48%	2.70%	50.47%	0.93	0.357	0.05%	0.87
8	107	-0.59%	-11.44%	5.84%	2.26%	28.97%	-2.69***	0.008	-0.56%	-3.37***
9	107	0.94%	-9.02%	31.20%	5.37%	57.01%	1.80*	0.075	0.13%	0.90
10	107	-0.03%	-17.04%	9.36%	3.10%	43.93%	-0.11	0.91	-0.15%	-0.38

Day is the day count before (-)/ after (+) the announcement day. **N** is the number of observations. **AAR** is the average abnormal return. **Min**, **max, and std. dev.** are the minimum, maximum and the standard deviation of AAR. **%>0** is the percentage of AAR of all observations. **t-test** is the one-sided t-test. **Median** is median of AAR of all observations. **WILCOXON Z** shows the standardized test result of the WILCOXON-SIGN-RANK-TEST of the median AAR. *, **, and *** highlight the 10%-, 5%-, and 1%- significance level.

Table 16: ECO event study test results (Market-adjusted Return Model)

Spin-off – Market Model

Day	N	AAR	Min	Max	Std. Dev.	%>0	t-test	p-value	Median	Wilcoxon Z
-10	363	-0.13%	-21.48%	11.89%	3.18%	46.56%	-0.78	0.435	-0.08%	-0.94
-9	363	-0.10%	-20.10%	23.18%	3.49%	46.28%	-0.57	0.572	-0.14%	-1.52
-8	363	-0.05%	-16.43%	26.94%	3.38%	44.90%	-0.29	0.772	-0.16%	-1.37
-7	363	-0.23%	-22.98%	27.46%	3.67%	43.80%	-1.22	0.223	-0.11%	-1.58
-6	363	0.14%	-20.25%	39.99%	3.92%	49.86%	0.66	0.510	-0.01%	0.04
-5	363	-0.17%	-25.29%	30.62%	3.88%	41.05%	-0.88	0.378	-0.27%	-2.81
-4	363	0.36%	-14.46%	42.10%	4.89%	42.42%	1.4	0.162	-0.18%	-1.63
-3	363	-0.00%	-21.03%	22.21%	3.45%	47.66%	-0.00	1.000	-0.09%	-0.694
-2	363	0.30%	-19.69%	26.53%	4.12%	49.86%	1.38	0.168	-0.02%	0.331
-1	363	0.22%	-16.11%	20.10%	3.50%	50.69%	1.20	0.231	0.01%	0.379
0	363	3.23%	-23.40%	66.41%	8.34%	66.67%	7.39***	0.000	1.37%	8.192
1	363	0.70%	-25.12%	48.13%	6.48%	47.66%	2.06**	0.040	-0.15%	0.265
2	363	-0.16%	-37.68%	25.77%	5.04%	41.60%	-0.61	0.540	-0.34%	-2.909
3	363	-0.17%	-27.99%	45.76%	4.14%	41.32%	-0.79	0.427	-0.27%	-2.944
4	363	-0.11%	-56.83%	69.67%	5.82%	42.70%	-0.37	0.712	-0.25%	-1.824
5	363	-0.15%	-25.53%	22.27%	3.97%	51.52%	-0.74	0.458	0.09%	0.356
6	363	0.18%	-18.21%	18.94%	3.25%	50.41%	1.04	0.299	0.01%	0.799
7	363	-0.32%	-16.11%	19.79%	2.76%	39.94%	-2.21**	0.027	-0.27%	-3.440
8	363	-0.15%	-21.17%	21.36%	3.32%	47.38%	-0.85	0.394	-0.09%	-0.944
9	363	-0.45%	-15.66%	12.94%	2.99%	39.67%	-2.86***	0.004	-0.24%	-3.679
10	363	-0.01%	-16.48%	28.80%	3.64%	44.63%	-0.05	0.964	-0.17%	-1637

Day is the day count before (-)/ after (+) the announcement day. **N** is the number of observations. **AAR** is the average abnormal return. **Min**, **max, and std. dev.** are the minimum, maximum and the standard deviation of AAR. **%>0** is the percentage of AAR of all observations. **t-test** is the one-sided t-test. **Median** is median of AAR of all observations. **WILCOXON Z** shows the standardized test result of the WILCOXON-SIGN-RANK-TEST of the median AAR. *, **, and *** highlight the 10%-, 5%-, and 1%- significance level.

Table 17: Spin-off event study test results (Market Model)

Spin-off – Market-adjusted Return Model

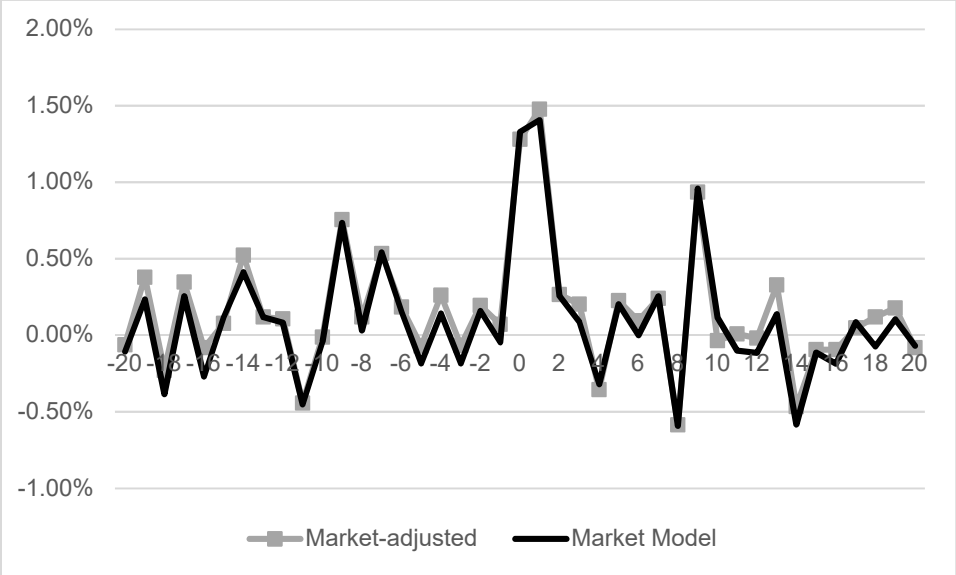
Day	N	AAR	Min	Max	Std. Dev.	%>0	t-test	p-value	Median	Wilcoxon Z
-10	368	-0.10%	-32.27%	12.82%	3.66%	50.00%	-0.53	0.599	-0.00%	0.14
-9	368	0.05%	-20.07%	24.03%	3.61%	47.55%	0.26	0.794	-0.05%	-0.80
-8	368	0.17%	-16.40%	26.44%	3.74%	46.20%	0.87	0.385	-0.11%	-0.40
-7	368	-0.02%	-23.05%	39.80%	4.20%	47.55%	-0.11	0.916	-0.09%	-0.54
-6	368	0.18%	-22.28%	39.69%	4.06%	51.90%	0.86	0.393	0.02%	1.10
-5	368	-0.10%	-22.26%	30.37%	3.88%	41.03%	-0.49	0.628	-0.24%	-2.37**
-4	368	0.50%	-15.23%	44.67%	5.09%	47.28%	1.89*	0.060	-0.08%	-0.28
-3	368	0.21%	-19.41%	21.61%	3.62%	51.63%	1.11	0.269	0.05%	0.81
-2	368	0.40%	-19.02%	27.11%	4.17%	52.72%	1.83*	0.068	0.08%	1.25
-1	368	0.36%	-14.91%	19.99%	3.50%	52.17%	2.00**	0.047	0.07%	1.31
0	368	3.24%	-23.62%	66.57%	8.33%	67.39%	7.47***	0.000	1.36%	8.38***
1	368	0.85%	-24.43%	48.83%	6.64%	48.64%	2.47**	0.014	-0.10%	0.673
2	368	-0.02%	-37.28%	26.24%	5.26%	42.93%	-0.06	0.950	-0.25%	-2.25**
3	368	-0.06%	-25.97%	44.04%	4.19%	43.21%	-0.28	0.782	-0.20%	-2.07**
4	368	-0.03%	-56.32%	71.97%	6.02%	42.93%	-0.10	0.921	-0.21%	-1.15
5	368	-0.08%	-24.97%	22.12%	4.01%	52.45%	-0.38	0.705	0.07%	0.79
6	368	0.24%	-18.14%	19.95%	3.28%	50.54%	1.43	0.153	0.05%	1.14
7	368	-0.22%	-14.44%	20.93%	2.75%	41.03%	-1.55	0.122	-0.23%	-2.65**
8	368	-0.05%	-21.67%	21.69%	3.50%	51.09%	-0.25	0.802	0.02%	-0.05
9	368	-0.36%	-16.51%	12.75%	3.05%	41.58%	-2.29**	0.023	-0.21%	-2.75***
10	368	0.15%	-15.66%	31.37%	4.02%	47.28%	0.73	0.467	-0.10%	-0.66

Day is the day count before (-)/ after (+) the announcement day. **N** is the number of observations. **AAR** is the average abnormal return. **Min**, **max, and std. dev.** are the minimum, maximum and the standard deviation of AAR. **%>0** is the percentage of AAR of all observations. **t-test** is the one-sided t-test. **Median** is median of AAR of all observations. **WILCOXON Z** shows the standardized test result of the WILCOXON-SIGN-RANK-TEST of the median AAR. *, **, and *** highlight the 10%-, 5%-, and 1%- significance level.

Table 18: Spin-off event study test results (Market-adjusted Return Model)

ECO: To graphically review the different models, Figure 9 depicts the average abnormal returns per day for the event window [-20;20]. The graphic leads to the conclusion that no major difference between the models is observable and, at the same time, highlights the significant stock price reaction on the event day.

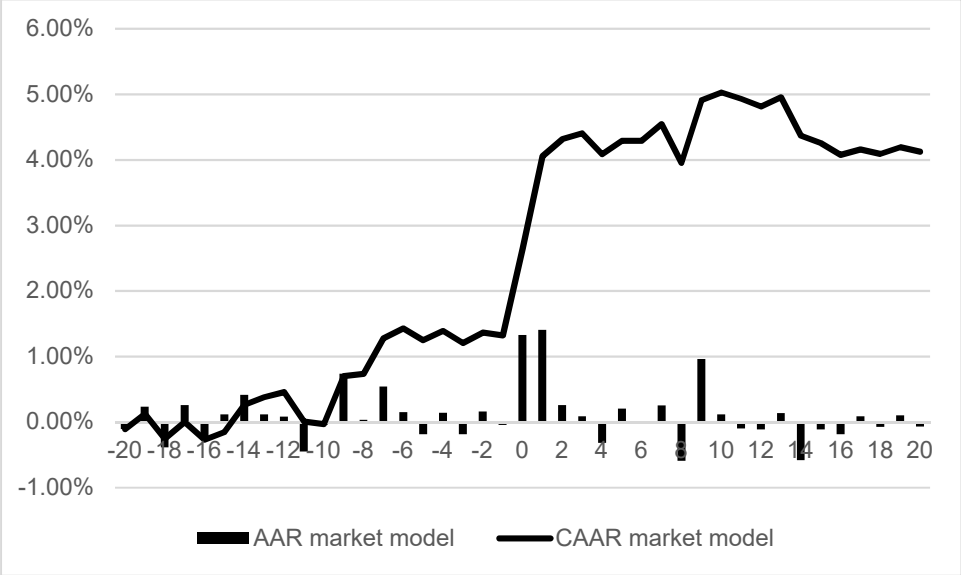
ECO



AAR market-adjusted return model and AAR market model are the average abnormal daily returns based on the market-adjusted returns model and the market model, respectively. Days are relative to the announcement day t_0.

Figure 9: Comparison market model vs. market-adjusted return model (ECO)

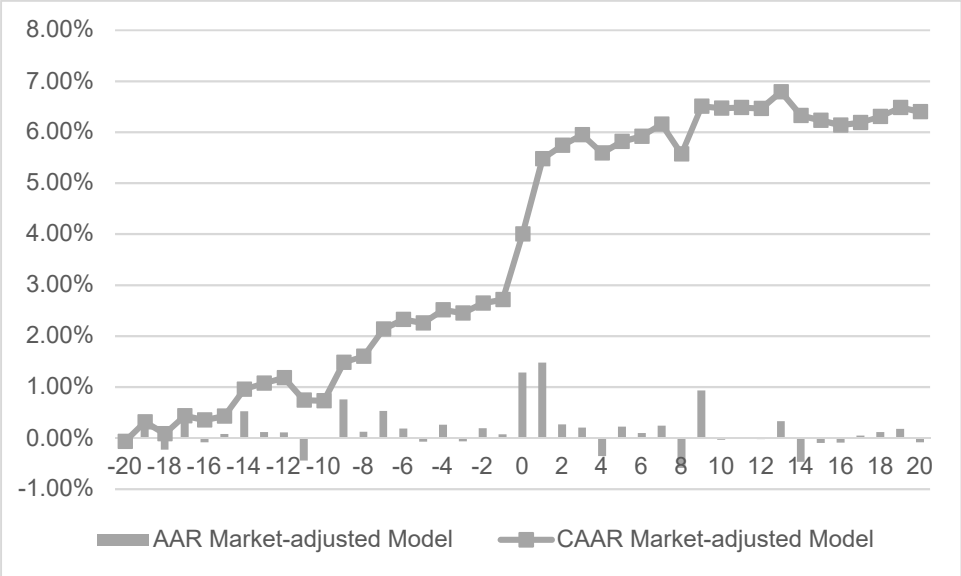
ECO



AAR and **CAAR** market model are the average abnormal daily returns and the cumulative average abnormal daily based on the market model. **Days** are relative to the announcement day t_0.

Figure 10: AAR and CAAR in the market model (ECO)

ECO

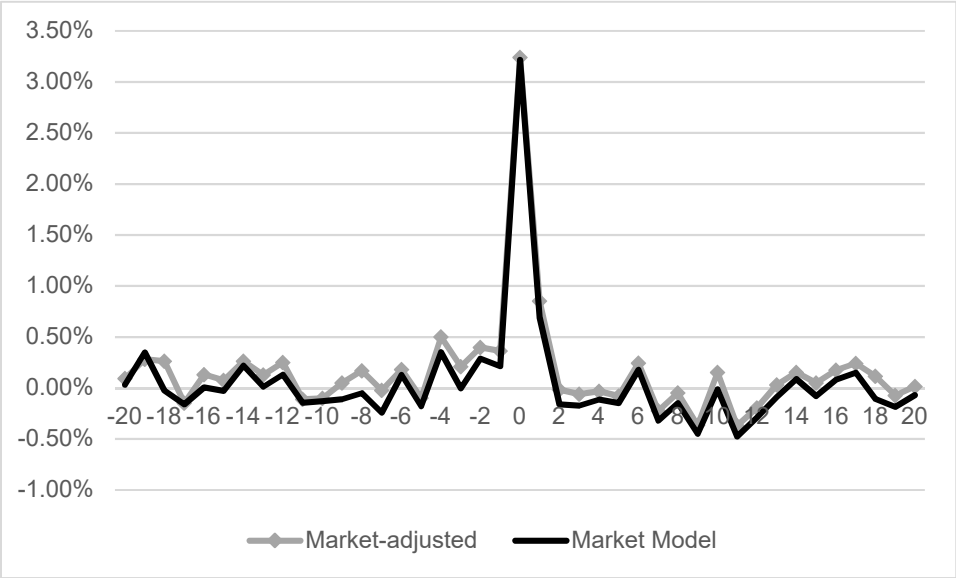


AAR and **CAAR** market-adjusted model are the average abnormal daily returns and the cumulative average abnormal daily based on the market-adjusted model. **Days** are relative to the announcement day t_0.

Figure 11: AAR and CAAR in the market-adjusted return model (ECO)

Spin-off: To graphically review the different models, Figure 12 depicts the average abnormal returns per day for the event window [-20;20]. The graphic leads to the conclusion that no major difference between the models is observable and, at the same time, highlights the significant stock price reaction on the event day.

Spin-off

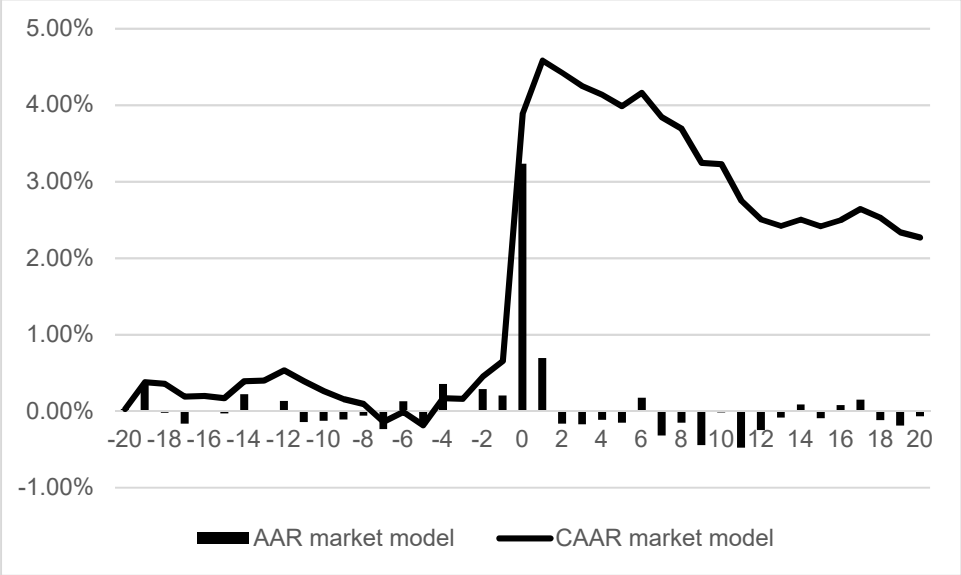


AAR market-adjusted return model and AAR market model are the average abnormal daily returns based on the market-adjusted returns model and the market model, respectively. Days are relative to the announcement day t_0.

Figure 12: Comparison market model vs. market-adjusted return model (spinoff)

To further strengthen the positive abnormal return reaction on the announcement day, figure 13 and 14 show the development of CAAR over the twenty-day event window for both the market model and market-adjusted return model, respectively. Interestingly, return reaction on the days following the announcement (t+1 to t+2) is negative. While the reactions are not significant they are consistently negative and are in line with the findings of Vollmar (2013), Barch/Börner (2007), Ostrowski (2007), Wheat-Ley/Brown/Jonason (2005), and Eichinger (2001). The negative reaction indicates an overshooting on the announcement day as well as a fast reaction of stock market participants in incorporating news.

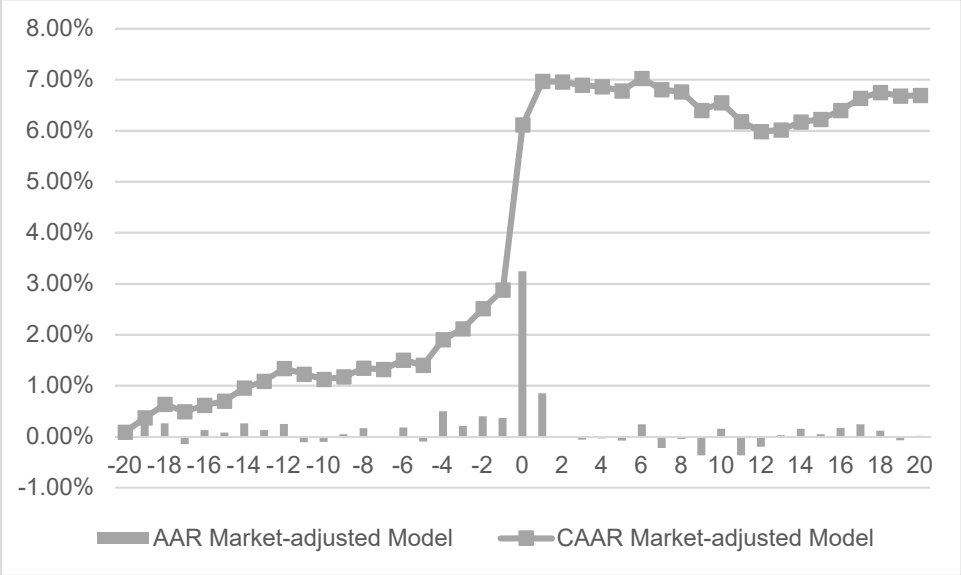
Spin-off



AAR and **CAAR** market model are the average abnormal daily returns and the cumulative average abnormal daily based on the market model. **Days** are relative to the announcement day t_0.

Figure 13: AAR and CAAR in the market model (spin-off)

Spin-off



AAR and **CAAR** market-adjusted model are the average abnormal daily returns and the cumulative average abnormal daily based on the market-adjusted model. **Days** are relative to the announcement day t_0.

Figure 14: AAR and CAAR in the market-adjusted return model (spin-off)

The period following the event day demonstrates the differences between the market model and market-adjusted returns model. While CAAR following the event day in the market-adjusted returns model adjust downwards only slightly, the returns using the market model show significant downward adjustment of stock prices. Figure 14 shows the CAAR as well as median CAR during the event window. Even though a direct causal link to the event during such a long event window is open to criticism, it is observable that the risk adjustment in the market model is doing its job. Implicitly this indicates a change in risk profile of the companies. Overall, the results show that the announcement effects are not sustainable, as after around 1.5 months the effects diminish, at least in the market model.

In sum, hypothesis 1 can be confirmed based on the results of the event study. The announcements of ECO and spin-off are relevant information for stock market participants in evaluating stock prices. Moreover, they create positive expectations of increased future returns, which are expressed in the highly significant and positive CAAR across different event windows using different price building models. Results are similar to those of previous studies such as Kirchmaier (2003), Veld/ Veld-

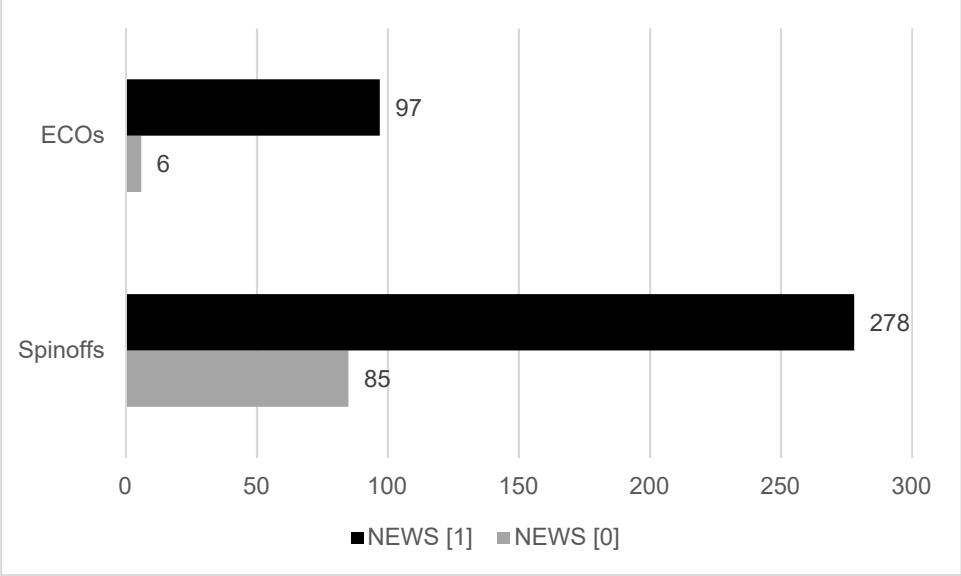
Merkulova (2004), Bühner (2004), Rüdisüli (2005) as well as Sudarsanam/Qian (2007) and Vollmar (2014). The results conform with the diversification theory/principal-agent theory as well as the expectations derived in section 3.2. discussing operational and financial synergies.

7.3 Univariate test results

7.3.1 Media coverage

The second main research question, Hypothesis 2, states that ECO and spin-off which are reported in a major news outlet show higher positive abnormal returns. The hypothesis is tested using the variable News [0;1]. Based on the variable News two subsets are built: 0 if a transaction is not covered in a major news journal and 1 if coverage exists. Figure 15 shows the number of transactions for which news is available.

Media Coverage



News [0] and **News [1]** correspond to the companies for which news coverage in a major news outlet [1] exists or where no coverage existed [0].

Figure 15: Availability of News

The results of the analysis of media coverage are shown in table 19. Spin-off announcements which are covered by a major news outlet as defined in Section 3 show, throughout all event windows, higher CAAR relative to spin-offs which are not reported by a major news outlet. While differences in the tightest event window around the announcement date [-1;1] are smallest, in all other event windows differences increase sharply. The t-test on the equality of means shows statistically significant differences in the event windows [-5;4] and [-20;20]. This is in line with expectations that news distributed by the media settles in over the time after the announcement. Tests for statistical difference are based on the Mann-Whitney-U-Test and Welch-Test if the assumption of homogeneity of variances is rejected at the 5%-significance level (Levene-test).

Spin-off							
Event window	**CAAR News [1]** N=278	**CAAR News [0]** N=85	**CAAR Diff.**	**t-test mean**		**Mann-Whitney-U**	
				t-value	p-value	z-value	p-value
[-10;0]†	3.83%***	2.59%	1.25%	-0.73	0.466	-1.28	0.202
[-1;0]†	3.85%***	3.33%***	0.52%	-0.39	0.635	-0.63	0.700
[-1;1]†	4.16%***	4.15%***	0.01%	-0.00	0.999	-0.97	0.333
[-5;4]	6.69%***	3.49%***	3.20%	-1.90*	0.058	-1.25	0.210
[-10;10]	3.49%***	0.96%	2.53%	-1.26	0.208	-1.17	0.241
[-20;20]	3.75%***	-2.64%	6.39%	-2.70***	0.007	-2.78***	0.005

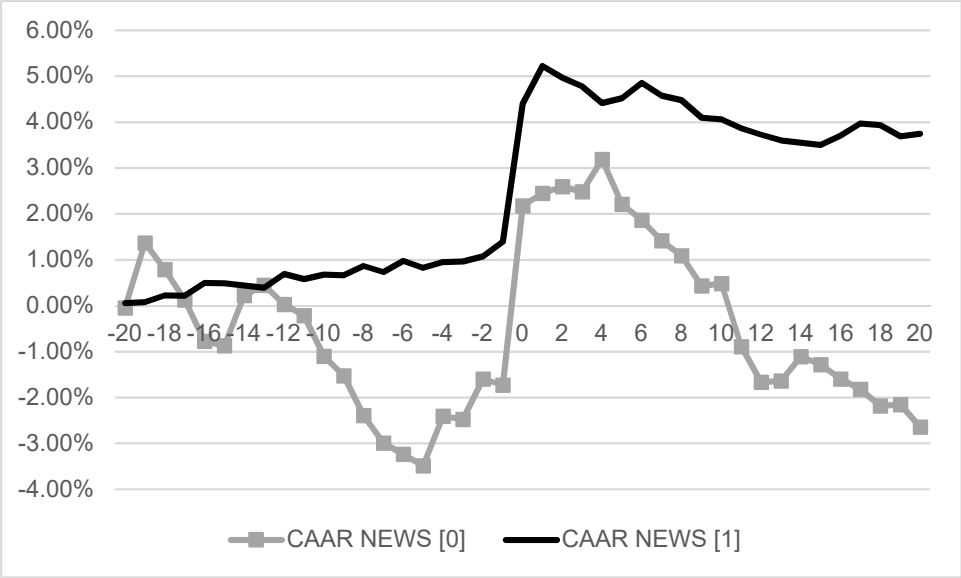
CAAR News [0] and **CAAR News [1]** correspond to the average cumulated abnormal returns during the event window for the spin-off whose announcement was reported through a major news outlet [1] or not [0]. The significance of the CAAR is based on the one sample t-test. **t-test mean** is based on the comparison of the mean for independent samples. The Levene-Test is used to test homogeneity or heterogeneity of the sample. If the assumption of homogeneity of variance is rejected at the 5%-significance level, the event window is marked with †. The t-values show the results of the Welch-Test. **Mann-Whitney-U** describes the non-parametric Mann-Whitney-U-test. **p-values** are based on the two-sided t- and z-distribution. *, **, and *** show the 10%-, 5%- and 1%-significance level.

Table 19: Univariate test results for News (spin-off)

The graphical comparison of CAAR of spin-off with and without news coverage (News [1] and News [0]) in Figure 16 is in line with the test results shown in Table 19. During the event window [20;20] the CAAR of the spin-offs with news coverage are very stable both in height and in durability and are consistently higher than

those of spin-offs without news coverage. Therefore, news coverage has a positive influence on abnormal returns and Hypothesis 2 can be confirmed.

Spin-off



CAAR News [0] and **CAAR News [1]** correspond to the average cumulated abnormal returns during the event window for the spin-off whose announcement was reported in a major news outlet [1] or not [0]. **Days** are relative to the announcement day t_0.

Figure 16: Comparison of CAAR with and without News (spin-off)

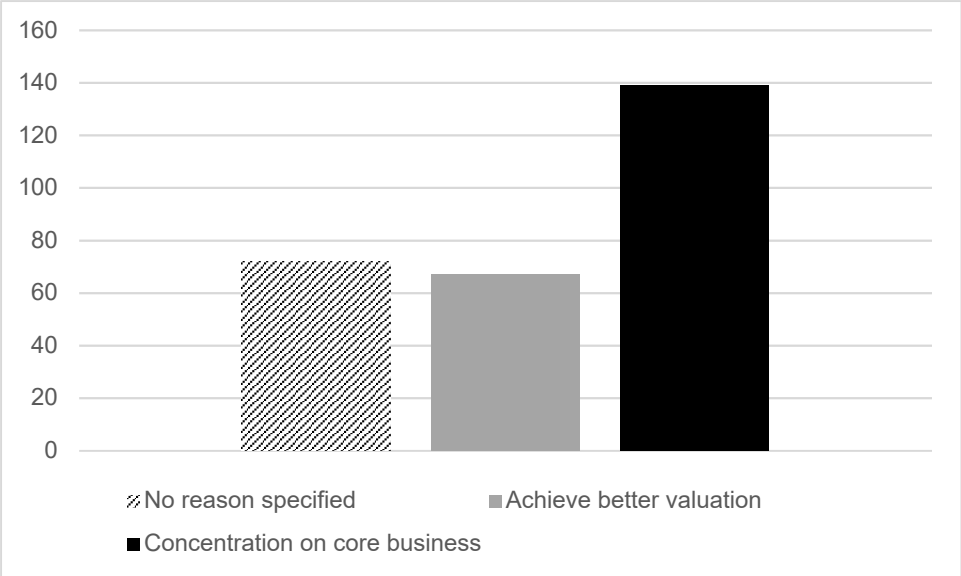
A possible extension at this point is the investigation of the intensity of reporting (# of articles) as a further explanatory variable.

7.3.2 Media content

To further investigate media coverage, Hypothesis 3 states that the content of news coverage has an influence on the abnormal stock price reaction. Figure 17 shows the identified news categories for spin-off. In 72 cases, the news did not specify a reason for the transaction, in 67 cases the media identified the objective of the transaction as motivated by the parent company's desire to achieve a better valuation through stock market. This is the case when a better individual valuation (sum of parts) is yielded as investors are better able to value the company. In the majority

of cases, that is 139, the reason for the announced transaction was for the parent company to concentrate on its core business.

Spin-off



No reason specified is the media coverage which does not specify a reason for the announced transaction, **Achieve better valuation** describes the media coverage,which specifies a better individual valuation (sum of parts) as reason for the announced transaction, and **Concentration on core business** describes the media coverage which specifies the concentration on core activity as reason.

Figure 17: Deal rationales of spin-off

Analysis of differences in announcement between reasons is performed in Tables 20, 21 and 22.

Spin-off							
Event window	**CAAR Core [1]** N=139	**CAAR Core [0]** N=139	**CAAR Diff.**	**t-test mean**		**Mann-Whitney-U**	
				t-value	p-value	z-value	p-value
[-10;0]	4.23%***	3.45%***	-0.79%	-0.58	0.566	-0.78	0.437
[-1;0]	3.06%***	3.60%***	0.54%	0.57	0.570	0.55	0.580
[-1;1]	3.17%***	4.59%***	0.88%	0.76	0.449	1.31	0.192
[-5;4]	3.66%***	3.31%***	-0.35%	-0.23	0.818	-0.68	0.497
[-10;10]	4.70%***	2.27%*	-2.43%	-1.29	0.197	-0.73	0.468
[-20;20]	5.08%***	2.42%	-2.66%	-1.19	0.234	-0.54	0.590

CAAR Core [0] and **CAAR Core [1]** correspond to the average cumulated abnormal returns during the event window for the spin-off whose announcement was reported by a major news outlet and reason was identified as the parent firm's concentrating on its core business [1] or not [1]. The significance of the CAAR is based on the one sample t-test. **t-test mean** is based on the comparison of the mean for independent samples. The LEVENE-TEST is used to test homogeneity or heterogeneity of the sample. If the assumption of homogeneity of variance is rejected at the 5%-significance level, the event window is marked with †. The t-values show the results of the Welch-Test. **MANN-WHITNEY-U** describes the non-parametric MANN-WHITNEY-U-TEST. **p-values** are based on the two-sided t- and z-distribution. *, **, and *** show the 10%-, 5%- and 1%-significance level.

Table 20: CAAR for news specifying concentration on core (spin-off)

Spin-off							
Event window	**CAAR Valua-tion [1]** N=67	**CAAR Valua-tion [0]** N=211	**CAAR Diff.**	**t-test mean**		**Mann-Whitney-U**	
				t-value	p-value	z-value	p-value
[-10;0]	3.01%**	4.10%***	1.09%	0.69	0.493	0.75	0.456
[-1;0]	4.35%***	3.00%***	-1.35%	-1.23	0.219	-1.60	0.111
[-1;1]	5.66%***	3.67%***	-1.98%	-1.46	0.146	-2.22**	0.026
[-5;4]	3.55%**	3.46%***	-0.09%	-0.05	0.958	-0.16	0.870
[-10;10]	1.36%	4.16%*	2.80%	1.28	0.203	0.70	0.484
[-20;20]	2.31%	4.21%***	1.90%	0.73	0.468	0.39	0.694

CAAR Valuation [0] and **CAAR Valuation [1]** correspond to the average cumulated abnormal returns during the event window for the spin-off whose announcement was reported by a major news outlet and reason was identified as the parent firm's desire for a better valuation on capital markets [1] or not [1]. The significance of the CAAR is based on the one sample t-test. **t-test mean** is based on the comparison of the mean for independent samples. The LEVENE-TEST is used to test homogeneity or heterogeneity of the sample. If the assumption of homogeneity of variance is rejected at the 5%-significance level, the event window is marked with †. The t-values show the results of the Welch-Test. **MANN-WHITNEY-U** describes the non-parametric MANN-WHITNEY-U-TEST. **p-values** are based on the two-sided t- and z-distribution. *, **, and *** show the 10%-, 5%- and 1%-significance level.

Table 21: CAAR for news specifying better valuation (spin-off)

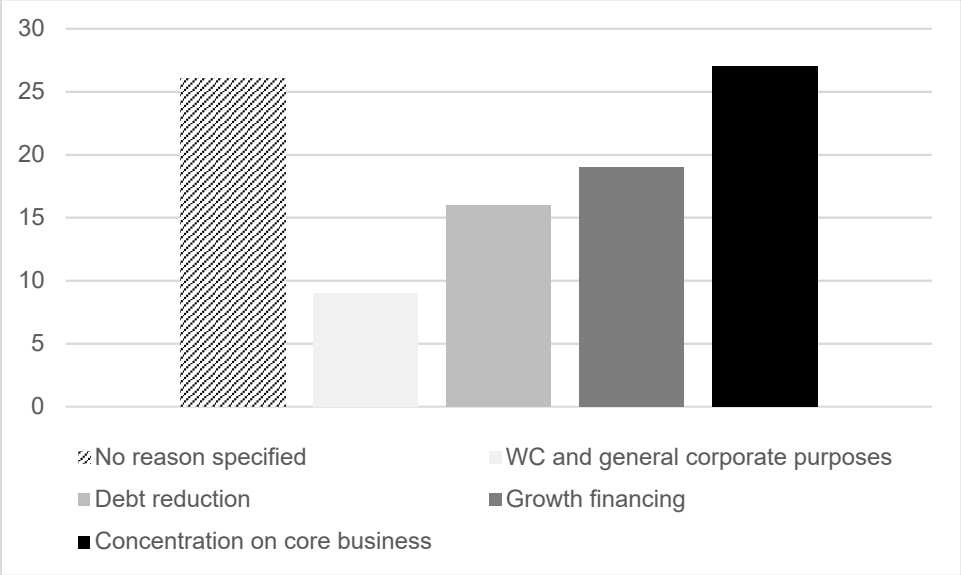
Spin-off							
Event window	**CAAR NR [1]** N=72	**CAAR NR [0]** N=206	**CAAR Diff.**	**t-test mean**		**Mann-Whitney-U**	
				t-value	p-value	z-value	p-value
[-10;0]	3.86%**	3.83%***	-0.03%	-0.01	0.989	0.16	0.874
[-1;0]	2.89%***	3.48%***	0.59%	0.55	0.583	0.93	0.35
[-1;1]	3.61%***	4.34%***	0.74%	0.55	0.580	0.68	0.708
[-5;4]	3.09%**	3.62%***	0.53%	0.31	0.754	0.94	0.350
[-10;10]	3.12%*	3.61%***	0.50%	0.23	0.818	0.15	0.885
[-20;20]	2.52%	4.18%***	1.66%	0.65	0.516	0.23	0.817

CAAR NR [0] and **CAAR NR [1]** correspond to the average cumulated abnormal returns during the event window for the spin-off whose announcement was reported by a major news outlet and reason was identified as that the parent firm (as well as the newspaper) did not specify a reason for the divestment [1] or not [1]. The significance of the CAAR is based on the one sample t-test. **t-test mean** is based on the comparison of the mean for independent samples. The LEVENE-TEST is used to test homogeneity or heterogeneity of the sample. If the assumption of homogeneity of variance is rejected at the 5%-significance level, the event window is marked with †. The t-values show the results of the Welch-Test. **MANN-WHITNEY-U** describes the non-parametric MANN-WHITNEY-U-TEST. **p-values** are based on the two-sided t- and z-distribution. *, **, and *** show the 10%-, 5%- and 1%-significance level.

Table 22: CAAR for news specifying no reason (spin-off)

For ECO transactions, media identified 5 different motivations for transactions. Figure 18 below provides an overview. The most frequent reason, as in spin-off, was the concentration on core business as motivation for the transactions – in 27 transactions this was identified as the reason. In 26 transactions the media did not specify a reason. In 19 cases, the transaction was motivated to obtain growth financing for either the ECO subsidiary or parent company. In 16 cases the transaction was performed to raise funds for debt reduction and in 9 cases the principal motivation was to raise money for working capital and other corporate purposes. Because no motivation was mentioned more than 30 times, no statistical analysis can be applied.

ECO

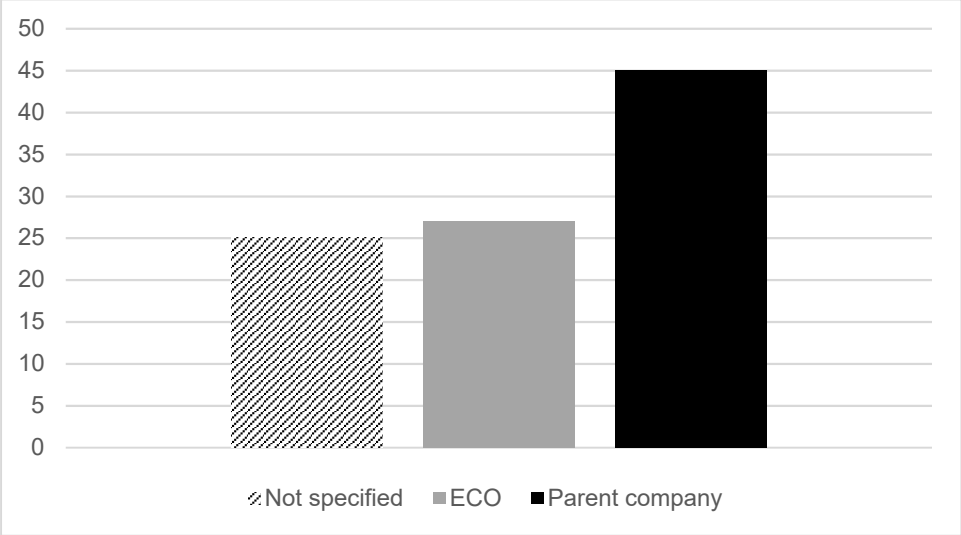


No reason specified is media coverage which does not specify a reason for the announced transaction. **WC and general corporate purposes** is media coverage that says the transaction was performed with the objective of improving working capital and use of funds for general corporate purposes. **Debt reduction** is media coverage that describes the transactions where the announcement specified the use of the proceeds for reduction of corporate debt of either parent company or subsidiary. **Growth financing** is media coverage which specifies that funds from the transaction are to be used to finance growth of either parent company or subsidiary. **Concentration on core business** describes media coverage which specifies the concentration on core activity as reason.

Figure 18: Deal rationales of ECO

Figure 19 below shows if the media specified whether the carve-out or the parent company were to receive the proceeds of the transaction. Interestingly in the majority of 45 transactions, the parent company was to benefit from the transaction, indicating that this is also a realization of investment from the parent company's view. In only 27 media articles was the subsidiary to benefit from the raised funds. In 25 announcements, the principal beneficiary of the funds raised was not specifically identified.

ECO



Not specified shows the number of transactions for which the media did not specify the recipient of the IPO proceeds. **ECO** shows the number of transactions for which the subsidiary did receive the proceeds while **parent company** shows the number of transaction for which the parent company did receive the IPO proceeds.

Figure 19: Recipient of ECO proceeds

In conclusion, while news matters, no differences between the announced reasons were identified. One could say any news is good news.

7.3.3 Sector focus

In order to test Hypothesis 4, which states that a sector focus of ECO and spin-off contributes positively to the announcement effect, based on the variable Ind Focus [0;1], two sub samples are built. If the 2-digit-SIC-code of the ECO or spin-off is different from the parent company, the transaction is considered to support th focus of the parent company. However, if the segregated entity is operating within the same sector, no focus of the parent company is assumed. Tables 23 and 24 show the number of focusing/ non-focusing transactions for the sample period for ECO and spin-off, respectively.

ECO															
	Announcement year (2000 – 2013)														
	‘00	‘01	‘02	‘03	‘04	‘05	‘06	‘07	‘08	‘09	‘10	‘11	‘12	‘13	Total
Ind Focus [0]	16	4	2	4	8	2	3	1	2	0	1	3	5	7	58
Ind Focus [1]	9	1	4	1	7	4	1	2	1	0	1	3	6	5	45
Total	25	5	6	5	15	6	4	3	3	0	2	6	11	12	103

Ind Focus [0] and **Ind Focus [1]** correspond to the transaction in which the segregated entities support [0] or do not support [1] the sector focus of the parent company based on the 2-digit-SIC-system.

Table 23: Comparison of CAAR with and without News (ECO)

Spin-off															
	Announcement year (2000 – 2013)														
	‘00	‘01	‘02	‘03	‘04	‘05	‘06	‘07	‘08	‘09	‘10	‘11	‘12	‘13	Total
Ind Focus [0]	26	8	10	10	14	21	17	20	12	7	10	12	14	9	190
Ind Focus [1]	16	5	5	5	10	11	11	13	7	5	10	26	8	11	143
Total	42	13	15	15	24	32	28	33	19	12	20	38	22	20	333

Ind Focus [0] and **Ind Focus [1]** correspond to the transaction in which the segregated entities support [0] or do not support [1] the sector focus of the parent company based on the 2-digit-SIC-system.

Table 24: Comparison of CAAR with and without News (spin-off)

The results of the regression analysis are displayed in Tables 25 and 26. Spin-offs which support the sector focus of the parent company display higher CAAR across all event windows than spin-offs which are operating in the same industrial sector as the parent company. Statistically significant based on the MANN-WHITNEY-U-test and WELCH-test are the results within the event windows [-10;0], [-1;0] and [-10;10].

ECO							
Event window	**Ind Focus [1]** N=45	**Ind Focus [0]** N=58	**CAAR Diff.**	**t-test mean**		**Mann-Whitney-U**	
				t-value	p-value	z-value	p-value
[-10;0]	0.58%	4.32%***	3.74%	2.46**	0.016	2.95***	0.003
[-1;0]	0.28%	2.04%***	1.74%	1.82*	0.071	1.73*	0.083
[-1;1]†	2.29%*	3.03%***	0.74%	0.49	0.627	0.98	0.330
[-5;4]†	2.70%	2.51%***	-0.19%	-0.11	0.917	0.54	0.587
[-10;10]	3.99%	5.81%***	1.82%	0.63	0.528	1.72*	0.086
[-20;20]	1.73%	5.99%***	4.24%	1.47	0.145	1.30	0.195

Ind Focus [1] and **Ind Focus [0]** correspond to the average cumulated abnormal returns during the event window for the ECO which support the industrial sector focus [1] or do not support the industrial focus [0] of the parent company based on the 2-digit-SIC code classification. The significance of the CAAR is based on the one sample t-test. **t-test mean** is based on the comparison of the mean for independent samples. The Levene-Test is used to test homogeneity or heterogeneity of the sample. If the assumption of homogeneity of variance is rejected at the 5%-significance level, the event window is marked with †. The t-values show the results of the Welch-Test. **Mann-Whitney-U** describes the non-parametric Mann-Whitney-U-test. **p-values** are based on the two-sided t- and z-distribution. *, **, and *** show the 10%-, 5%- and 1%-significance level.

Table 25: Univariate test results for industrial sector focus Ind Focus (ECO)

Spin-off							
Event window	**Ind Focus [1]** N=143	**Ind Focus [0]** N=190	**CAAR Diff.**	**t-test mean**		**Mann-Whitney-U**	
				t-value	p-value	z-value	p-value
[-10;0]†	3.24%***	3.69%***	0.45%	0.34	0.738	0.11	0.915
[-1;0]	3.07%***	3.84%***	0.78	0.88	0.381	1.63	0.103
[-1;1]	3.88***	4.90%***	1.02%	0.95	0.344	1.39	0.164
[-5;4]	3.40%***	5.91%***	2.53%	1.77*	0.078	1.52	0.129
[-10;10]†	2.90%***	3.64%**	0.74%	0.41	0.678	0.39	0.692
[-20;20]†	1.41%	4.29%	2.88%	1.30	0.194	0.78	0.435

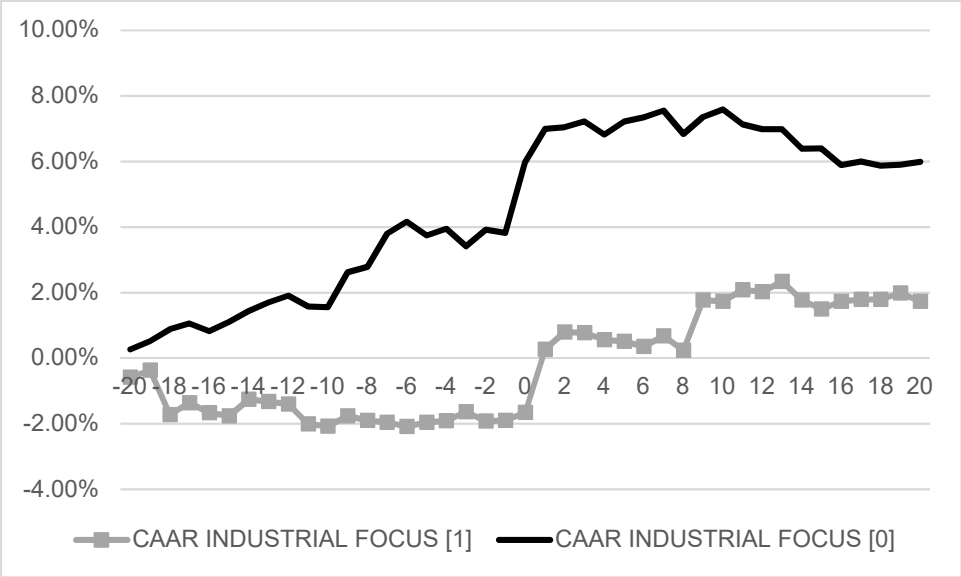
Ind Focus [1] and **Ind Focus [0]** correspond to the average cumulated abnormal returns during the event window for the spin-off which support the industrial sector focus [1] or do not support the industrial focus [0] of the parent company based on the 2-digit-SIC code classification. The significance of the CAAR is based on the one sample t-test. **t-test mean** is based on the comparison of the mean for independent samples. The Levene-Test is used to test homogeneity or heterogeneity of the sample. If the assumption of homogeneity of variance is rejected at the 5%-significance level, the event window is marked with †. The t-values show the results of the Welch-Test. **Mann-Whitney-U** describes the non-parametric Mann-Whitney-U-test. **p-values** are based on the two-sided t- and z-distribution. *, **, and *** show the 10%-, 5%- and 1%-significance level.

Table 26: Univariate test results for industrial sector focus Ind Focus (spin-off)

The graphical evaluation of the CAAR of both subsamples as shown in Figures 20 and 21 are in line with the results of the numerical test procedures. The Figure shows the development of the CAAR in the event window [-20;20]. The CAAR of spin-off transactions enhancing the focus of the parent company are consistently more positive, both in absolute value as well as sustainability, than of those transactions that do not enhance the focus of the parent company. This implies that the segregation of assets not belonging to the core is preferable to the disposal of core assets.

Based on the above analyses, Hypothesis 4 can be confirmed for both ECO and spin-off. The results are largely consistent with the investigations of Markides (1992), Daley, Mehrotra and Sivakumar (1997), Krishnaswami and Subramaniam (1999), Desai and Jain (1999), Veld and Veld-Merkoulova (2004), Rustige and Grote (2009) and Veld and Veld-Merkoulova (2009). Bartsch and Börner (2007) and Ostrowski (2007), however, present contrary results for the German capital market.

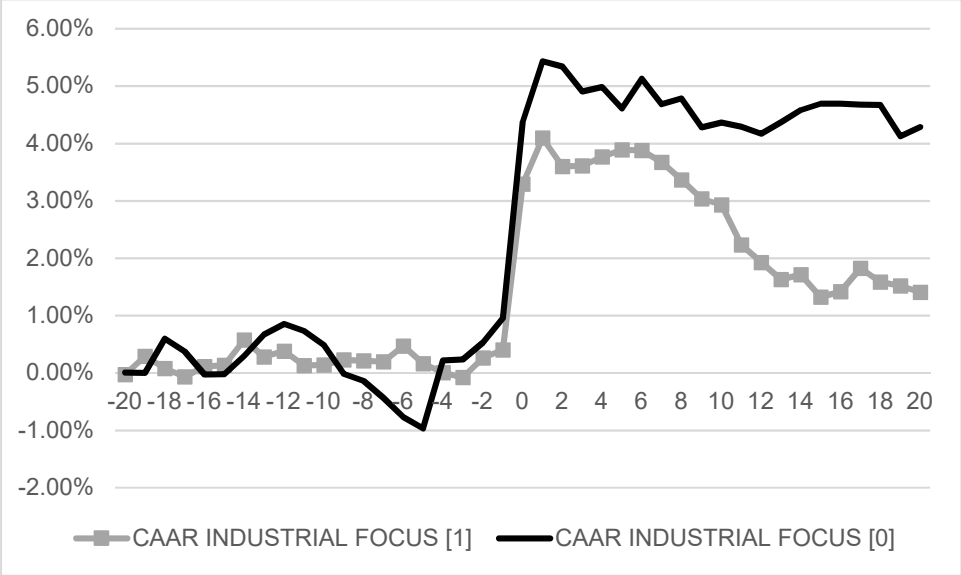
ECO



Ind Focus [1] and **Ind Focus [0]** correspond to the average cumulated abnormal returns during the event window for the ECO which support the industrial sector focus [1] or do not support the industrial focus [0] of the parent company based on the 2-digit-SIC code classification. **Days** are relative to the announcement day t_0.

Figure 20: Comparison of transactions supporting Ind Focus vs. not (ECO)

Spin-off



Ind Focus [1] and **Ind Focus [0]** correspond to the average cumulated abnormal returns during the event window for the spin-off, which support the industrial sector focus [1] or do not support the industrial focus [0] of the parent company based on the 2-digit-SIC code classification. **Days** are relative to the announcement day t_0.

Figure 21: Comparison of transactions supporting Ind Focus vs. not (spin-off)

7.3.4 Geographical focus

Hypothesis 5 states that the geographical focus of a transaction influences the abnormal returns realized by parent companies. In particular, a transaction leading to a more focused parent company has a stronger influence on the abnormal stock price reaction than a transaction which does not yield a more geographically focused parent company.

In order to test Hypothesis 5, based on the variable Geo Focus [0;1], two sub samples are built. If the headquarters of the parent company announcing an ECO or spin-off is located in a different country than that of the divested entity, the transaction is considered to be geographically focused and Geo Focus is defined as [1] and Geo Focus [0] if the headquarters of both the segregated entity and parent company are located within the same country. Tables 27 and 28 show the number of geographically focusing/non-focusing transactions for the sample period for ECO and spin-off, respectively.

ECO															
	Announcement year (2000 – 2013)														
	‘00	‘01	‘02	‘03	‘04	‘05	‘06	‘07	‘08	‘09	‘10	‘11	‘12	‘13	Total
Geo Focus [0]	24	4	5	5	8	4	2	3	3	0	1	5	10	11	85
Geo Focus [1]	1	1	1	0	7	2	2	0	0	0	1	1	1	1	18
Total	25	5	6	5	15	6	4	3	3	0	2	6	11	12	103

Geo Focus [0] and **Geo Focus [1]** correspond to the transaction in which the segregated entities support [1] or do not support [0] the geographical focus of the parent company based on the country in which the headquarters of the entity and parent company is located.

Table 27: Comparison of CAAR with and without Geo Focus (ECO)

Spin-off															
	Announcement year (2000 – 2013)														
	‘00	‘01	‘02	‘03	‘04	‘05	‘06	‘07	‘08	‘09	‘10	‘11	‘12	‘13	Total
Geo Focus [0]	39	12	16	14	22	31	27	33	18	12	20	38	21	19	322
Geo Focus [1]	3	1	0	1	2	3	2	1	2	0	0	2	1	1	19
Total	42	13	16	15	24	34	29	34	20	12	20	40	22	20	341

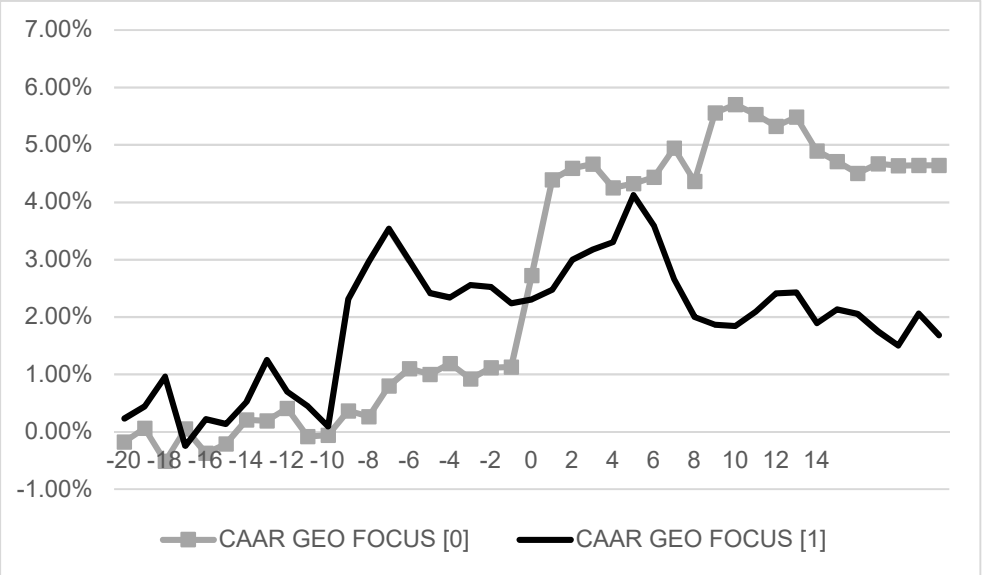
Geo Focus [0] and **Geo Focus [1]** correspond to the transaction in which the segregated entities support [1] or do not support [0] the geographical focus of the parent company based on the country in which the headquarters of the entity and parent company is located.

Table 28: Comparison of CAAR with and without Geo Focus (spin-off)

The results of the analysis of Geo Focus for spin-offs are summarized in Figure 22., the ones for spin-off in Figure 23. The figures show that the positive abnormal returns of CAAR not supporting a Geo Focus outperform geographically focusing transactions. This is in contrast to Hypothesis 5 , but in line with previous studies (Veld-Merkoulova, 2004; Rüdisüli, 2005; Vollmar, 2014). In addition, Tables 29

and 30 complement the figures and confirm that no statistically significant differences between Geo Focus [1] and Geo Focus [0] divestments exist. Consequently, Hypothesis 5 is rejected.

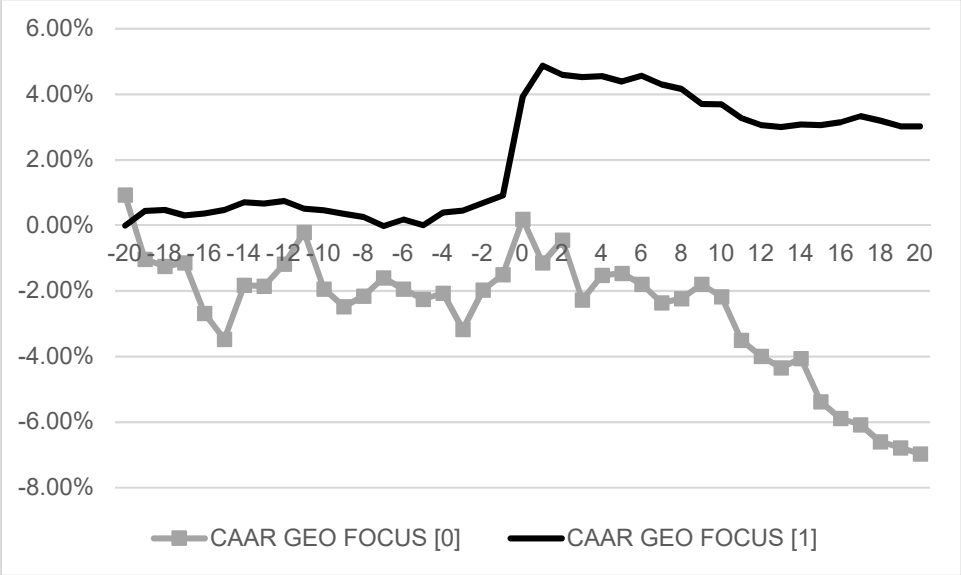
ECO



Geo Focus [0] and **Geo Focus [1]** correspond to the average cumulated abnormal returns during the event window for ECO, which support the geographical focus [1] or do not support the geographical focus [0] of the parent company based on the country where the headquarters of the ECO and parent company is located. **Days** are relative to the announcement day t_0.

Figure 22: Comparison of CAAR for Geo Focus (ECO)

Spin-off



Geo Focus [0] and **Geo Focus [1]** correspond to the average cumulated abnormal returns during the event window for spin-off, which support the geographical focus [1] or do not support the geographical focus [0] of the parent company based on the country where the headquarters of the spin-off and parent company is located. **Days** are relative to the announcement day t_0.

Figure 23: Comparison of CAAR for Geo Focus (spin-off)

ECO							
Event window	**Geo Focus [0]** N=85	**Geo Focus [1]** N=18	**CAAR Diff.**	**t-test mean**		**Mann-Whitney-U**	
				t-value	p-value	z-value	p-value
[-10;0]†	2.87%***	1.84%	-1.03%	-0.38	0.709	-1.42	0.157
[-1;0]†	1.58%***	-0.23%	-1.81%	-2.20*	0.032	-1.80*	0.071
[-1;1]†	3.28%***	-0.05%	-3.33%	-2.76***	0.008	-2.17*	0.030
[-5;4]	3.10%***	0.15%	-2.95%	-1.33	0.187	-1.80*	0.071
[-10;10]	5.81%***	1.26%	-4.55%	-1.22	0.226	-2.15**	0.031
[-20;20]	4.64%***	1.68%	-2.96	-0.78	0.439	-1.49	0.138

Geo Focus [0] and **Geo Focus [1]** correspond to the average cumulated abnormal returns during the event window for ECO, which support the geographical focus [1] or do not support the geographical focus [0] of the parent company based on the country where the headquarters of the spin-off and parent company is located. The significance of the CAAR is based on the one sample t-test. **t-test mean** is based on the comparison of the mean for independent samples. The Levene-Test is used to test homogeneity or heterogeneity of the sample. If the assumption of homogeneity of variance is rejected at the 5%-significance level, the event window is marked with †. The t-values show the results of the Welch-Test. **Mann-Whitney-U** describes the non-parametric Mann-Whitney-U-test. **p-values** are based on the two-sided t- and z-distribution. *, **, and *** show the 10%-, 5%- and 1%-significance level.

Table 29: Univariate test results for Geo Focus (ECO)

Spin-off							
Event window	**Geo Focus [0]** N=322	**Geo Focus [1]** N=19	**CAAR Diff.**	**t-test mean**		**Mann-Whitney-U**	
				t-value	p-value	z-value	p-value
[-10;0]	3.50%***	0.34%	-3.16%	-1.13	0.258	-1.42	0.155
[-1;0]	3.27%***	2.13%	-1.14%	-0.58	0.560	-1.21	0.225
[-1;1]†	4.22%***	0.81%	-3.41%	-2.75**	0.010	-1.81*	0.071
[-5;4]	4.49%***	0.41%	-4.08%	-1.31	0.191	-1.86*	0.063
[-10;10]	3.27%***	-2.20%	-5.47%	-1.43	0.152	-1.78*	0.740
[-20;20]	-6.97%*	3.02%***	-9.99%	-2.20**	0.028	2.38**	0.018

Geo Focus [0] and **Geo Focus [1]** correspond to the average cumulated abnormal returns during the event window for spin-off, which support the geographical focus [1] or do not support the geographical focus [0] of the parent company based on the country where the headquarters of the spin-off and parent company is located. The significance of the CAAR is based on the one sample t-test. **t-test mean** is based on the comparison of the mean for independent samples. The Levene-Test is used to test homogeneity or heterogeneity of the sample. If the assumption of homogeneity of variance is rejected at the 5%-significance level, the event window is marked with †. The t-values show the results of the Welch-Test. **Mann-Whitney-U** describes the non-parametric Mann-Whitney-U-test. **p-values** are based on the two-sided t- and z-distribution. *, **, and *** show the 10%-, 5%- and 1%-significance level.

Table 30: Univariate test results for Geo Focus (spin-off)

7.3.5 Degree of diversification of parent company

Diversification theory states that companies have a value-efficient level of diversification. Based on the framework of diversification theory, the prediction is that companies that go beyond their value-efficient level of diversification experience negative value effects of (over)diversification. Consequently, for companies that are diversified beyond their value-efficient level, diversification reduction should result in positive price reactions. The analysis of Hypothesis 6 that the degree of diversification of the parent company has an influence on the valuation of the spin-off announcement is analyzed using the CAAR (mean value comparison) of diversified and non-diversified companies. Variable Conglomerate [0;1] serves as differentiation characteristic between both groups. Parent companies that operate in three or more different industries, as indicated by their 2-digit-SIC-code affiliations, are classified as diversified companies or conglomerates [1]. Parent companies operating in only one or two different 2-digit-SIC-code industries are not classified as conglomerates [0]. Tables 31 and 32 provide an overview of the distribution of conglomerates deemed [0] and [1] over the sample period.

	ECO														
	Announcement year (2000 – 2013)														
	‘00	‘01	‘02	‘03	‘04	‘05	‘06	‘07	‘08	‘09	‘10	‘11	‘12	‘13	Total
Conglomerate [0]	11	3	3	2	5	3	3	1	2	0	2	3	4	2	44
Conglomerate [1]	14	2	3	3	10	3	1	2	1	0	0	3	7	10	59
Total	25	5	6	5	15	6	4	3	3	0	2	6	11	12	103

Conglomerate [0] and **Conglomerate [1]** correspond to the transaction for which parent companies operate in less than three [0] or in three or more [1] different 2-digit-SIC-code industries.

Table 31: Comparison of CAAR with and without Conglomerate (ECO)

Spin-off															
	Announcement year (2000 – 2013)														
	‘00	‘01	‘02	‘03	‘04	‘05	‘06	‘07	‘08	‘09	‘10	‘11	‘12	‘13	Total
Conglo-merate [0]	24	4	12	8	18	15	18	24	12	8	16	30	11	10	210
Conglo-merate [1]	18	9	4	9	7	19	11	9	8	7	6	11	17	10	145
Total	42	13	16	17	25	34	29	33	20	15	22	41	28	20	355

Conglomerate [0] and **Conglomerate [1]** correspond to the transaction for which parent companies operate in less than three [0] or in three or more [1] different 2-digit-SIC-code industries.

Table 32: Comparison of CAAR with and without Conglomerate (spin-off)

Tables 33 and 34 show the results of the mean value comparison for Conglomerate [0] and [1]. Companies classified as conglomerates do not have higher announcement returns (CAAR) than companies which are not considered to be conglomerates (with the exception in the event window [-20;20] for ECO). This is in contrast to previous studies. However, results are statistically not significant. Figures 24 and 25 illustrate the CAAR of Conglomerate [0] and [1] for ECO and spin-off, respectively. The graphics show that the differences for ECO are almost nonexistent while for spin-off they highlight a smaller difference of non-conglomerates having higher returns than conglomerates. Based on those results, Hypothesis 6 is rejected.

ECO							
Event window	**Conglo-merate [0]** N=44	**Conglo-merate [1]** N=59	**CAAR Diff.**	**t-test mean**		**Mann-Whitney-U**	
				t-value	p-value	z-value	p-value
[-10;0]	2.07%**	3.15%***	-1.08%	-0.69	0.490	-0.38	0.704
[-1;0]	0.88%	1.55%**	-0.67%	-0.68	0.495	-0.07	0.945
[-1;1]	2.93%**	2.53%***	0.40%	0.28	0.780	0.00	0.997
[-5;4]	1.96%	3.07%**	-1.11	-0.65	0.517	0.46	0.644
[-10;10]†	4.24%**	5.59%**	-1.35%	-0.50	0.618	-0.43	0.665
[-20;20]	4.59%**	3.78%*	0.81%	0.28	0.782	0.19	0.847

Conglomerate [0] and **Conglomerate [1]** correspond to the average cumulated abnormal returns during the event window for ECO, for which parent companies operate in less than three [0] or in three or more [1] different 2-digit-SIC-code industries. The significance of the CAAR is based on the one sample t-test. **t-test mean** is based on the comparison of the mean for independent samples. The Levene-Test is used to test homogeneity or heterogeneity of the sample. If the assumption of homogeneity of variance is rejected at the 5%-significance level, the event window is marked with †. The t-values show the results of the Welch-Test. **Mann-Whitney-U** describes the non-parametric Mann-Whitney-U-test. **p-values** are based on the two-sided t- and z-distribution. *, **, and *** show the 10%-, 5%- and 1%-significance level.

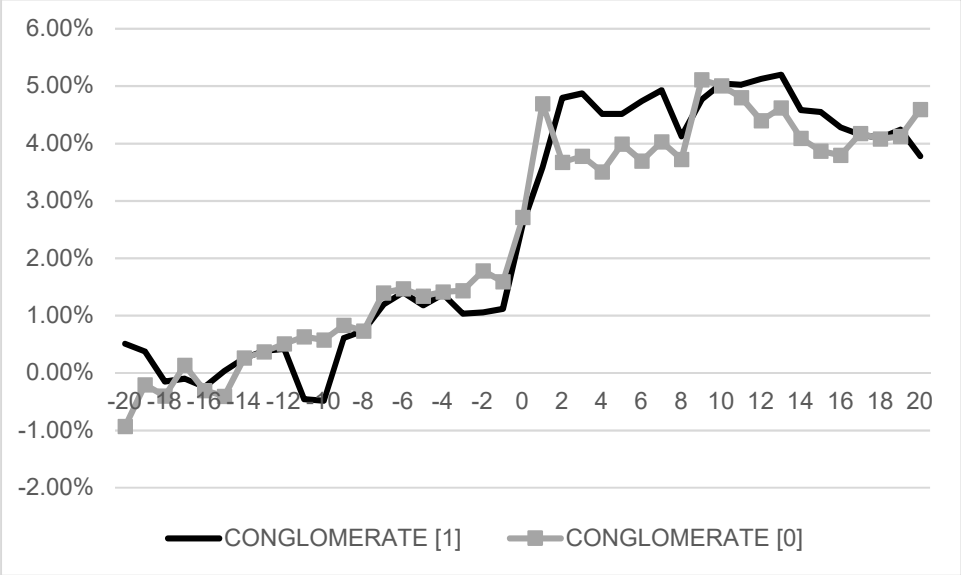
Table 33: Univariate test results for Conglomerate (ECO)

Spin-off							
Event window	**Conglo-merate [0]** N=210	**Conglo-merate [1]** N=145	**CAAR Diff.**	**t-test mean**		**Mann-Whitney-U**	
				t-value	p-value	z-value	p-value
[-10;0]†	4.16%***	2.92%***	1.23%	1.03	0.304	0.53	‘.560
[-1;0]	3.94%***	3.20%***	0.74%	0.79	0.430	0.14	0.887
[-1;1]	4.86%***	3.81%***	1.05%	0.97	0.335	0.29	0.776
[-5;4]	5.47%***	2.92%***	2.55%	1.76*	0.079	1.23	0.221
[-10;10]†	3.58%**	2.47%**	1.11%	0.67	0.500	0.00	0.997
[-20;20]†	2.17%	2.59%*	0.42	0.212	0.832	-.441	0.659

Conglomerate [0] and **Conglomerate [1]** correspond to the average cumulated abnormal returns during the event window for spin-off, for which parent companies operate in less than three [0] or in three or more [1] different 2-digit-SIC-code industries. The significance of the CAAR is based on the one sample t-test. **t-test mean** is based on the comparison of the mean for independent samples. The Levene-Test is used to test homogeneity or heterogeneity of the sample. If the assumption of homogeneity of variance is rejected at the 5%-significance level, the event window is marked with †. The t-values show the results of the Welch-Test. **Mann-Whitney-U** describes the non-parametric Mann-Whitney-U-test. **p-values** are based on the two-sided t- and z-distribution. *, **, and *** show the 10%-, 5%- and 1%-significance level.

Table 34: Univariate test results for Conglomerate (spin-off)

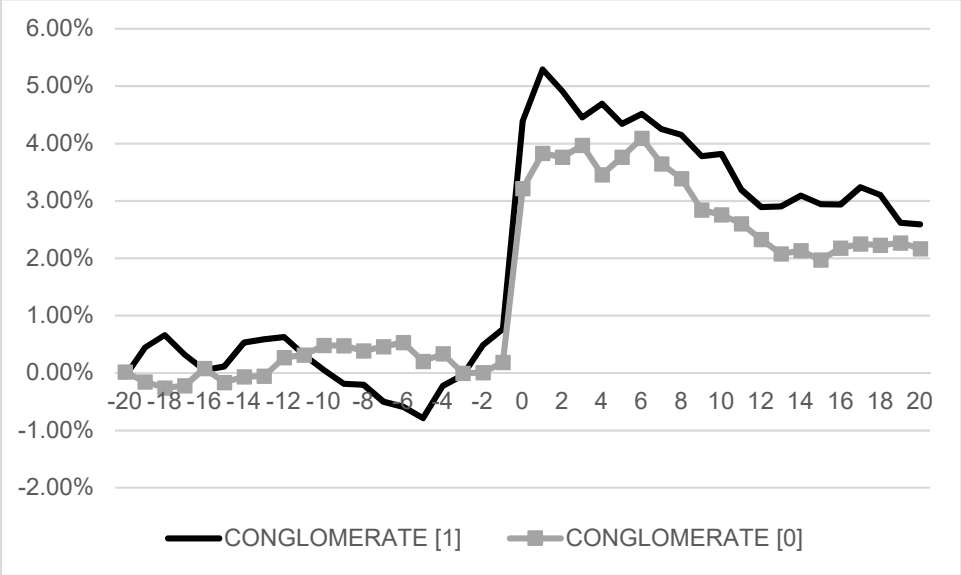
ECO



Conglomerate [0] and **Conglomerate [1]** correspond to the average cumulated abnormal returns during the event window for ECO, for which parent companies operate in less than three [0] or in three or more [1] different 2-digit-SIC-code industries. **Days** are relative to the announcement day t_0.

Figure 24: Comparison of CAAR for Conglomerate (ECO)

Spin-off



Conglomerate [0] and **Conglomerate [1]** correspond to the average cumulated abnormal returns during the event window for spin-off, for which parent companies operate in less than three [0] or in three or more [1] different 2-digit-SIC-code industries. **Days** are relative to the announcement day t_0.

Figure 25: Comparison of CAAR for Conglomerate (spin-off)

7.3.6 Valuation discount

Hypothesis 7 postulates the influence of a valuation discount on CAAR. To examine the relationship Tobin's Q is used based on Lang and Stulz (1994). For transactions in which the parent company has a market to book value (mtbv) of less than 1, Tobin's Q is set at [1]. For transactions in which the parent company has a market to book value of greater or equal to 1, Tobin's Q is set a [0]. Table 35 and 36 show the sample for Tobin's Q [1] and [0] over time.

ECO															
	Announcement year (2000 – 2013)														
	‘00	‘01	‘02	‘03	‘04	‘05	‘06	‘07	‘08	‘09	‘10	‘11	‘12	‘13	Total
Tobin's Q [0]	24	5	4	5	14	6	3	3	3	0	2	4	10	1	84
Tobin's Q [1]	1	0	2	0	1	0	1	0	0	0	0	2	1	1	9
Total	25	5	6	5	15	6	4	3	3	0	2	6	11	2	93

Tobin's Q [0] and **Tobin's Q [1]** correspond to the transaction for which parent companies have market to book value of less than 1 [1] or equal or greater than 1 [0].

Table 35: Comparison of CAAR for Tobin's Q (ECO)

Spin-off															
	Announcement year (2000 – 2013)														
	‘00	‘01	‘02	‘03	‘04	‘05	‘06	‘07	‘08	‘09	‘10	‘11	‘12	‘13	Total
Tobin's Q [0]	37	11	14	14	23	35	26	28	19	9	16	40	24	19	315
Tobin's Q [1]	5	2	3	3	2	1	4	6	2	6	6	3	4	1	48
Total	42	13	17	17	25	36	30	34	21	15	22	43	28	20	363

Tobin's Q [0] and **Tobin's Q [1]** correspond to the transaction for which parent companies have market to book value of less than 1 [1] or equal or greater than 1 [0].

Table 36: Comparison of CAAR for Tobin's Q (spin-off)

The mean value comparison between the two sub-samples for Tobin's Q [0] and [1] are shown in Tables 37 and 38 for ECO and spin-off, respectively. Contrary to expectations, the CAAR of companies trading at discount (mtbv <1 [0]) are not above those of parent companies which do not trade at discount (mtbv >=1 [1]) for ECO, while for spin-off they are. However, the measured differences are not significant. Figures 26 and 27 below highlight the development graphically for ECO and spin-off, respectively. For ECO transactions the cumulated CAAR for Tobin's Q [1] are consistently below the one Tobin's Q [0] while for spin-offs, CAAR Tobin's Q [1] are not consistently below Tobin's Q [0].

Overall, the CAAR for spin-off for parent companies with Tobin's Q [1] are consistently above those of with Tobin's Q [0]. Therefore, Hypothesis 7 is partially confirmed.

ECO							
Event window	**Tobin's Q [0]** N=84	**Tobin's Q [1]** N=9	**CAAR Diff.**	**t-test mean**		**Mann-Whitney-U**	
				t-value	p-value	z-value	p-value
[-10;0]	2.77%***	1.79%	0.98%	0.36	0.721	0.14	0.889
[-1;0]	1.42%***	-0.39%	1.81%	1.05	0.295	1.09	0.275
[-1;1]	2.82%***	1.52%	1.30%	0.51	0.611	0.49	0.623
[-5;4]†	2.46%***	3.91%	-1.45%	-0.22	0.831	-0.50	0.615
[-10;10]†	4.38%***	11.62%	-7.24%	-0.71	0.498	-0.11	0.916
[-20;20]	4.54%***	-0.14%	4.68%	0.91	0.364	1.10	0.27

Tobin's Q [0] and **Tobin's Q [1]** correspond to the average cumulated abnormal returns during the event window for ECO, for which parent companies have market to book value of less than 1 [1] or equal or greater than 1 [0]. The significance of the CAAR is based on the one sample t-test. **t-test mean** is based on the comparison of the mean for independent samples. The Levene-Test is used to test homogeneity or heterogeneity of the sample. If the assumption of homogeneity of variance is rejected at the 5%-significance level, the event window is marked with †. The t-values show the results of the Welch-Test. **Mann-Whitney-U** describes the non-parametric Mann-Whitney-U-test. **p-values** are based on the two-sided t- and z-distribution. *, **, and *** show the 10%-, 5%- and 1%-significance level.

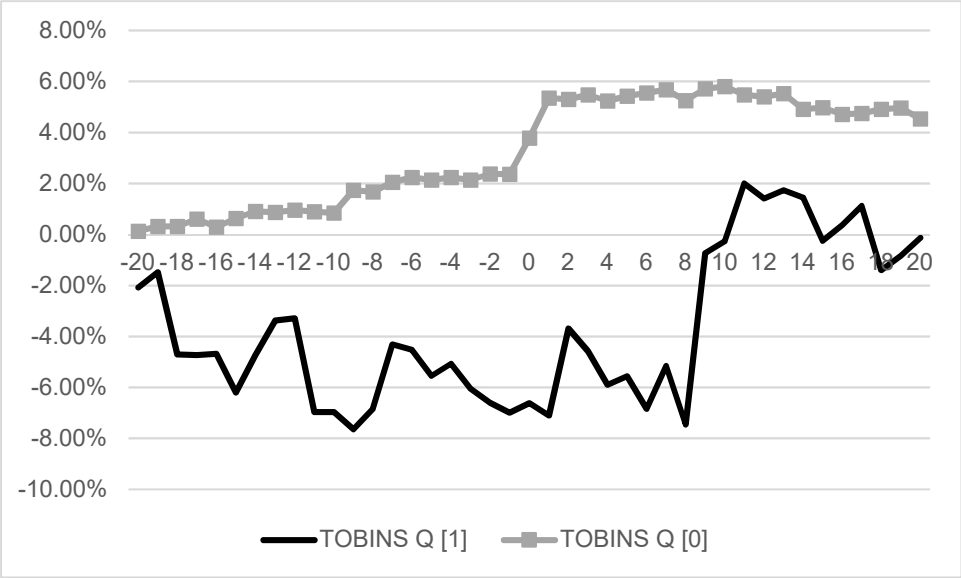
Table 37: Univariate test results for Tobin's Q (ECO)

Spin-off							
Event window	**Tobin's Q [0]** N=315	**Tobin's Q [1]** N=48	**CAAR Diff.**	**t-test mean**		**Mann-Whitney-U**	
				t-value	p-value	z-value	p-value
[-10;0]†	3.35%***	4.86%*	-1.51%	-0.52	0.603	0.96	0.338
[-1;0]†	3.24%***	4.82%**	-1.58%	-0.74	0.463	0.55	0.582
[-1;1]†	3.84%***	6.20%**	-2.36%	-0.99	0.326	0.32	0.746
[-5;4]†	3.93%***	6.21%**	-2.28%	-0.82	0.415	0.41	0.685
[-10;10]†	2.49%***	5.54%	-3.05%	-0.79	0.432	0.14	0.891
[-20;20]†	4.31%	1.94%*	2.38%	0.68	0.501	0.17	0.865

Tobin's Q [0] and **Tobin's Q [1]** correspond to the average cumulated abnormal returns during the event window for spin-off, for which parent companies have market to book value of less than 1 [1] or equal or greater than 1 [0]. The significance of the CAAR is based on the one sample t-test. **t-test mean** is based on the comparison of the mean for independent samples. The Levene-Test is used to test homogeneity or heterogeneity of the sample. If the assumption of homogeneity of variance is rejected at the 5%-significance level, the event window is marked with †. The t-values show the results of the Welch-Test. **Mann-Whitney-U** describes the non-parametric Mann-Whitney-U-test. **p-values** are based on the two-sided t- and z-distribution. *, **, and *** show the 10%-, 5%- and 1%-significance level.

Table 38: Univariate test results for Tobins Q (spin-off)

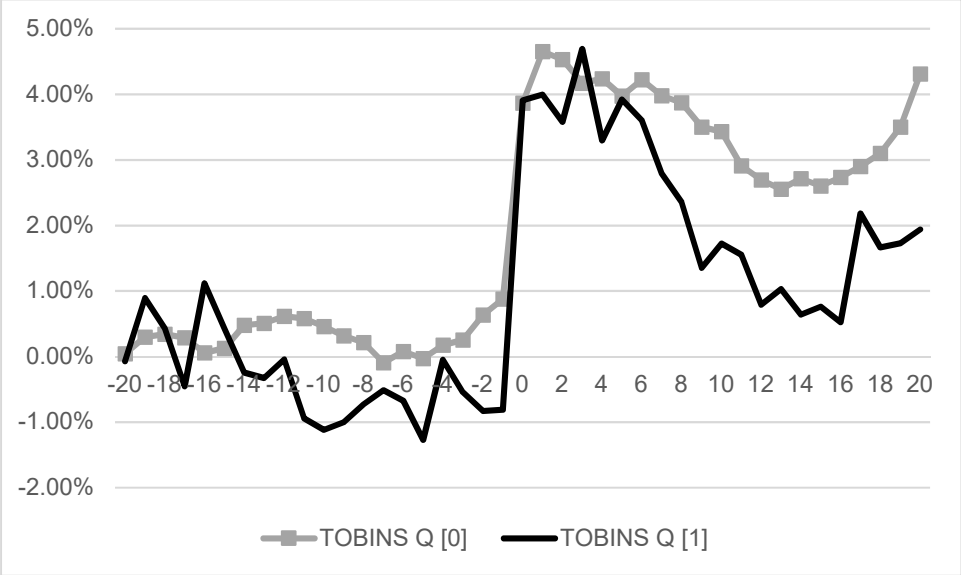
ECO



Tobin's Q [0] and **Tobin's Q [1]** correspond to the average cumulated abnormal returns during the event window for ECO, for which parent companies have market to book value of less than 1 [1] or equal or greater than 1 [0]. **Days** are relative to the announcement day t_0.

Figure 26: Comparison of CAAR for Tobin's Q (ECO)

Spin-off



Tobin's Q [0] and **Tobin's Q [1]** correspond to the average cumulated abnormal returns during the event window for spin-off, for which parent companies have market to book value of less than 1 [1] or equal or greater than 1 [0]. **Days** are relative to the announcement day t_0.

Figure 27: Comparison of CAAR for Tobin's Q (spin-off)

7.3.7 Size of parent company

Hypothesis 8 assumes a positive correlation between the size of the parent company and the abnormal stock price reaction on the announcement of a spin-off or ECO. The proxy variables used to measure size are Net sales USD, #Employees and B/S USD (total size of balance sheet in USD). All three proxy variables are regressed over different event windows to identify a potential relationship. If such a relationship (correlation) exists, significant regression coefficients can be expected. Tables 39 and 40 show the regression results for ECO and spin-off, respectively.

ECO						
Event window	Constant	Regression Coefficient	t-value	p-value	R^2	Adj. R^2
Panel 1: Net sales USD / N=103						
$\mathbf{CAR_{i,t1-t2} = \alpha + \sum_{j=1}^{J} \beta_j\ Net\ sales\ USD_{i,j} + \varepsilon_{i,t1-t2}}$						
[-10;0]	0.031	$-1.92e^{-10}$	-1.14	0.258	0.013	0.003
[-1;0]	0.012	$3.14e^{-11}$	0.29	0.769	0.001	-0.009
[-1;1]	0.028	$-1.31e^{-11}$	-0.08	0.934	0.000	-0.010
[-5;4]	0.028	$-7.93e^{-11}$	-0.43	0.672	0.002	-0.008
[-10;10]	0.058	$-3.29e^{-10}$	-1.06	0.294	0.011	0.001
[-20;20]	0.040	$5.39e^{-11}$	0.17	0.866	0.000	-0.010
Panel 2: #Employees / N=97						
$\mathbf{CAR_{i,t1-t2} = \alpha + \sum_{j=1}^{J} \beta_j\ \#Employees_{i,j} + \varepsilon_{i,t1-t2}}$						
[-10;0]	0.028	$-4.97e^{-9}$	-0.06	0.956	0.000	-0.011
[-1;0]	0.009	$8.06e^{-8}$	1.46	0.146	0.022	0.012
[-1;1]	0.022	$8.98e^{-8}$	1.08	0.284	0.012	0.002
[-5;4]	0.268	$5.31e^{-8}$	0.58	0.561	0.004	-0.007
[-10;10]	0.053	$-1.51e^{-8}$	-0.09	0.928	0.000	-0.011
[-20;20]	0.027	$2.64e^{-7}$	1.57	0.119	0.026	0.015
Panel 3: B/S USD / N=103						
$\mathbf{CAR_{i,t1-t2} = \alpha + \sum_{j=1}^{J} \beta_j\ B/S\ USD_{i,j} + \varepsilon_{i,t1-t2}}$						
[-10;0]	0.030	$-8.15e^{-11}$	-1.05	0.295	0.011	0.001
[-1;0]	0.013	$1.40e^{-12}$	0.03	0.977	0.000	-0.010
[-1;1]	0.027	$2.92e^{-12}$	0.04	0.968	0.000	-0.010
[-5;4]	0.027	$-2.03e^{-11}$	-0.24	0.813	0.001	-0.009
[-10;10]	0.055	$-1.22e^{-10}$	-0.85	0.396	0.007	-0.003
[-20;20]	0.038	$7.88e^{-11}$	0.54	0.590	0.003	-0.007

Nets sales USD correspond to the parent company sales in the announcement year of the transaction in USD million. **#Employees** correspond to the number of full time employees at time of the transaction announcement. **B/S USD** correspond to the sum of the balance sheet of the parent company at the end of the fiscal year following the transaction announcement in USD million. **t-value** is the result of the t-test of the regression coefficients. **p-values** are based on the two-sided t distribution. **R^2** is the coefficient of determination. **Adj. R^2** is the adjusted coefficient of determination. *, **, and *** show the 10%-, 5%- and 1%-significance level.

Table 39: Linear regression results for size of parent company (ECO)

Spin-off						
Event window	Constant	Regression Coefficient	t-value	p-value	R^2	Adj. R^2
Panel 1: Net sales USD / N=338						
$\mathbf{CAR_{i,t1-t2} = \alpha + \sum_{j=1}^{J} \beta_j\ Net\ sales\ USD_{i,j} + \varepsilon_{i,t1-t2}}$						
[-10;0]	0.039	$-1.74e^{-10}$	-0.72	0.474	0.002	-0.001
[-1;0]	0.039	$-3.11e^{-10}$	-1.75*	0.082	0.009	0.006
[-1;1]	0.047	$-297e^{-10}$	-1.50	0.135	0.007	0.004
[-5;4]	0.043	$-2.47e^{-10}$	-1.03	0.302	0.003	0.000
[-10;10]	0.031	$1.12e^{-11}$	0.03	0.973	0.000	-0.003
[-20;20]	0.020	$3.34e^{-10}$	0.86	0.390	0.002	-0.001
Panel 2: #Employees / N=294						
$\mathbf{CAR_{i,t1-t2} = \alpha + \sum_{j=1}^{J} \beta_j\ \#Employees_{i,j} + \varepsilon_{i,t1-t2}}$						
[-10;0]	0.027	$4.99e^{-8}$	0.53	0.596	0.001	-0.003
[-1;0]	0.031	$-3.30e^{-8}$	-0.43	0.668	0.001	-0.003
[-1;1]	0.041	$-6.81e^{-8}$	-0.80	0.427	0.002	-0.001
[-5;4]	0.028	$-2.63e^{-8}$	-0.23	0.817	0.000	-0.001
[-10;10]	0.203	$1.66e^{-7}$	1.31	0.192	0.006	0.002
[-20;20]	0.015	$3.05e^{-7}$	1.86*	0.064	0.012	0.008
Panel 3: B/S USD / N=338						
$\mathbf{CAR_{i,t1-t2} = \alpha + \sum_{j=1}^{J} \beta_j\ B/S\ USD_{i,j} + \varepsilon_{i,t1-t2}}$						
[-10;0]	0.040	$-2.10e^{-10}$	-1.21	0.226	0.004	0.001
[-1;0]	0.040	$-2.91e^{-10}$	-2.30	0.022	0.016	0.013
[-1;1]	0.048	$-2.80e^{-10}$	-1.98	0.048	0.012	0.009
[-5;4]	0.045	$-3.28e^{-10}$	-1.74*	0.083	0.009	0.006
[-10;10]	0.319	$-4.05\ e^{-11}$	-0.17	0.863	0.000	-0.003
[-20;20]	0.019	$3.53e^{-10}$	1.27	0.204	0.005	0.002

Net sales USD correspond to the parent company sales in the announcement year of the transaction in USD million. **#Employees** correspond to the number of full time employees at time of the transcation announcement. **B/S USD** correspond to the sum of the balance sheet of the parent company at the end of the fiscal year following the transaction announcement in USD million. **t-value** is the result of the t-test of the regression coefficients. **p-values** are based on the two-sided t distribution. $\mathbf{R^2}$ is the coefficient of determination. **Adj. $\mathbf{R^2}$** is the adjusted coefficient of determination. *, **, and *** show the 10%-, 5%- and 1%-significance level.

Table 40: Linear regression results for size of parent company (spin-off)

The results do not confirm that abnormal returns depend on the size of the parent company. Neither the Net sales USD, #Employees nor the B/S USD as proxies for size have an explanatory significance of the abnormal returns realized during an ECO or spin-off announcement. Results are consistent across all event windows. The results are consistent with prior results of Ostrowski (2007) and Vollmar (2014) which do not identify an influence of the size of the parent company on abnormal returns during divestments. Based on the regression results, Hypothesis 8 is rejected.

7.4 Univariate test results of control variables

7.4.1 Equity owner control

Expected reaction 1 is based on the idea that the control exercised through equity owners influences the abnormal returns realized during a divestment announcement. The idea is founded in the principal-agent theory that postulates that efficient control has a long-term positive impact on the value of a company. However, the return impact of a divestment cannot be unambiguously predicted based on principal-agent theory. While divestments of companies, which are subject to strong ownership control, are expected to be received positively by stock markets, the positive effect on ownership control of these transactions is limited, as agency costs are already low. To control for ownership control, concentration of voting rights, that is, the percentage of ownership of the 10 biggest shareholders, is used. As percentage of ownership of the 10 biggest shareholders is a metrically scaled variable, linear regression is performed. The regression equation is as follows:

$$CAR_{i,t1\text{-}t2} = \alpha + \sum_{j=1}^{J} \boldsymbol{\beta}_j \text{ Owner conc}_{i,j} + \varepsilon_{i,t1\text{-}t2}$$

The linear regression results are shown in Tables 41 and 42 for ECO and spin-off, respectively. The regression results do not show a significant positive relationship between the concentration of voting rights and the magnitude of abnormal returns

realized at the announcement of the divestiture, for both ECO and spin-off. Further, the results do not indicate that the concentration of ownership has a particularly positive influence on the abnormal results in the period prior to the announcement.

ECO						
Event window	Constant	Regression Coefficient	t-value	p-value	R^2	Adj. R^2
Owner conc / N=25						
[-10;0]	0.018	0.000	0.23	0.824	0.002	-0.041
[-1;0]	0.011	0.000	0.12	0.903	0.001	-0.043
[-1;1]	0.019	0.000	0.16	0.872	0.001	-0.042
[-5;4]	0.021	0.000	0.32	0.750	0.005	-0.039
[-10;10]	-0.008	0.003	1.17	0.255	0.056	0.015
[-20;20]	0.043	0.003	0.92	0.367	0.036	-0.006

Owner conc corresponds to the sum of the ownership of the top 10 investors in the parent company. **t-value** is the result of the t-test of the regression coefficients. **p-values** are based on the two-sided t distribution. **R^2** is the coefficient of determination. **Adj. R^2** is the adjusted coefficient of determination. *, **, and *** show the 10%-, 5%- and 1%-significance level.

Table 41: Linear regression results for Owner conc (ECO)

Spin-off						
Event window	Constant	Regression Coefficient	t-value	p-value	R^2	Adj. R^2
Owner conc / N=185						
[-10;0]	0.024	0.000	0.59	0.555	0.002	-0.004
[-1;0]	0.022	0.000	1.24	0.218	0.008	0.003
[-1;1]	0.032	0.000	0.65	0.518	0.002	-0.003
[-5;4]	0.069	-0.001	-1.81*	0.072	0.018	0.012
[-10;10]	0.036	-0.000	-0.54	0.592	0.002	-0.004
[-20;20]	0.030	-0.001	-0.42	0.672	0.001	-0.005

Owner conc corresponds to the sum of the ownership of the top 10 investors in the parent company. **t-value** is the result of the t-test of the regression coefficients. **p-values** are based on the two-sided t distribution. **R^2** is the coefficient of determination. **Adj. R^2** is the adjusted coefficient of determination. *, **, and *** show the 10%-, 5%- and 1%-significance level.

Table 42: Linear regression results for Owner conc (spin-off)

To further investigate the relationship between ownership control and abnormal announcement returns, the study investigates the ownership of a reference shareholder, which is a shareholder owning at least 20% of outstanding shares. The use of percentage of ownership of the reference shareholder as metric variable can be examined using the formula:

$$CAR_{i,t1\text{-}t2} = \alpha + \sum_{j=1}^{J} \boldsymbol{\beta}_j \text{ Ref Sh perc}_{i,j} + \varepsilon_{i,t1\text{-}t2}$$

The linear regression results are shown in Tables 43 and 44 for ECO and spin-off, respectively. The regression results show a significant positive relationship between the concentration of voting rights and the magnitude of abnormal returns realized at the announcement of the divestiture, both for ECO and spin-off, in the event windows [-10;0], [-1;0] and [-10;10]. The results support that the idea that the level of abnormal returns realized, in particular prior to the announcement, is positively influenced by the concentration of ownership. Expected reaction 1 is therefore confirmed.

ECO						
Event window	Constant	Regression Coefficient	t-value	p-value	R^2	Adj. R^2
Ref Sh perc / N=42						
[-10;0]	-0.005	0.001	2.65**	0.011	0.150	0.129
[-1;0]	0.000	0.001	3.37***	0.002	0.221	0.202
[-1;1]	0.022	0.001	1.40	0.169	0.047	0.023
[-5;4]	0.018	0.001	1.61	0.115	0.061	0.037
[-10;10]	0.017	0.001	1.73*	0.091	0.070	0.047
[-20;20]	0.029	0.001	1.48	0.147	0.052	0.028

Ref Sh perc corresponds to the percentage of ownership of the biggest shareholder in the parent company. **t-value** is the result of the t-test of the regression coefficients. **p-values** are based on the two-sided t distribution. **R^2** is the coefficient of determination. **Adj. R^2** is the adjusted coefficient of determination. *, **, and *** show the 10%-, 5%- and 1%-significance level.

Table 43: Linear regression results for Ref Sh perc (ECO)

Spin-off						
Event window	Constant	Regression Coefficient	t-value	p-value	R^2	Adj. R^2
Ref Sh perc / N=105						
[-10;0]	0.014	0.001	2.25**	0.027	0.047	0.038
[-1;0]	0.017	0.001	2.00**	0.048	0.037	0.028
[-1;1]	0.021	0.001	1.43	0.157	0.019	0.001
[-5;4]	0.015	0.001	1.39	0.167	0.019	0.009
[-10;10]	0.009	0.001	1.95*	0.053	0.036	0.026
[-20;20]	0.021	0.001	1.21	0.229	0.014	0.004

Ref Sh perc corresponds to the percentage of ownership of the biggest shareholder in the parent company. **t-value** is the result of the t-test of the regression coefficients. **p-values** are based on the two-sided t distribution. **R^2** is the coefficient of determination. **Adj. R^2** is the adjusted coefficient of determination. *, **, and *** show the 10%-, 5%- and 1%-significance level.

Table 44: Linear regression results for Ref Sh perc (spin-off)

7.4.2 Debt owner control

Within academic literature, it is common sense that the use of debt limits the discretionary room for manoeuvre of management. Consequently, if management accepts a higher debt-to-equity ratio, it implicitly believes that it can carry out projects with a positive net present value. Based on the stated belief, expected reaction 2 assumes that a positive relationship between debt-to-equity ratio and abnormal share price reaction of divestment announcement exists. As debt-to-equity is metrically scaled, a univariate regression is performed using the following equation:

$$CAR_{i,t1\text{-}t2} = \alpha + \sum_{j=1}^{J} \beta_j \text{ Debt-to-equity}_{i,j} + \varepsilon_{i,t1\text{-}t2}$$

The results in Tables 45 and 46 for ECO and spin-off indicate a positive linear relationship between debt-to-equity ratio and the level of abnormal stock returns during the event windows closest to the announcement dates for ECO but not for spin-off. With results only being significant in one event window, the positive linear relationship between the debt-to-equity ratio and the level of abnormal stock returns cannot be confirmed and Expected Reaction 2 must be rejected.

ECO						
Event window	Constant	Regression Coefficient	t-value	p-value	R^2	Adj. R^2
Debt-to-equity / N=98						
[-10;0]	0.035	-0.000	-1.27	0.207	0.017	0.006
[-1;0]	0.010	0.000	0.40	0.689	0.002	-0.009
[-1;1]	0.007	0.000	3.03***	0.003	0.087	0.077
[-5;4]	0.015	0.001	1.46	0.148	0.021	0.011
[-10;10]	0.051	$-2.42e^{-6}$	-0.02	0.981	0.000	-0.010
[-20;20]	0.033	0.000	0.49	0.624	0.003	-0.008

Debt-to-equity corresponds to ratio of debt to equity of the parent company at the end of the last fiscal year prior to the divestiture announcement. **t-value** is the result of the t-test of the regression coefficients. **p-values** are based on the two-sided t distribution. **R^2** is the coefficient of determination. **Adj. R^2** is the adjusted coefficient of determination. *, **, and *** show the 10%-, 5%- and 1%-significance level.

Table 45: Linear regression results for Debt-to-equity (ECO)

Spin-off						
Event window	Constant	Regression Coefficient	t-value	p-value	R^2	Adj. R^2
Debt-to-equity / N=318						
[-10;0]	0.033	0.000	0.54	0.588	0.001	-0.002
[-1;0]	0.036	-0.000	-0.74	0.462	0.002	-0.001
[-1;1]	0.046	-0.000	-1.06	0.289	0.004	0.000
[-5;4]	0.041	-0.000	-0.59	0.554	0.001	-0.002
[-10;10]	0.234	0.000	1.11	0.270	0.004	0.001
[-20;20]	0.006	0.0002	2.88***	0.004	0.026	0.023

Debt-to-equity corresponds to the ratio of debt to equity of the parent company at the end of the last fiscal year prior to the divestiture announcement. **t-value** is the result of the t-test of the regression coefficients. **p-values** are based on the two-sided t distribution. **R^2** is the coefficient of determination. **Adj. R^2** is the adjusted coefficient of determination. *, **, and *** show the 10%-, 5%- and 1%-significance level.

Table 46: Linear regression results for Debt-to-equity (spin-off)

7.4.3 Insider outsider information gap

Information asymmetries between company insiders such as management and company outsiders such as investors may lead to different evaluation of a company's prospects of the two parties. The lower the information gap between corporate management and investors, the better investors can value the company. Higher uncertainty (through a larger information gap) usually leads to a valuation discount. A corporate divestment of a subsidiary, whether an ECO or a spin-off, imposes new reporting requirements of the subsidiary as it is being listed on a stock exchange and, consequently, reduces information asymmetries. Therefore, it can contribute to an improvement in the external allocation of resources and support a positive stock price reaction.[74] To test Expected Reaction 3, that postulates a positive correlation between the level of information asymmetry and the abnormal stock price reaction, the metrically scaled variable SD EPS forecast is used. SD EPS forecast is the standard deviation of the earnings per share forecast of the parent company at the end of the month prior to the divestiture announcement. A higher standard deviation is used as proxy for a larger information gap between

[74] See Section 5.11

corporate management and outside investors on the capital market. The linear regression model is as follows:

$$CAR_{i,t1\text{-}t2} = \alpha + \sum_{j=1}^{J} \beta_j \text{ SD EPS}_{i,j} + \varepsilon_{i,t1\text{-}t2}$$

The results in Tables 47 and 48 for ECO and spin-off do not confirm the expected positive correlation between the level of information asymmetry prevailing at the time of the divestiture announcement and the abnormal stock price returns. The results are rather negative, but not significant in any event window. Consequently, Expected Reaction 3 is not confirmed.

ECO						
Event window	Constant	Regression Coefficient	t-value	p-value	R^2	Adj. R^2
SD EPS / N=91						
[-10;0]	0.017	0.004	1.18	0.241	0.015	0.004
[-1;0]	0.018	-0.002	-0.93	0.355	0.010	-0.002
[-1;1]	0.033	-0.003	-0.79	0.431	0.007	-0.004
[-5;4]	0.026	-0.002	-0.52	0.602	0.003	-0.008
[-10;10]	0.0346	0.007	1.40	0.164	0.022	0.011
[-20;20]	0.045	0.002	0.26	0.799	0.001	-0.012

SD EPS corresponds to the standard deviation of the earnings per share forecast (as forecasted by equity analysts) of the parent company at the end of the month prior to the divestiture announcement. **t-value** is the result of the t-test of the regression coefficients. **p-values** are based on the two-sided t distribution. **R^2** is the coefficient of determination. **Adj. R^2** is the adjusted coefficient of determination. *, **, and *** show the 10%-, 5%- and 1%-significance level.

Table 47: Linear regression results for SD EPS (ECO)

Spin-off						
Event window	Constant	Regression Coefficient	t-value	p-value	R^2	Adj. R^2
SD EPS / N=247						
[-10;0]	0.030	-0.000	-0.84	0.401	0.003	-0.001
[-1;0]	0.027	-0.000	-0.75	0.457	0.002	-0.002
[-1;1]	0.031	-0.000	-1.23	0.219	0.006	0.002
[-5;4]	0.257	-0.000	-0.92	0.357	0.004	-0.001
[-10;10]	0.031	-0.000	-0.87	0.387	0.003	-0.001
[-20;20]	0.034	-0.000	-0.67	0.505	0.002	-0.002

SD EPS corresponds to the standard deviation of the earnings per share forecast (as forecasted by equity analysts) of the parent company at the end of the month prior to the divestiture announcement. **t-value** is the result of the t-test of the regression coefficients. **p-values** are based on the two-sided t distribution. **R^2** is the coefficient of determination. **Adj. R^2** is the adjusted coefficient of determination. *, **, and *** show the 10%-, 5%- and 1%-significance level.

Table 48: Linear regression results for SD EPS (spin-off)

7.4.4 Stock performance of parent company

The present section investigates the influence of the parent company's share price performance prior to a divestiture announcement on the abnormal stock price returns realized at announcement. Expected Reaction 4 proposes a positive correlation between the parent company's stock price performance prior to a divestiture announcement and the level of abnormal stock price returns realized at announcement. To test the expected reaction, the question of whether the variable Parent return, that is, the discrete 1-year return of the parent company at the time of the divestiture announcement has explanatory power of the identified abnormal stock returns at announcement is examined. The following regression equation is used:

$$CAR_{i,t1\text{-}t2} = \alpha + \sum_{j=1}^{J} \boldsymbol{\beta_j}\ \text{Parent return}_{i,j} + \varepsilon_{i,t1\text{-}t2}$$

The results in Tables 49 and 50 for ECO and spin-off show the regression results. For ECO parent return is significantly positive correlated with the announcement return in the window [-10:0¨and [-20;20], and negatively correlated in the event

window [-1;1]. Moreover, for spin-off, negative correlation is significant during the event window [-10;10] and [-20;20]. However, during other event windows the sign of correlation changed.

To further investigate the findings, the study examines whether the sign of the parent company's stock price performance prior to the announcement has any explanatory power of the abnormal stock returns at announcement. To operationalize this the dummy variable Parent return >0 is created. Tables 51 and 52 show the results of the mean value comparison. The results obtained do not support a positive or negative relationship between higher average CAAR and a positive share performance of the parent company. Based on both analyses, Expected Reaction 4 is partially supported.

ECO						
Event window	Constant	Regression Coefficient	t-value	p-value	R^2	Adj. R^2
Parent return / N=103						
[-10;0]	0.016	0.064	3.82***	0.000	0.126	0.118
[-1;0]	0.015	-0.025	-1.20	0.231	0.014	0.004
[-1;1]	0.037	-0.090	-3.03***	0.003	0.083	0.074
[-5;4]	0.026	0.002	0.06	0.951	0.000	-0.010
[-10;10]	0.045	0.028	0.81	0.419	0.007	-0.003
[-20;20]	0.029	0.064	2.05**	0.043	0.040	0.030

Parent return corresponds to the discrete return of the parent company during the 1-year period prior to the divestiture announcement. **t-value** is the result of the t-test of the regression coefficients. **p-values** are based on the two-sided t distribution. **R^2** is the coefficient of determination. **Adj. R^2** is the adjusted coefficient of determination. *, **, and *** show the 10%-, 5%- and 1%-significance level.

Table 49: Linear regression results for Parent return (ECO)

Spin-off						
Event window	Constant	Regression Coefficient	t-value	p-value	R^2	Adj. R^2
Parent return / N=363						
[-10;0]	0.036	-0.01	-0.45	0.652	0.001	-0.002
[-1;0]	0.036	-0.10	-1.25	0.212	0.004	0.002
[-1;1]	0.041	0.001	0.09	0.928	0.000	-0.003
[-5;4]	0.044	-0.008	-0.60	0.551	0.001	-0.002
[-10;10]	0.036	-0.039	-2.57**	0.011	0.018	0.015
[-20;20]	0.035	-0.087	-4.52***	0.001	0.054	0.051

Parent return corresponds to the discrete return of the parent company during the 1-year period prior to the divestiture announcement. **t-value** is the result of the t-test of the regression coefficients. **p-values** are based on the two-sided t distribution. **R^2** is the coefficient of determination. **Adj. R^2** is the adjusted coefficient of determination. *, **, and *** show the 10%-, 5%- and 1%-significance level.

Table 50: Linear regression results for Parent return (spin-off)

ECO							
Event window	**Parent return >0 [0]** N=37	**Parent return >0 [1]** N=66	**CAAR Diff.**	**t-test mean**		**Mann-Whitney-U**	
				t-value	p-value	z-value	p-value
[-10;0]	3.30%***	2.35%**	0.95%	0.59	0.557	0.98	0.329
[-1;0]†	2.19%**	0.75%	1.44%	1.25	0.218	0.82	0.413
[-1;1]†	5.00%***	1.43%*	3.57%	2.19**	0.033	2.16**	0.311
[-5;4]	3.57%**	2.21%**	1.36%	0.72	0.474	-0.09	0.928
[-10;10]†	9.46%**	3.51%***	5.95%	1.39	0.175	1.12	0.264
[-20;20]	6.64%**	3.19%*	3.45%	1.06	0.290	1.15	0.251

Parent return >0 [0] and **Parent return >0 [1]** correspond to the average cumulated abnormal returns of the parent company realized during the 1-year prior to the event window and are defined as [1] if bigger than 0 and [0] otherwise. The significance of the CAAR is based on the one sample t-test. **t-test mean** is based on the comparison of the means for independent samples. The Levene-Test is used to test homogeneity or heterogeneity of the sample. If the assumption of homogeneity of variance is rejected at the 5%-significance level, the event window is marked with †. The t-values show the results of the Welch-Test. **Mann-Whitney-U** describes the non-parametric Mann-Whitney-U-test. **p-values** are based on the two-sided t- and z-distribution. *, **, and *** show the 10%-, 5%- and 1%-significance level.

Table 51: Univariate test results for Parent return >0 (ECO)

Spin-off							
Event window	**Parent return >0 [0]** N=133	**Parent return >0 [1]** N=230	**CAAR Diff.**	**t-test mean**		**Mann-Whitney-U**	
				t-value	p-value	z-value	p-value
[-10;0]	3.99%***	3.30%***	0.69%	0.52	0.603	0.67	0.506
[-1;0]	3.92%***	3.19%***	0.73%	0.75	0.456	0.51	0.610
[-1;1]	3.71%***	4.31%***	-0.60%	-0.49	0.623	-0.61	0.540
[-5;4]	4.63%***	4.01%***	0.62%	0.42	0.675	0.73	0.465
[-10;10]†	4.99%***	1.86%*	3.13%	1.63	0.105	1.25	0.213
[-20;20]	6.79%***	-0.34%	7.13%	3.45***	0.001	3.52***	0.000

Parent return >0 [0] and **Parent return >0 [1]** correspond to the average cumulated abnormal returns of the parent company realized during the 1 year prior to the event window and are defined as [1] if bigger than 0 and [0] otherwise. The significance of the CAAR is based on the one sample t-test. **t-test mean** is based on the comparison of the mean for independent samples. The Levene-Test is used to test homogeneity or heterogeneity of the sample. If the assumption of homogeneity of variance is rejected at the 5%-significance level, the event window is marked with †. The t-values show the results of the Welch-Test. **Mann-Whitney-U** describes the non-parametric Mann-Whitney-U-test. **p-values** are based on the two-sided t- and z-distribution. *, **, and *** show the 10%-, 5%- and 1%-significance level.

Table 52: Univariate test results for Parent return >0 (spin-off)

7.4.5 Economic performance of parent company

The prediction of Expected Reaction 5 is that divestiture transactions are positively received by capital markets investors in situations where the parent company is facing economic challenges. The Expected Reaction is tested through univariate regressions of indicators of economic performance as expressed through the following variables: Quick ratio, RoA, RoE, CF margin. Tables 53 and 54 below show the results for both ECO and spin-off.

ECO						
Event window	Constant	Regression Coefficient	t-value	p-value	R^2	Adj. R^2
Quick ratio / N=101						
[-10;0]	0.025	0.001	0.12	0.905	0.000	-0.010
[-1;0]	0.014	-0.001	-0.18	0.856	0.000	-0.010
[-1;1]	0.035	-0.006	-0.88	0.384	0.008	-0.002
[-5;4]	0.046	-0.165	-2.14**	0.035	0.044	0.034
[-10;10]	0.034	0.013	1.02	0.311	0.010	0.000
[-20;20]	0.031	0.007	0.51	0.614	0.003	-0.008
RoA / N=101						
[-10;0]	0.036	-0.002	-1.87*	0.065	0.034	0.024
[-1;0]	0.010	0.001	0.91	0.365	0.008	-0.002
[-1;1]	0.028	0.000	0.02	0.983	0.000	-0.010
[-5;4]	0.020	0.001	1.19	0.238	0.014	0.004
[-10;10]	0.054	-0.000	-0.24	0.813	0.001	-0.010
[-20;20]	0.044	-0.000	-0.11	0.909	0.000	-0.010
RoE / N=100						
[-10;0]	0.028	-0.000	-0.49	0.625	0.002	-0.008
[-1;0]	0.010	0.000	1.11	0.268	0.012	0.002
[-1;1]	0.214	0.000	2.07**	0.041	0.041	0.032
[-5;4]	0.017	0.001	2.89***	0.005	0.078	0.068
[-10;10]	0.047	0.003	0.79	0.434	0.006	-0.004
[-20;20]	0.042	0.000	0.36	0.717	0.001	-0.009
CF margin / N=100						
[-10;0]	0.027	-0.000	-0.24	0.813	0.001	-0.010
[-1;0]	0.012	0.000	0.55	0.580	0.003	-0.007
[-1;1]	0.025	0.000	0.50	0.619	0.003	-0.008
[-5;4]	0.027	0.000	0.20	0.841	0.000	-0.010
[-10;10]	0.045	0.000	0.34	0.735	0.001	-0.009
[-20;20]	0.047	-0.000	-0.43	0.668	0.002	-0.008

Quick ratio corresponds to the ratio of the sum of cash marketable securities and accounts receivable to current liabilities. **RoA** corresponds to the percentage return before tax to the average assets of the parent company. **RoE** corresponds to the percentage return before tax to the average equity. **CF margin** corresponds to the ratio of cash flow to revenues. **t-value** is the result of the t-test of the regression coefficients. **p-values** are based on the two-sided t distribution. **R^2** is the coefficient of determination. **Adj. R^2** is the adjusted coefficient of determination. *, **, and *** show the 10%-, 5%- and 1%-significance level.

Table 53: Linear regression results for profitability of parent company (ECO)

Spin-off						
Event window	Constant	Regression Coefficient	t-value	p-value	R^2	Adj. R^2
Quick ratio / N=323						
[-10;0]	0.040	-0.000	-2.01**	0.045	0.012	0.009
[-1;0]	0.036	-0.000	-0.48	0.634	0.001	-0.002
[-1;1]	0.042	0.001	4.58***	0.000	0.060	0.057
[-5;4]	0.041	-0.000	-1.93*	0.055	0.011	0.008
[-10;10]	0.026	-0.000	-0.74	0.459	0.002	-0.001
[-20;20]	0.026	-0.000	-1.45	0.147	0.006	0.003
RoA / N=333						
[-10;0]	0.033	-0.000	-2.85***	0.005	0.024	0.021
[-1;0]	0.033	-0.000	-4.93***	0.000	0.069	0.066
[-1;1]	0.040	-0.000	-3.98***	0.000	0.046	0.043
[-5;4]	0.037	-0.000	-1.46	0.146	0.006	0.003
[-10;10]	0.030	-0.000	-0.41	0.682	0.001	-0.003
[-20;20]	0.025	0.000	0.70	0.486	0.002	-0.002
RoE / N=323						
[-10;0]	0.030	0.000	1.15	0.251	0.004	0.001
[-1;0]	0.033	0.000	0.75	0.456	0.002	-0.001
[-1;1]	0.041	0.000	1.32	0.189	0.005	0.002
[-5;4]	0.035	-0.000	-0.95	0.344	0.003	-0.000
[-10;10]	0.260	0.000	0.51	0.612	0.000	-0.002
[-20;20]	0.024	0.000	1.74*	0.082	0.009	0.006
CF margin / N=305						
[-10;0]	0.028	$7.66e^{-7}$	0.27	0.789	0.000	-0.003
[-1;0]	0.035	$2.81e^{-7}$	1.30	0.196	0.006	0.002
[-1;1]	0.042	$3.35e^{-7}$	1.44	0.151	0.007	0.004
[-5;4]	0.039	$7.46e^{-7}$	2.39**	0.018	0.018	0.015
[-10;10]	0.040	$9.46e^{-7}$	2.45**	0.015	0.019	0.016
[-20;20]	0.0345	0.000	0.63	0.532	0.001	-0.002

Quick ratio corresponds to the ratio of the sum of cash marketable securities and accounts receivable to current liabilities. **RoA** corresponds to the percentage return before tax to the average assets of the parent company. **RoE** corresponds to the percentage return before tax to the average equity. **CF margin** correspond to the ratio of cash flow to revenues. **t-value** is the result of the t-test of the regression coefficients. **p-values** are based on the two-sided t distribution. **R^2** is the coefficient of determination. **Adj. R^2** is the adjusted coefficient of determination. *, **, and *** show the 10%-, 5%- and 1%-significance level.

Table 54: Linear regression results for profitability of parent company (spin-off)

The results show that the linear relationship is very small, sometimes even changing in sign and most importantly, with a few exceptions, not statistically significant. Therefore, the results do not support a linear relationship between abnormal returns and the economic performance or the parent company. This holds for both ECO and spin-off. Based on these observations, Expected Reaction 5 must be rejected.

7.4.6 Timing of announcement

Expected Reaction 6 assumes a positive relationship between the year of announcement and the level of abnormal returns. The following analysis investigates the impact of the announcement year and the prevailing market environment on the success of the divestiture. The starting point of the analysis is the belief that social, legal and economic conditions are changing and with these the valuation of divestiture transactions. Due to the nominal scaling of announcement year, the KRUSKAL WALLIS test is used.

ECO				
Event window	**KOLMOGOROV-SMIRNOV-LILLIEFORS**		**KRUSKAL-WALLIS**	
	K/S-statistic	p-value (two sided)	X^2	p-value (one sided)
[-10;0]	0.075	0.557	0.014	1.000
[-1;0]	0.141**	0.024	-0.042	1.000
[-1;1]	0.139**	0.027	-0.042	1.000
[-5;4]	0.141**	0.024	-0.040	1.000
[-10;10]	0.163***	0.006	0.014	1.000
[-20;20]	0.139**	0.029	0.010	1.000

Announcement year is the calendar year in which the transaction is announced. **K/S-statistic** is the KOLMOGOROV-SMIRNOV-LILLIEFORS-Test for normal distribution. The assumption of normal distribution is rejected at the 1% level. The event window is then marked with a †. **KRUSKAL-WALLIS** is the non-parametric KRUSKAL-WALLIS-Test. **t-test mean** is based on the comparison of the mean for independent samples. **p-values** describe the p-values of the KRUSKAL-WALLIS-Test based on the one-sided **Chi-distribution.** *, **, and *** show the 10%-, 5%- and 1%-significance level.

Table 55: Test results for Announcement year (ECO)

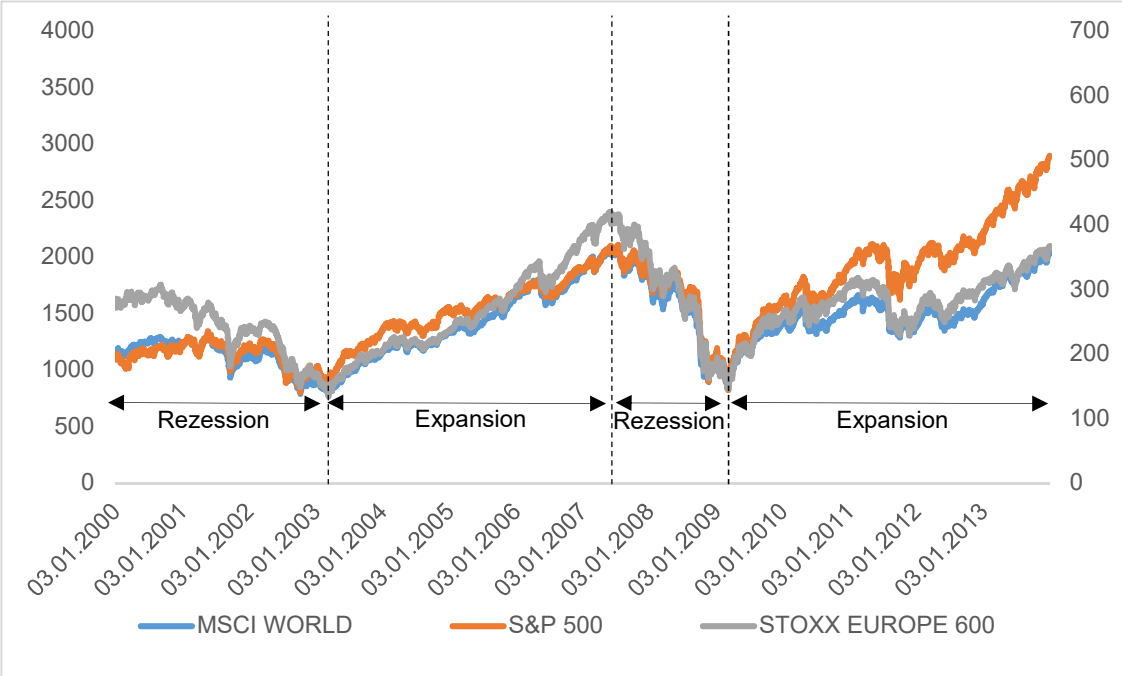
Spin-off				
Event window	KOLMOGOROV-SMIRNOV-LILLIEFORS		KRUSKAL-WALLIS	
	K/S-statistic	p-value (two sided)	X^2	p-value (one sided)
[-10;0]	0.112***	0.000	764.79***	0.000
[-1;0]	0.130***	0.000	87.33***	0.000
[-1;1]	0.146***	0.000	184.11***	0.000
[-5;4]†	0.123***	0.000	81.63***	0.000
[-10;10]†	0.0942***	0.003	886.71***	0.000
[-20;20]	0.0691*	0.055	814.14***	0.000

Announcement year is the calendar year in which the transaction is announced. **K/S-statistic** is the KOLMOGOROV-SMIRNOV-LILLIEFORS-Test for normal distribution. The assumption of normal distribution is rejected at the 1% level. The event window is then marked with a †. **KRUSKAL-WALLIS** is the non-parametric KRUSKAL-WALLIS-Test. **t-test mean** is based on the comparison of the mean for independent samples. **p-values** describe the p-values of the KRUSKAL-WALLIS-Test based on the one-sided **Chi-distribution.** *, **, and *** show the 10%-, 5%- and 1%-significance level.

Table 56: Test results for Announcement year (spin-off)

The results in Tables 55 and 56 highlight significant differences in the abnormal price returns between years. This holds for all event windows for ECO and spin-off with exception of [-10;0] for ECO. Therefore, Expected Reaction 6 can be confirmed.

To cover a different angle of timing, Expected Reaction 7 implies that the market environment at the time of the announcement affects the valuation of a corporate divestiture and thus the realized abnormal returns. As the sample covers North America as well as Europe, the S&P 500 and EUROSTOXX 600 are used as market indices. The development of both the S&P 500 and the EUROSTOXX 600 is graphically depicted in figure 28. All graphs lead to the same division of market environment in recession and expansion phases.



RECESSION covers the periods of January 2000 to March 2003 and July 2007 to March 2009. **EXPANSION** covers the periods of March 2003 to July 2007 and March 2009 to December 2013. All indices are equal weighted price indices.

Figure 28: Market environment following MSCI World, S&P 500 and EUROSTOXX 600

In the next step, the variable Market expansion is created: For divestitures announced in the period between January 2000 and March 2003 as well as July 2007 to March 2009, the variable takes on [1] while in the periods from March 2003 to July 2007 as well as March 2009 to December 2013, the variable takes on the value [0]. Tables 57 and 58 show the distribution of the sample over time for ECO and spin-off, respectively.

ECO															
	Announcement year (2000 – 2013)														
	‘00	‘01	‘02	‘03	‘04	‘05	‘06	‘07	‘08	‘09	‘10	‘11	‘12	‘13	Total
Market expansion [0]	25	5	6	0	0	0	0	0	3	0	0	0	0	0	39
Market expansion [1]	0	0	0	5	15	6	4	3	0	0	2	6	11	12	64
Total	25	6	7	6	15	6	4	3	3	0	2	6	11	12	103

Market expansion [0] covers the periods of March 2003 to July 2007 and March 2009 to December 2013 and **Market expansion [1]** covers the periods of January 2000 to March 2003 and July 2007 to March 2009.

Table 57: Sample distribution for Market expansion over time (ECO)

Spin-off															
	Announcement year (2000 – 2013)														
	‘00	‘01	‘02	‘03	‘04	‘05	‘06	‘07	‘08	‘09	‘10	‘11	‘12	‘13	Total
Market expansion [0]	0	0	0	15	25	36	30	18	0	15	22	43	28	20	252
Market expansion [1]	42	13	17	2	0	0	0	16	21	0	0	0	0	0	111
Total	42	13	17	17	25	36	30	34	21	15	22	43	28	20	363

Market expansion [0] covers the periods of March 2003 to July 2007 and March 2009 to December 2013 and **Market expansion [1]** covers the periods of January 2000 to March 2003 and July 2007 to March 2009.

Table 58: Sample distribution for Market expansion over time (spin-off)

To assess Expected Reaction 7 the mean values of Market expansion [0] and [1] are compared. Market expansion describes the market environment (expansion vs. recession) at announcement that is the level of abnormal returns realized at divestiture. Tables 59 and 60 show the results for ECO and spin-off, respectively.

ECO							
Event window	**Market expansion [0]** N=39	**Market expansion [1]** N=64	**CAAR Diff.**	**t-test mean**		**Mann-Whitney-U**	
				t-value	p-value	z-value	p-value
[-10;0]	2.56%*	2.76%***	0.20%	0.13	0.899	0.51	0.610
[-1;0]	0.40%	1.78%***	1.38%	1.39	0.169	1.64	0.102
[-1;1]	1.29%	3.55%***	2.26%	1.55	0.125	1.94*	0.053
[-5;4]	3.21%**	2.22%**	0.99%	-0.57	0.571	0.25	0.806
[-10;10]†	6.79%**	3.93%**	-2.86%	-0.85	0.403	0.50	0.620
[-20;20]†	6.11%**	2.92%**	-3.19%	-0.96	0.341	-0.60	0.550

Market expansion [0] and **Market expansion [1]** correspond to the average cumulated abnormal returns of the parent company which announced a divestiture during an expansion [1] (periods of January 2000 to March 2003 and July 2007 to March 2009) or recession [0] (periods of March 2003 to July 2007 and March 2009 to December 2013) cycle. **t-test mean** is based on the comparison of the mean for independent samples. The Levene-Test is used to test homogeneity or heterogeneity of the sample. If the assumption of homogeneity of variance is rejected at the 5%-significance level, the event window is marked with †. The t-values show the results of the Welch-Test. **Mann-Whitney-U** describes the non-parametric Mann-Whitney-U-test. **p-values** are based on the two-sided t- and z-distribution. *, **, and *** show the 10%-, 5%- and 1%-significance level.

Table 59: Univariate test results for Market expansion (ECO)

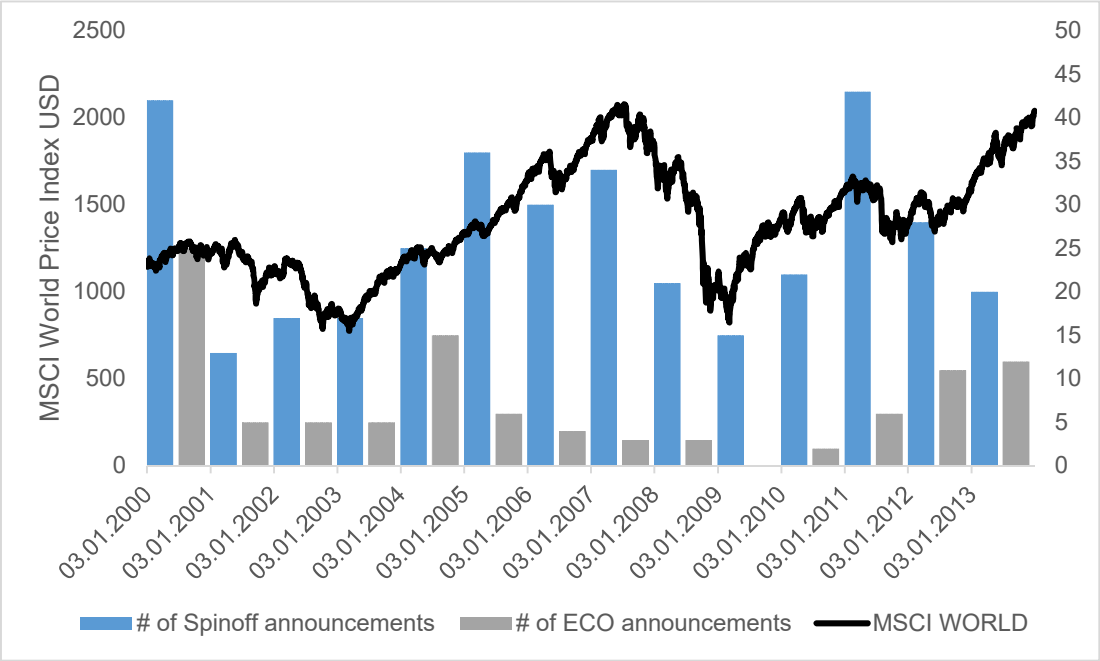
Spin-off							
Event window	**Market expansion [0]** N=252	**Market expansion [1]** N=111	**CAAR Diff.**	**t-test mean**		**Mann-Whitney-U**	
				t-value	p-value	z-value	p-value
[-10;0]	3.47%***	3.72%***	-0.25%	-0.18	0.854	-0.92	0.358
[-1;0]†	3.78%***	2.70%***	1.08%	1.18	0.240	1.34	0.18
[-1;1]	4.71%***	2.90%***	1.81%	1.54	0.125	1.14	0.253
[-5;4]†	3.66%***	5.54***	-1.08%	0.28	0.277	-0.50	0.620
[-10;10]	2.31%**	4.21%**	-1.90%	-1.03	0.302	-1.64	0.102
[-20;20]	0.92%	5.29%***	-4.37%	-2.00**	0.046	-2.03**	0.042

Market expansion [0] and **Market expansion [1]** correspond to the average cumulated abnormal returns of the parent company which announced a divestiture during an expansion [1] (periods of January 2000 to March 2003 and July 2007 to March 2009) or recession [0] (periods of March 2003 to July 2007 and March 2009 to December 2013). **t-test mean** is based on the comparison of the mean for independent samples. The Levene-Test is used to test homogeneity or heterogeneity of the sample. If the assumption of homogeneity of variance is rejected at the 5%-significance level, the event window is marked with †. The t-values show the results of the Welch-Test. **Mann-Whitney-U** describes the non-parametric Mann-Whitney-U-test. **p-values** are based on the two-sided t- and z-distribution. *, **, and *** show the 10%-, 5%- and 1%-significance level.

Table 60: Univariate test results for Market expansion (spin-off)

The results show that there is no significant impact from the market environment on the level of abnormal returns for either ECO or spin-off. With the exception of the event window [-20;20], none of the results are significant. Moreover, the differences change from positive to negative between the different event windows. Consequently, Expected Reaction 7 is rejected.

The graph below shows the distribution of ECO and spin-off announcement over the sample period relative to the development of the MSCI World Index. Only approximately a third of all spin-offs were announced during a period of recession (111 out of 363). This raises the question of how management times a divestiture announcement. Expected Reaction 8 postulates a positive relationship between market environment and the parent company's management divestiture decision. The number of divestiture announcements and the market environment is depicted in Figure 29 for spin-off and ECO.



The graphic shows the development of the **MSCI World equal weighted price index** and the **distribution of divestiture announcements** over time.

Figure 29: Divestiture announcements in relation to market environment

Figure 29 suggests a positive relation between market environment and the number of divestiture announcements. To statistically investigate the relationship of the two, the correlation between the discrete 1-year return of the MSCI World Index and the number of divestiture announcements is used. The results are shown in Table 61 for ECO and spin-off.

For both divestiture types, the correlation coefficient based on the normal distribution assumption according to PEARSON and the non-parametric rank correlation coefficients following KENDALL and SPEARMAN indicate a significant positive relationship between market environment and the number of divestiture announcements. Therefore, the conclusion is that parent company management prefer the announcement of divestiture transactions during a positive market environment. Expected Reaction 8 can thus be confirmed.

Year	#ECO	#spin-off	Return MSCI World
2000	25	42	4.28%
2001	5	13	-8.61%
2002	6	17	-22.24%
2003	5	17	32.11%
2004	15	25	16.59%
2005	6	36	21.74%
2006	4	30	14.66%
2007	3	34	-1.34%
2008	3	21	-43.09%
2009	0	15	33.56%
2010	2	22	11.52%
2011	6	43	-11.89%
2012	11	28	14.57%
2013	12	20	28.69%
Total	N = 103	N = 363	

	Correlation ECO	Asymptotic Significance	Correlation spin-off	Asymptotic Significance
PEARSON	0.536***	0.000	-0.085	0.108
KENDALLS TAU B	0.278***	0.000	-0.089**	0.047
SPEARMANS RHO	0.580***	0.000	-0.105**	0.046

PEARSON is PEARSONS product-moment-correlation-coefficient. The assumption of normal distribution cannot be rejected based on the KOLMOGOROS-SMIRNO-LILLIEFORS-TTEST at the 5%-significance level, therefore the condition for application of the parametric correlation coefficient following PEARSON is met. **KENDALLS TAU** and **SPEARMANS RHO** are the non-parametric sign-rank correlation coefficients following CHARLES SPEARMAN and MAURICE GEORGE KENDALL. *, **, and *** show the 10%-, 5%- and 1%-significance level based on the two-sided asymptotic significance levels.

Table 61: Correlation analysis market environment to number of announcements

7.4.7 Relative size of divested entity

Expected Reaction 9 implies a positive relationship between the size of the divested company and that of its parent company. To investigate the hypothesis, Relative size is used as independent variable. For ECO, Relative size is the USD proceeds of the sale of the divested entity in relation to the total USD assets of the parent company. For spin-off, Relative size is defined as the transaction value in USD relative to the total USD assets of the parent company. The linear regression takes the form:

$$CAR_{i,t1\text{-}t2} = \alpha + \sum_{j=1}^{J} \boldsymbol{\beta_j} \text{ Relative size}_{i,j} + \varepsilon_{i,t1\text{-}t2}$$

The results for ECO and spin-off are summarized in Tables 62 and 63.

ECO						
Event window	Constant	Regression Coefficient	t-value	p-value	R^2	Adj. R^2
Relative size / N=102						
[-10;0]	0.007	259.038	3.86***	0.000	0.130	0.121
[-1;0]	0.014	-12.360	-0.27	0.785	0.000	-0.009
[-1;1]	0.032	-60.325	-0.90	0.368	0.008	-0.002
[-5;4]	0.030	-52.678	-0.67	0.506	0.004	-0.006
[-10;10]	0.034	224.91	1.72*	0.089	0.029	0.019
[-20;20]	0.037	60.205	0.45	0.657	0.002	-0.008

Relative size corresponds to the ratio of the sales of the divested entity to the parent company's total USD assets at the time of announcement. **t-value** is the result of the t-test of the regression coefficients. **p-values** are based on the two-sided t distribution. **R^2** is the coefficient of determination. **Adj. R^2** is the adjusted coefficient of determination. *, **, and *** show the 10%-, 5%- and 1%-significance level.

Table 62: Linear regression results for Relative size (ECO)

Spin-off						
Event window	Constant	Regression Coefficient	t-value	p-value	R^2	Adj. R^2
Relative size / N=232						
[-10;0]	0.035	-0.872	-0.54	0.590	0.001	-0.003
[-1;0]	0.036	-0.203	-0.19	0.851	0.000	-0.004
[-1;1]	0.047	-0.202	-0.15	0.882	0.000	-0.004
[-5;4]	0.040	-1.573	-0.87	0.385	0.003	-0.001
[-10;10]	0.035	-4.120	-1.87*	0.063	0.015	0.011
[-20;20]	0.024	-3.305	-1.16	0.246	0.006	0.002

Relative size corresponds to the ratio of the sales of the divested entity to the parent company's total USD assets at the time of announcement. **t-value** is the result of the t-test of the regression coefficients. **p-values** are based on the two-sided t distribution. **R^2** is the coefficient of determination. **Adj. R^2** is the adjusted coefficient of determination. *, **, and *** show the 10%-, 5%- and 1%-significance level.

Table 63: Linear regression results for Relative size (spin-off)

As the Tables show, the relationship between size and abnormal returns is rather negative for both ECO and spin-off. However, results are statistically significant only in the event window [-10;10] for both Eco and spin-off. Therefore, the results indicate a negative relationship and lead to the rejection of Expected Reaction 9.

7.4.8 Industry sector

Expected Reaction 10 postulates that differences in abnormal returns realized by parent companies are dependent on the industry in which the divesting entity is operating. Tables 64 and 65 show the results of the industry-specific event studies for ECO and spin-off, respectively. As these tables show, the number of observations per industry is too low to derive statistically relevant results.

Industry analysis – ECO						
	Event windows					
	[-10;0]	[-1;0]	[-1;1]	[-5;4]	[-10;10]	[-20;20]
Mining / N =8						
CAAR	4.32%	-0.02%	3.63%	0.93%	7.83%	7.35%
p-value[1]	0.153	0.990	0.122	0.854	0.138	0.120
Construction / N =2						
CAAR	7.25%	5.35%*	5.34%**	0.25%	-1.77%	-12.94%
p-value[1]	0.228	0.067	0.012	0.942	0.801	0.407
Manufacturing / N =39						
CAAR	2.87%**	1.19%	2.47%*	1.74%	2.17%*	0.45%
p-value[1]	0.010	0.175	0.073	0.141	0.067	0.802
Transportation, Communications, Electric, Gas, and Sanitary Services / N =31						
CAAR	-0.09%	0.38%	1.92%	1.60%	2.84%	5.32%**
p-value[1]	0.928	0.579	0.106	0.103	0.130	0.031
Wholesale trade / N =1						
CAAR	No regression performed as N=1.					
p-value[1]						
Retail trade / N =11						
CAAR	5.37%**	4.83%**	5.56%*	6.08%*	7.36%	10.56%*
p-value[1]	0.048	0.027	0.072	0.055	0.166	0.095
Services / N =11						
CAAR	3.95%	0.50%	1.46%	6.83%	18.70%*	9.87%
p-value[1]	0.378	0.647	0.314	0.146	0.072	0.177

1 All **p-**values are one sided. **CAAR** correspond to the average cumulated abnormal returns during the event window. **Median CAR** corresponds to the median cumulated abnormal returns during the event window. **p-value** refers to the one-sided t-test for the CAAR as well as the WILXOCON sign rank test for the median. *, **, and *** show the 10%-, 5%- and 1%-significance level. If the assumption of normal distribution is rejected based on the K**OLMOGOROV-SMIRNOV-LILLIEFORS-TEST** at the 1%-significance level, the event window is marked with a †.

Table 64: Univariate test results per industry sector (ECO)

Industry analysis – spin-off						
	Event windows					
	[-10;0]	[-1;0]	[-1;1]	[-5;4]	[-10;10]	[-20;20]
Mining / N =8						
CAAR	4.32%	-0.02%	3.63%	0.93%	7.83%	7.35%
p-value[1]	0.153	0.990	0.122	0.854	0.138	0.120
Construction / N =2						
CAAR	7.25%	5.35%*	5.34%**	0.25%	-1.77%	-12.94%
p-value[1]	0.228	0.067	0.012	0.942	0.801	0.407
Manufacturing / N =39						
CAAR	2.87%**	1.19%	2.47%*	1.74%	2.17%*	0.45%
p-value[1]	0.010	0.175	0.073	0.141	0.067	0.802
Transportation, Communications, Electric, Gas, and Sanitary Services / N =31						
CAAR	-0.09%	0.38%	1.92%	1.60%	2.84%	5.32%**
p-value[1]	0.928	0.579	0.106	0.103	0.130	0.031
Wholesale trade / N =1						
CAAR	No regression performed as N=1.					
p-value[1]						
Retail trade / N =11						
CAAR	5.37%**	4.83%**	5.56%*	6.08%*	7.36%	10.56%*
p-value[1]	0.048	0.027	0.072	0.055	0.166	0.095
Services / N =11						
CAAR	3.95%	0.50%	1.46%	6.83%	18.70%*	9.87%
p-value[1]	0.378	0.647	0.314	0.146	0.072	0.177

1 All **p-**values are on sided. **CAAR** correspond to the average cumulated abnormal returns during the event window. **Median CAR** corresponds to the median cumulated abnormal returns during the event window. **p-value** refers to the one-sided t-test for the CAAR as well as the WILXOCON sign rank test for the median. *, **, and *** show the 10%-, 5%- and 1%-significance level. If the assumption of normal distribution is rejected based on the K**OLMOGOROV-SMIRNOV-LILLIEFORS-TEST** at the 1%-significance level, the event window is marked with a †.

Table 65: Univariate test results per industry sector (spin-off)

The results for each industry sector show a positive abnormal return for both ECO and spin-off. However, for both ECO and spin-off the sample size is too low across

all but the industry sector “Manufacturing” to derive statistically relevant results. Moreover, results for spin-off are only significant for the industry sector. Consequently, Expected Reaction 10 cannot be confirmed.

7.5 Multivariate test results

In addition to the performed univariate analysis, the independent variables are combined in a multivariate analysis. However, the objective of this study is not to make the ECO or spin-off success predictable but to see the change in relevance if individual dependent variables are aggregated in a combined model. Tables 66 and 67 show the results for ECO and spin-off, respectively. The dependent variable is defined as the CAR of event window [-10;10]. Models 1 to 5 include various control variables; Model 6 is a full model including all available variables (while avoiding multicollinearity).

Multivariate regression: ECO						
	Event window [-10;10]					
	[1] N=94	[2] N=94	[3] N=94	[4] N=94	[5] N=85	[6] N=85
Factors						
Media	0.036	0.019	0.019			0.067
Ind Focus			-0.040	-0.038	0.003	0.002
Geo Focus			0.035	0.035	0.060	0.053
Conglomerate				0.013	0.001	-0.002
Tobin's Q					-0.079	-0.084
Net sales USD (nat. log)					-0.005	-0.010
Debt-to-equity (5% winso-rized)					0.000	0.000
SD EPS (5% winsorized)					0.053	0.058
Moderating factors						
Relative size		308.828*				-123.071
Parent return	0.034	0.009	0.044	0.042	0.005	0.006
Quick ratio	0.028	0.025	0.026	0.025	0.017	0.021
RoA	0.002	0.004	0.001	0.001	0.002	0.001
CF margin	0.001	0.001	0.001	0.001	-0.000	-0.001
Z-Score	-0.011	-0.015	-0.010	-0.009	-0.007	-0.008
Market return	0.615	1.062	0.214	0.313	0.445	0.416
Statistics						
$\mathbf{R^2}$	0.036	0.070	0.067	0.068	0.128	0.143

CAAR corresponds to the average cumulated abnormal returns during the event window. **Median CAR** corresponds to the median cumulated abnormal returns during the event window. **p-value** refers to the one-sided t-test for the CAAR as well as the WILXOCON sign rank test for the median. *, **, and *** show the 10%-, 5%- and 1%-significance level. If the assumption of normal distribution is rejected based on the K**OLMOGOROV-SMIRNOV-LILLIEFORS-TEST** at the 1%-significance level, the event window is marked with a †.

Table 66: Multivariate regression results (ECO)

Multivariate regression: spin-off						
	Event window [-10;10]					
	[1] N=285	[2] N=205	[3] N=270	[4] N=270	[5] N=219	[6] N=173
Factors						
Media	-0.009	-0.034	-0.020			-0.024
Ind Focus			0.043**	0.036*	0.037**	0.039**
Geo Focus			0.043	0.042	0.010	-0.027
Conglomerate				-0.026	-0.001	-0.009
Tobin's Q					-0.000	-0.007
Net sales USD (nat.log)					-0.006	-0.005
Debt-to-equity (5% winso-rized)					0.005**	0.006**
SD EPS (5% winsorized)					0.002	-0.001
Moderating factors						
Relative size		-0.155				26.572*
Parent return	-0.077***	-0.059***	-0.076***	-0.078***	-0.075***	-0.062**
Quick ratio	-0.001	0.004	-0.001	-0.001	-0.008	0.007
RoA	-0.000	0.000	-0.000	-0.000	0.001	0.000
CF margin	$1.14e^{-6}$**	$9.08e^{-7}$*	1.31^{-6}***	$1.34e^{-6}$***	$1.14e^{-6}$**	$1.77e^{-6}$***
Z-Score	-0.001	-0.001	-0.001	-0.001	0.001	-0.004
Market return	0.521	-0.791	-0.025	-0.043	0.504	-0.037
Statistics						
$\mathbf{R^2}$	0.1261	0.101	0.148	0.153	0.119	0.168

CAAR correspond to the average cumulated abnormal returns during the event window. **Median CAR** corresponds to the median cumulated abnormal returns during the event window. **p-value** refers to the one-sided t-test for the CAAR as well as the WILXOCON sign rank test for the median. *, **, and *** show the 10%-, 5%- and 1%-significance level. If the assumption of normal distribution is rejected based on the K**OLMOGOROV-SMIRNOV-LILLIEFORS-TEST** at the 1%-significance level, the event window is marked with a †.

Table 67: Multivariate regression results (spin-off)

7.6 Results summary

Parent companies located in Europe or North America that adjust their corporate structure using divestitures, namely equity carve-out and spin-off, generally create shareholder value. Differently stated, the announcement of an equity carve-out or spin-off is relevant for investors in their stock price valuation and the announcement itself is perceived as contributing to a positive value increase. A major question for this study is to identify whether reporting by a major news outlet that is relevant to capital markets has an impact on the abnormal return realized through the announcement of an equity carve-out or spin-off. For spin-off, a positive impact of news reporting on the abnormal returns in the market is observed. More precisely, spin-off transactions reported by a major news outlet create higher value on average than transactions not reported by a major news outlet. On the other hand, almost all equity carve-outs considered in this study were also covered by a major news outlet and thus no conclusion about the announcement effect for equity carve-out can be drawn. Furthermore, the motivation of the transaction of spin-off transactions as revealed in the news coverage did not induce a difference in returns.

The success factors for divestiture transactions as identified through the diversification theory further explains the value creation effect of equity carve-out and spin-off. The analysis confirms that market participants act rationally and adjust their expectations based on new information.

Limitations

The objective of this study is the investigation of implications of equity carve-out and spin-off: this comprises capital market reaction to the announcement of these transactions, the importance of media reporting of these transactions and factors potentially explaining capital market reactions. However, it is not a playbook on how to best pursue an equity carve-out or spin-off divestiture nor how to best play capital markets when performing such a transaction. This study should be read as providing further insights on factors influencing a transaction, while being aware of the following limitations:

(1) The study focuses on short-term capital market reactions to the transaction announcements. The long-term benefits for divested entities or parent companies are not (neither separately nor in aggregate) examined. Therefore, the results may not hold over time; factors relevant in the short-term to capital markets are not relevant in long-term value creation.

(2) The statistical methodologies applied in this study inherently limit results. Measurement errors, violation of assumptions and the general limiting conceptual frameworks in describing real world phenomena limit the generalization of results.

8 Conclusion

Overall conclusion

The empirical analysis of 103 ECO announcements and 363 spin-off announcements between 2000 and 2013 in Europe and North America provide clear answers to the main research questions:

1. Does corporate management create value for shareholders by divesting subsidiaries as spin-off and ECO?
   Yes, the announcements of ECO and spin-off create positive abnormal stock returns for parent company shareholders.

2. Does media coverage of spin-off and ECO transactions influence shareholder value creation?
   Yes, the reporting of a spin-off announcement by a major news outlet positively influences the abnormal stock return realized by parent companies. However, not enough observations for ECO exist to derive a statistically relevant answer.

3. What are motivations (deal rationales) presented by media coverage and does the contents (deal rationale) of the news coverage of spin-off and ECO transactions influence shareholder value creation?
   For spin-off, the main **deal rationales** are the motivation of the parent company to concentrate on its core business and to achieve a better stock market valuation. For ECO, the main **deal rationales** are the motivation of the parent company to concentrate on its core business and to raise funds for growth financing of the subsidiary or debt reduction.
   With regard to the relevance of news contents, the deal rationale retrieved from a major news outlet **does not significantly influence** the abnormal stock returns realized by parent companies through the announcement of a spin-off. Not enough observations for ECO announcements were identified to derive statically relevant results.

The study thereby answers the main research questions directly: ECO and spin-off increase shareholder value. Media is pivotal in ensuring an effective dissemination of the announcement information to market participants so that they can update their buy and sell decisions accordingly. Last, the contents of the media distribution – the actual reasoning for the execution of a transaction – was not found to have a statistically significant explanatory power on the value creation effect.

Conclusion per hypotheses

- Ad **Hypothesis 1**: The announcement of an ECO or spin-off creates positive abnormal stock returns for parent companies.

  Result: Using the market model, ECO transaction announcement creates a positive abnormal stock return for parent companies of between 1.26% and 5.01% across different event windows. The shortest event window [-1;1] around the announcement day 0 highlights a cumulative abnormal stock return of 2.71%. As with spin-off, the range across different event windows is from 2.25% to 4.24% with 4.15% in the [-1;1] event window. The results are all statistically significant and confirm the hypothesis unambiguously. Moreover, the results are confirmed using the market-adjusted return model.

- Ad **Hypothesis 2**: The reporting of an ECO or spin-off announcement by a major news outlet positively influences the abnormal stock returns realized by parent companies.

  Result: Of all 103 ECO considered, 97 were covered by a major news outlet and 6 were not. The existing data does not allow the derivation of (statistically) meaningful results. For spin-off transactions, 278 transactions were covered by a major news outlet and 85 were not. Transactions which were reported by a major news outlet show higher abnormal returns throughout all event windows than transactions which were not reported by a major

news outlet. Results are statistically significant in the event window [-4;4] and [-20;20]. Consequently, Hypothesis 2 is confirmed.

- Ad **Hypothesis 3**: The deal rationale assessed by a major news outlet significantly influences the abnormal stock returns realized by parent companies through the announcement of an ECO or spin-off.

  Result: For ECO transactions, the number of observations is insufficient to derive statistically relevant results. For spin-offs, abnormal returns vary between the different deal rationales identified by major news outlets, for example, deal rationale "concentration on core business" shows different abnormal returns than "achieve better valuation". However, these differences are not statistically significant in any event window. Therefore, Hypothesis 3 cannot be confirmed.

- Ad **Hypothesis 4**: Divestiture of a subsidiary operating in a business sector different in scope than the parent company of an ECO or spin-off transaction leads to a sector focus of the parent company that positively influences the abnormal return realized.

  Result: Empirical results support Hypothesis 4. While statistical results are not consistently significant, graphical analysis helps to support Hypothesis 4. For ECO, 58 out of 103 transactions contributed to sector focus while 45 did not. For spin-off, the 333 observable data points revealed 190 transactions supporting sector focus, while 143 did not. For both ECO and spin-off, sector focusing transactions consistently showed higher abnormal parent returns across all event windows. However, results were only significant in the event windows [-10;0] and [-1;0] for ECO and the [-5;4] window for spin-off.

- Ad **Hypothesis 5**: Divestiture of a subsidiary operating in a different geography than the parent company of an ECO or spin-off transaction leads to a geographical focus of the parent company that positively influences the abnormal return realized.

Result: Empirical results do not support Hypothesis 5. Out of 103 ECO transactions, only 18 support a geographical focus of the parent company. For spin-off, only 19 out of 341 support geographical focus. Given the low sample size of geographical-supporting transactions, statistical results are carefully considered. Data suggests that transactions supporting geographical focus consistently yield lower returns across different event windows with results not being significant.

- Ad **Hypothesis 6**: Subsidiary divestitures such as ECO or spin-off transactions performed by a conglomerate parent company positively influence the abnormal return realized.

  Result: Empirical results do not support Hypothesis 6. Out of 103 ECO parent companies, 59 are considered conglomerates. For spin-offs, 145 out of 355 spin-offs are considered conglomerates. In 4 out of 6 event windows, ECO conglomerate parents show higher abnormal stock returns than non-conglomerates. For spin-off, conglomerate parents actually show lower returns across all but the [-20;20] event window. Overall, results are not statically significant.

- Ad **Hypothesis 7**: Subsidiary divestitures such as ECO or spin-off transactions performed by parent companies trading at discount positively influence the abnormal returns realized.

  Result: Empirical results partially support Hypothesis 7. Out of 93 ECO parent companies, only 9 trade at a market-to-book value below 1. Out of 363 spin-off companies, 48 trade below a market-to-book value of 1. For spin-off, the abnormal returns realized are greater for parents with a market-to-book value below 1 across all but the longest event window. However, results are not statistically significant.

- Ad **Hypothesis 8**: The size of the parent company has a significant impact on the level of abnormal returns realized through ECO and spin-off transactions.

Result: Empirical results do not support Hypothesis 8. For both ECO and spin-off transactions, the size of the parent company measured by parent company net sales, number of employees and total assets did not produce statically significant results nor indicate a positive linear relationship of abnormal returns with size.

Conclusion of Expected Reactions of Control Variables

- Ad **Expected Reaction 1**: Control exercised by shareholders of the parent company has a significant impact on the level of abnormal returns realized through ECO and spin-off transactions.

  Result: Empirical results support Expected Reaction 1. The control exercised by shareholders measured by ownership concentration of the 10 biggest shareholders indicates a positive relationship between control and abnormal announcement returns. In addition, if control is measured by the presence of a single owner owning more than 20%, a positive relation between control and abnormal announcement returns is equally found.

- Ad **Expected Reaction 2**: A higher level of debt of a parent company has a positive significant impact on the level of abnormal returns realized in an ECO or spin-off transaction.

  Result: Empirical results do not support Expected Reaction 2. The statistical analysis of debt-to-equity ratio of the parent company and the positive abnormal returns realized does not indicate a relevant positive correlation.

- Ad **Expected Reaction 3**: The degree of information asymmetry (measured by higher dispersion in the EPS forecast) between the stock market and the parent company has a positive significant impact on the level of abnormal returns realized in an ECO and spin-off transaction

Result: Empirical results do not support Expected Reaction 3. The information asymmetry measured by the standard deviation of a parent company's EPS forecast does indicate a negative relationship contrary to the expectations. However, results are not statistically significant.

- Ad **Expected Reaction 4**: There is a significant relationship between the stock performance of the parent company prior to the announcement and the level of abnormal returns realized in an ECO and spin-off transaction.

  Result: Empirical results partially support Expected Reaction 4. The results for ECO indicate a statistically significant relationship which is positive for the event windows [-10;0] and [-20;20] and negative for the event window [-1;1]. The results for spin-off suggest a negative relationship significant in the long event windows [-10;10] and [-20;20]. Consequently, the Expected Reaction 4 is partially supported, however, no clear indication of the relationship can be drawn.

- Ad **Expected Reaction 5**: There is a significant relationship between the economic performance of the parent company prior to divestiture announcement and the level of abnormal returns realized in an ECO and spin-off transaction.

  Result: Empirical results do not support expected reaction 5. The regression of abnormal returns on the parent company's Quick Ratio, RoA, RoE and CF margin do not indicate a consistently positive or negative relationship, and most importantly are overall not statistically significant.

- Ad **Expected Reaction 6**: The abnormal returns realized following the announcement of ECO and spin-off transactions vary significantly from year to year.

  Result: Empirical results support Expected Reaction 6. For both ECO and spin-off transactions, the abnormal returns vary significantly from year to year and thus suggest that investors' perceptions vary over time.

- Ad **Expected Reaction 7**: The abnormal returns realized following the announcement of ECO and spin-off transactions vary significantly with the business cycle.

  Result: Empirical results do not support Expected Reaction 7. There is no statistical significance difference between abnormal returns realized in ECO and spin-off announcements during a market recession or market expansion phase.

- Ad **Expected Reaction 8**: The number of ECO and spin-off transactions is higher during times of market expansion than during market downturns.

  Result: Empirical results support Expected Reaction 8. The number of ECO and spin-off announcements positively correlates with a growing market. In an increasingly positive market environment, more transactions are announced while fewer announcements are made during a downwards market environment.

- Ad **Expected Reaction 9**: The level of abnormal returns realized in an ECO and spin-off transaction increases with the size of the divested entity relative to the parent company.

  Result: Empirical results lead to the rejection of Expected Reaction 9. The linear regression between the proxy for relative size and abnormal return indicates a negative linear relationship which is positive in the event window [-10;10] for ECO and spin-off but otherwise not statistically significant.

- Ad **Expected Reaction 10**: The industry sector in which the parent company is operating has a significant impact on the level of abnormal returns realized in an ECO and spin-off transaction.

  Result: Empirical results cannot confirm Expected Reaction 10. While individually returns between industry sectors differ, industry sub-sample sizes are too low to assess statistically relevant results.

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Appendix

Appendix table 1: ECO sample

ECO transactions		
Announcement day	**Parent company**	**ECO**
13.01.2000	Phoenix Technologies Ltd	inSilicon Corp
21.01.2000	Deutsche Telekom AG	T-Online International AG
07.02.2000	Distefora Holding AG	Ision Internet AG
25.02.2000	Canal+ SA	Le Studio Canal(Canal Plus SA)
01.03.2000	France Telecom SA	Wanadoo SA
08.03.2000	Crompton Corp	Osca Inc(Great Lakes Chem)
31.03.2000	Iberdrola SA	Gamesa
04.04.2000	Deluxe Corp	eFunds Corp
17.04.2000	Southern Co	Southern Energy Inc
19.04.2000	Northern States Power Co	NRG Energy Inc
26.04.2000	Eaton Corp	Axcelis Technologies(Eaton)
12.05.2000	Pharmacia Corp	Monsanto Co
30.05.2000	Sara Lee Corp	Coach Inc
06.06.2000	SPX Corp	INRANGE Technologies Corp
26.06.2000	Philip Morris Cos Inc	Kraft Foods Inc
20.07.2000	Lucent Technologies Inc	Agere Systems Inc
27.07.2000	Alcatel SA	Alcatel Optronics
14.08.2000	L-3 Communications Holdings	SureBeam Corp(Titan Corp)
29.08.2000	SAP AG	SAP Systems Integration AG
14.09.2000	Unaxis Holding AG	INFICON Holding AG
27.09.2000	Telefonica SA	Telefonica Moviles SA
04.10.2000	Millipore Corp	Mykrolis Corp
30.10.2000	The Williams Cos Inc	Williams Energy Partners LP
31.10.2000	FMC Corp	FMC Technologies Inc
30.11.2000	Babcock Borsig AG	Nordex AG(Babcock Borsig AG)
19.01.2001	Spherion Corp	Michael Page Group(Interim)
04.06.2001	Circuit City Stores Inc	CarMax Group
23.08.2001	Barnes & Noble Inc	GameStop Corp
19.10.2001	Sunoco Inc	Sunoco Logistics Partners LP
19.10.2001	Nestle SA	Alcon Inc
02.04.2002	Gas Natural SDG SA	Enagas SA

ECO transactions

Announcement day	Parent company	ECO
29.04.2002	ML Laboratories PLC	Cobra BioManufacturing PLC
08.05.2002	Hay & Robertson PLC	International Brand Licensing
10.05.2002	Pirelli & C SpA	Pirelli & C Real Estate SpA
25.07.2002	BD Multi Media SA	Gayplanet SA
18.12.2002	Mediaset SpA	Gestevision Telecinco SA
19.06.2003	Norsk Hydro ASA	Yara International ASA
04.08.2003	Union Pacific Corp	Overnite Corp
29.09.2003	Deutsche Post AG	Deutsche Postbank AG
06.10.2003	Motorola Inc	Freescale Semiconductor Inc
18.11.2003	GE	Genworth Financial Inc
15.01.2004	Enel SpA	Terna SpA
30.01.2004	Deutsche Telekom AG	Virgin Mobile Holdings(UK)PLC
09.03.2004	Titan International Inc	Titan Europe PLC
12.03.2004	Service Corp International	Dignity PLC
15.03.2004	Volvo AB	Ainax AB
29.04.2004	France Telecom SA	PagesJaunes SA
25.05.2004	Kemira Oyj	Kemira GrowHow
04.06.2004	Grupo Ferrovial SA	Cintra
07.06.2004	Insight Enterprises Inc	Plusnet PLC
07.06.2004	Nobia AB	Smallbone PLC
30.06.2004	Groupe Finuchem SA	ECA SA
07.07.2004	Suez SA	Elia System Operator SA
04.11.2004	Pirelli & C SpA	Olinda Fondo Shops
09.11.2004	Raytheon Co	Raymarine PLC
19.11.2004	GUS PLC	Experian Group Ltd
03.02.2005	Fortum Oyj	Neste Oil Corporation
28.02.2005	Telefonica SA	Endemol Holding NV
13.04.2005	Advanced Micro Devices Inc	Spansion Inc
29.04.2005	Clear Channel Commun Inc	Clear Channel Outdoor Hldg Inc
29.07.2005	Triarc Cos Inc	Tim Hortons Inc
22.09.2005	McDonald's Corp	Chipotle Mexican Grill Inc
03.02.2006	Walter Industries Inc	Mueller Water Products Inc
09.06.2006	Lonza Group Ltd	Polynt SpA
22.06.2006	SAS AB	Rezidor Hotel Group
23.10.2006	Halliburton Co	KBR Inc
07.02.2007	EMC Corp	VMware Inc

ECO transactions

Announcement day	Parent company	ECO
26.04.2007	Autonomy Corp PLC	blinkx PLC
22.05.2007	Iberdrola SA	Iberdrola Renovables SA
28.01.2008	EDP Energias de Portugal SA	EDP Renovaveis SA
07.04.2008	Bristol-Myers Squibb Co	Mead Johnson Nutrition Co
17.04.2008	Global Geo Services ASA	Spectrum ASA
18.02.2010	Barrick Gold Corp	African Barrick Gold PLC
08.03.2010	Triton fund/ Ambea AB	Ambea AB
24.02.2011	Rio Tinto PLC	Ivanplats Ltd
04.03.2011	Advantage Oil & Gas Ltd	Longview Oil Corp
23.03.2011	Sunoco Inc	Suncoke Energy Inc
25.03.2011	Sevan Marine ASA	Sevan Drilling ASA
24.10.2011	Jourdan Resources Inc	Gimus Resources Inc
27.10.2011	Sirios Resources Inc	Khalkos Exploration Inc
23.02.2012	Sears Holdings Corp	Sears Hometown & Outlet Stores
04.05.2012	Cincinnati Bell Inc	CyrusOne Inc
30.05.2012	Telefonica SA	Telefonica Deutschland Holding
07.06.2012	Tipp24 SE	Lotto24 AG
07.06.2012	Pfizer Inc	Zoetis Inc
08.06.2012	KTG Agrar AG	KTG Energie AG
20.06.2012	Susser Holdings Corp	Susser Petroleum Partners LP
07.08.2012	Dean Foods Co	The WhiteWave Foods Co
05.09.2012	Safeway Inc	Blackhawk Network Holdings Inc
04.12.2012	Compuware Corp	Covisint Corp
06.12.2012	George Weston Ltd	Choice Properties REIT
06.05.2013	Exxon Mobil Corp	Antero Resources Corp
09.05.2013	QEP Resources Inc	QEP Midstream Partners LP
09.05.2013	Canadian Tire Corp Ltd	CT Real Estate Invest Trust
07.06.2013	NRG Energy Inc	NRG Yield Inc
11.06.2013	Enbridge Energy Partners LP	Midcoast Energy Partners LP
26.06.2013	TransAlta Corp	TransAlta Renewables Inc
01.07.2013	CBS Corp	CBS Outdoor Americas Inc
25.07.2013	Western Refining Inc	Western Refining Logistics LP
19.09.2013	Valero Energy Corp	Valero Energy Partners LP
20.09.2013	Cheniere Energy Inc	Cheniere Energy Partners LP

ECO transactions

Announcement day	Parent company	ECO
03.10.2013	GE	Cembra Money Bank AG
25.11.2013	CenterPoint Energy Inc	Enable Midstream Partners LP

Source: Thomson Reuters

Appendix table 2: Spin-off sample

Spin-off transactions		
Announcement day	**Parent company**	**Spin-off**
05.01.2000	IMS Group PLC	Teamtalk.com PLC
14.01.2000	RPC Inc	Marine Products Corp(RPC Inc)
19.01.2000	BCE Inc	Nortel Networks Corp
25.01.2000	Aeterna Laboratories Inc	Aeterna Laboratories Inc
27.01.2000	Actuant Corp (Applied Power)	APW Ltd(Actuant Corp)
28.01.2000	Siemens	Siemens AG-Vaccum Pumps
02.02.2000	AT&T Corp	AT&T Broadband & Internet Svcs/ Wireless Group
03.02.2000	Peninsular & Oriental Steam	P&O Princess Cruises PLC
01.03.2000	Sequana (Arjo Wiggins)	Antalis
01.03.2000	Lucent Technologies Inc	Avaya Inc
22.03.2000	BG Group PLC	Lattice Group PLC(BG Group)
06.04.2000	Hart Stores Inc	Hartco Income Fund
14.04.2000	Ford Motor Co	Visteon Corp
19.04.2000	Modern Times Group MTG AB	Metro International SA
24.04.2000	Sybron International Corp	Sybron Dental Specialties Inc
16.05.2000	IMS Health Inc	Strategic Technologies
30.05.2000	Agresso Group ASA	Groupe Concept ASA
05.06.2000	Degussa-Huels AG	Degussa Metals Catalysts AG
06.06.2000	Hammond Manufacturing Co Ltd	Hammond Power Solutions Inc
08.06.2000	Adaptec Inc	Roxio Inc
15.06.2000	Kansas City Southern Inds Inc	Stilwell Financial Inc
20.07.2000	ESS Technology Inc	ViAlta.Com(ESS Technology Inc)
27.07.2000	Algonquin Mercantile Corp	Dominion Citrus & Drugs Ltd
27.07.2000	Herlitz AG	Herlitz PBS AG-Logistical
07.08.2000	SAP AG	SAP AG-IT Services Company
10.08.2000	Avery Communications Inc	Primal Solutions Inc
11.09.2000	Relyon Group PLC	Photo-Scan PLC(Relyon Group)
15.09.2000	Bayer AG	Bayer AG-Computing Center
18.09.2000	PKC Group Oyj	PKC Group Oyj-Software
02.10.2000	Equifax Inc	Equifax Inc-Pmt Svcs Unit
04.10.2000	Merkantildata ASA	Hands ASA
05.10.2000	Kyro Corp	Tecnomen Holding Corporation
13.11.2000	Uniq PLC	Wincanton PLC(Unigate)
14.11.2000	Perstorp AB	Pergo AB
15.11.2000	Eni SpA	ENI-Domestic Gas Network

Spin-off transactions		
Announcement day	**Parent company**	**Spin-off**
15.11.2000	AT&T Corp	Liberty Media Corp
27.11.2000	Southern Vectis PLC	Conder Environmental PLC
08.12.2000	Rockwell International Corp	Rockwell Collins Inc
11.12.2000	Pitney Bowes Inc	Pitney Bowes-Copier & Fax Bus
15.12.2000	Swisslog Holding AG	Swisslog Holding AG-Shelving
18.12.2000	Granada Compass PLC	Granada Compass-Hospitality
22.12.2000	AT&T Corp	AT&T Wireless Services Inc
20.02.2001	Southern Co	Mirant Corp
22.02.2001	Bristol-Myers Squibb Co	Zimmer Holdings Inc
20.03.2001	TT Group PLC	Send Group PLC(TT Group PLC)
24.04.2001	USX-US Steel Group	USX-US Steel Group
26.04.2001	Gladstone PLC	Transware PLC(Gladstone PLC)
01.05.2001	Kaneb Services Inc	Kaneb Services LLC
10.05.2001	British Telecommunications PLC	mmO2 PLC
18.06.2001	Reed Executive PLC	Reed Health Group PLC
28.06.2001	National Service Industries	L&C Spinco Inc
01.08.2001	Kingfisher PLC	Woolworths Group PLC
04.09.2001	Goodrich Corp	Goodrich Corp-Engineered Ind
11.10.2001	Thermo Electron Corp	Viasys Healthcare Inc
16.11.2001	Ambassadors International Inc	Ambassadors Group Inc
10.01.2002	L-3 Communications Holdings	SureBeam Corp(Titan Corp)
22.01.2002	Allergan Inc	Advanced Medical Optics Inc
25.02.2002	Dover Downs Entertainment Inc	Dover Downs Gaming & Entertain
26.02.2002	Somfy SA	Damartex SA
11.03.2002	CT Holdings Inc	Citadel Security Software Inc
12.03.2002	Chorion PLC	Urbium PLC(Chorion PLC)
14.03.2002	Yellow Corp	SCS Transportation Inc
08.05.2002	Hay & Robertson PLC	International Brand Licensing
11.07.2002	GP Strategies Corp	GP Strategies Corp-Cert Asts
14.08.2002	US Microbics Inc	Majestic Safe-T-Products Inc
15.08.2002	First American Scientific Corp	VMH VideoMovieHouse.com
26.09.2002	Astronics Corp	MOD PAC CORP
01.10.2002	Six Continents PLC	Six Conts-Hotels & Britvic Div
02.10.2002	Adherex Technologies Inc	Cadherin Biomedical Research
21.10.2002	TMP Worldwide Inc	Hudson Highland Group Inc
22.10.2002	Montefibre SpA	NGP SpA
04.11.2002	Vermilion Resources Ltd	Clear Energy Inc
06.01.2003	palmOne Inc	PalmSource Inc

Spin-off transactions		
Announcement day	**Parent company**	**Spin-off**
11.02.2003	NCC AB	Altima AB
13.03.2003	Bilia AB	Bilia AB-Truck & Constr Equip
17.03.2003	Three Five Systems Inc	Brillian Corp
24.03.2003	Conexant Systems Inc	Mindspeed Technologies Inc
01.04.2003	Telecom Italia Media SpA	Seat Pagine Gialle-Directories
09.04.2003	Bonavista Petroleum Ltd	NuVista Energy Ltd
15.04.2003	Kingfisher PLC	Kesa Electricals PLC
22.04.2003	Centex Corp	Cavco Industries Inc
26.05.2003	Tandberg Data GmBH	Tandberg Data ASA-Research
19.06.2003	Norsk Hydro ASA	Yara International ASA
02.07.2003	EFI	Electronics For Imaging-eBeam
21.08.2003	Abbott Laboratories	Hospira Inc
09.09.2003	Fortum Oyj	Neste Oil Corporation
07.10.2003	Motorola Inc	Freescale Semiconductor Inc
17.10.2003	Oxus Gold PLC	Marakand Minerals Ltd
18.12.2003	Pharmacopeia Inc	Pharmacopeia Drug Discovery
23.02.2004	South Staffordshire Group PLC	South Staffordshire PLC
25.02.2004	Kimberly-Clark Corp	Neenah Paper Inc
25.02.2004	Flamemaster Corp	Flamemaster Aerospace Corp
11.03.2004	Nexfor Inc	Fraser Papers Inc
11.03.2004	ITAB Industri AB	ITAB Industri AB-Shop Design
25.05.2004	Kemira Oyj	Kemira GrowHow
26.05.2004	Nera ASA	Nera ASA-Satellite Operations
02.06.2004	SouthernEra Resources Ltd	Southern Platinum Corp
03.06.2004	Hays PLC	DX Services PLC
16.06.2004	Conroy Diamonds & Gold PLC	Conroy-Finish Diamond Interest
	Saverco NV/ Cie Maritime	
17.06.2004	Belge SA	Euronav NV
21.07.2004	Bayer AG	Lanxess AG
20.08.2004	Bourbon SA	CBo Territoria
07.09.2004	iVoice Inc	iVoice Technology Inc
08.09.2004	Poolia ASA	Uniflex AB
13.09.2004	iVoice Inc	Deep Field Technologies Inc
27.10.2004	Ketch Resources Ltd	Kereco Energy Ltd
27.10.2004	Bear Creek Energy Ltd	Bear Ridge Resources Ltd
05.11.2004	iVoice Inc	Speechswitch Inc
01.12.2004	FrontLine Ltd	Golden Ocean Group Ltd
09.12.2004	Glowpoint Inc	Total Digital Displays Inc
13.12.2004	American Utilicraft Corp	Utilicraft Aerospace Industrie

Spin-off transactions		
Announcement day	**Parent company**	**Spin-off**
15.12.2004	Cofina SGPS SA	Cofina-Industrial Group
15.12.2004	Texas Industries Inc	Chaparral Steel Co
21.12.2004	IAC/InterActiveCorp	Expedia Inc
18.01.2005	Nexen Inc	Nexen Chemicals
26.01.2005	Dean Foods Co	Dean Specialty Foods Group LLC
10.02.2005	Sara Lee Corp	Sara Lee Corp-Americas/Asia
11.02.2005	EMS-Chemie Holding AG	Dottikon Es Holding AG
15.02.2005	Electrolux AB	Husqvarna AB
21.02.2005	Lonrho Africa PLC	Castle Acquisitions PLC
22.02.2005	Umicore NV	Cumerio
28.02.2005	Bunzl PLC	Bunzl PLC-Filtrona Filter
14.03.2005	Marzotto SpA	Italfashion SpA
29.03.2005	Paramount Resources Ltd	Paramount Resources-Oil,Gas
30.03.2005	Galtech Semiconductor	International Amateur Sports
31.03.2005	Gunnebo AB	Gunnebo Industrier AB
13.04.2005	Lions Gate Entertainment Corp	Lions Gate Entertainment-TV
23.05.2005	Unilever NV	Pan American Relations
25.05.2005	AltaGas Income Trust	AltaGas Income Trust-Natural
31.05.2005	Forest Gate Resources Inc	Blue Note Metals Inc
31.05.2005	Alloy Inc	Alloy Inc-Alloy Merchandising
14.06.2005	Viacom Inc	Viacom-Cable Network Bus
28.06.2005	BWT AG	Christ Water Technology AG
30.06.2005	Eni SpA	Isotini-Water Management
12.07.2005	Rubicon Minerals Corp	Paragon Minerals Corp
03.08.2005	Gray Television Inc	Triple Crown Media Inc
26.08.2005	Cypress Semiconductor Corp	SunPower Corp
31.08.2005	Gurit Holding AG	Medisize Holding AG
22.09.2005	SkyTerra Communications Inc	SkyTerra-Network Sys Asts
10.10.2005	Orion Oyj	Orion Oyj-Wholesale Div; Oriola -KD OYI
21.10.2005	RWE AG	Thames Water PLC
21.10.2005	PSI Group ASA	PSI Group-Mobile Solutions Bus; Captura ASA
01.11.2005	MBMI Resources Inc	Garson Resources Ltd
05.12.2005	Verizon Communications Inc	Verizon Info Services-Domestic
07.12.2005	Total SA	Arkema SA
13.12.2005	Human Genome Sciences Inc	Human Genome Sciences-CoGenesy
15.12.2005	Fyffes PLC	Fyffes PLC-property assets; Balmoral International Land Holdings Plc
20.12.2005	Intertape Polymer Group Inc	Intertape-Coated Products Op

Spin-off transactions		
Announcement day	**Parent company**	**Spin-off**
20.12.2005	Sonae	Sonae SGPS-Industrial Holdings
22.12.2005	Rocksource ASA	Nordic Mining ASA
25.01.2006	First Data Corp	Western Union Financial Svcs
31.01.2006	Novartis AG	Antibiotic Research Institute
10.02.2006	Securitas AB	Loomis Cash Handling Svcs AB
23.02.2006	WaveLight AG	Wavelight Laser Tech AG-
28.03.2006	Petroleum Geo-Services ASA	Petroleum Geo-Svcs A/S-Float; Teekay Petrojarl ASA
04.04.2006	Severn Trent PLC	Biffa PLC
11.04.2006	Red Lion Hotels Corp	Red Lion Hotels-RE Mgmt Bus
12.04.2006	WH Smith PLC	WH Smith PLC-News Distribution
19.04.2006	Bilia AB	Catena AB
04.05.2006	FACT Corp	FACT Products Inc
30.05.2006	Robotic Technology Systems PLC	RTS Innovation
31.05.2006	Extendicare Inc	Assisted Living Concepts Inc
28.06.2006	Duke Energy Corp	Duke Energy Corp-Natural Gas
03.07.2006	Nestor Healthcare Group PLC	Nestor Healthcare-Staffing Bus
11.07.2006	Hillenbrand Industries Inc	Batesville Casket Co
12.07.2006	Golden Chalice Resources Inc	Golden Chalice-Chapleau Proj
12.07.2006	Betsson AB	Net Entertainment AB
31.07.2006	Wolfden Resources Inc	Wolfden Resources INc-Northern
02.08.2006	Automatic Data Processing Inc	Automatic Data Processing-Brkg
29.08.2006	BBA Group PLC	Fiberweb PLC
07.09.2006	Fyffes PLC	Fyffes-General Produce & Distn; Total Produce Plc
21.09.2006	Sequoia Oil & Gas Trust	Trafalgar Energy Ltd
22.09.2006	Rolland Virtual Business Sys	Rolland Virtual Bus-IT Div
05.10.2006	Patient Safety Technologies	SurgiCount Medical Inc
05.10.2006	Eaton Laboratories Inc	IVPSA Inc
16.10.2006	Wildcat Silver Corp	Ventana Gold Corp
19.10.2006	Peab AB	Peab Industri AB
27.10.2006	Hutter & Schrantz AG	Hutter & Schrantz Stahlbau AG
31.10.2006	Egdon Resources PLC	Portland Gas Ltd
13.12.2006	Avanti Screenmedia Group PLC	Avanti Screenmedia-Satellite
03.01.2007	Dotronix Inc	PuraMed BioScience Inc
08.01.2007	NCR Corp	Teradata Corp
26.01.2007	Titan Global Holdings Inc	Titan Global Hldg Inc-Printed
31.01.2007	Strathmore Minerals Corp	Strathmore Minerals Corp-

Spin-off transactions		
Announcement day	**Parent company**	**Spin-off**
31.01.2007	Minco Mining & Metals Corp	Minco Base Metals Corp
02.02.2007	New Generation Hldgs Inc	Plastinum Corp
16.02.2007	Broca Plc; 2 Ergo Group Plc	Broca Plc
29.03.2007	iVoice Inc	Thomas Pharmaceuticals Ltd
03.04.2007	Laramide Resources Ltd	Laramide Resources Ltd-Non
16.04.2007	Point 360	Point 360-Remaining Businesses
24.04.2007	Morse PLC	Morse PLC-Monitise Business
10.05.2007	Koninklijke BAM Groep NV	Villaforte
11.05.2007	Norsk Hydro ASA	Hydro IS Partner AS
14.05.2007	Peabody Energy Corp	Patriot Coal Corp
15.05.2007	Consilium AB	Precomp Solutions AB
29.05.2007	Kverneland ASA	Kverneland ASA-Vineyard
31.05.2007	Anglo American PLC	Mondi PLC
12.06.2007	DNO International ASA	DNO AS
23.07.2007	Acuity Brands Inc	Acuity Specialty Group Inc
05.09.2007	RecycleNet Corp	Oldwebsites.com Inc
01.10.2007	Belo Corp	Belo Corp-Newspaper Business
10.10.2007	Cadbury PLC	Cadbury Schweppes Americas
18.10.2007	Watson Wyatt Worldwide Inc	Watson Wyatt Worldwide Inc-
19.10.2007	RNB Retail & Brands AB	Polarn O Pyret AB
23.10.2007	Bentley Pharmaceuticals Inc	Bentley Pharm Inc-Drug
25.10.2007	Fidelity Natl Info Svcs Inc	Fidelity Natl Info Svcs Inc-Le
26.10.2007	Hafslund ASA	Hafslund Infratek ASA
29.10.2007	FMC Technologies Inc	John Bean Technologies Corp
08.11.2007	Sonae	Sonae Capital SGPS SA
14.11.2007	Integrated Biopharma Inc	InB:Biotechnologies Inc
16.11.2007	Photocure ASA	PCI Biotech Holding ASA
06.12.2007	Linde AG	Linde AG-Medical Gas Business
12.12.2007	3U Holding AG	3U TELECOM GmbH
19.12.2007	Marine Harvest ASA	Lighthouse Caledonia ASA
29.01.2008	Pelangio Mines Inc	Pelangio Mines Inc-Cert Asts
07.02.2008	Gaiam Inc	Real Goods Solar Inc
14.02.2008	AstraZeneca PLC	AstraZeneca PLC-Gastrointestin
19.02.2008	Arura Pharma Inc	Arura Specialty Pharma Inc
25.02.2008	Brink's Co	Brink's Co-Brink's Home Sec
26.02.2008	iGATE Corp	iGate Corp-Professional Svcs
14.03.2008	ProSafe SE	Prosafe Production Public Ltd
18.03.2008	Alerion Clean Power SpA	Alerion Industries SpA-Non-
18.03.2008	Arrowhead Research Corp	Ensysce Biosciences Inc

Spin-off transactions		
Announcement day	**Parent company**	**Spin-off**
26.03.2008	Motorola Inc	Motorola SpinCo Holdings Corp
09.04.2008	Jelmoli Holding AG	Jelmoli-Invest Bus
09.04.2008	VeriSign Inc	Globys Inc
10.04.2008	PDL Biopharma Inc	PDL Biopharma Inc-Biotech Bus
17.04.2008	Altri SGPS SA	F Ramada
17.04.2008	Global Geo Services ASA	GGS ASA-Seismic Business
17.04.2008	Potlatch Corp	Potlatch Corp-Pulp Based Bus
18.04.2008	Hexagon AB	Hexagon Polymers AB; Hexpol AB
12.06.2008	Finisar Corp	Finisar Corp-NetWisdom Bus
07.08.2008	Cardinal Health Inc	CareFusion Corp
02.09.2008	Maestro Ventures Ltd	Maestro Ventures-Mineral Ppty
20.10.2008	Myriad Genetics Inc	Myriad Genetics Inc-Research &
14.04.2009	Grand Peak Capital Corp	Lucky Minerals Inc
29.04.2009	Time Warner Inc	AOL LLC
13.05.2009	IDT Corp	CTM Media Holdings Inc
30.07.2009	Cablevision Systems Corp	Madison Square Garden Corp
30.07.2009	Oppmann Immobilien AG	Sektkellerei J. Oppmann AG
16.09.2009	Normabec Mining Resources Ltd	Normabec Mining-Pitt Gold Ppty
22.09.2009	Woodward Governor Co	VanDyne SuperTurbo Inc
01.10.2009	Solar Energy Initiatives Inc	Solar Park Initiatives Inc
09.10.2009	Bard Ventures Ltd	Beatrix Ventures Inc
23.10.2009	Sopra Group SA	Axway Software SA
27.10.2009	Vishay Intertechnology Inc	Vishay-Measurement & Resistor
27.10.2009	Pharmaceutical Prod Dvlp Inc	PPD Inc-Furiex Pharm Inc
07.12.2009	McDermott International Inc	The Babcock & Wilcox Co
09.12.2009	NetGem SA	Video Futur Entertainment Group AG
21.12.2009	Norse Energy Corp ASA	Panoro Energy ASA
19.01.2010	Exeter Resource Corp	Exeter Resource Corp-Assets
29.01.2010	Carphone Warehouse Ltd	TalkTalk Telecom Group PLC; Carphone Warehouse Group
01.02.2010	Georex SA	Poros Warehouse Group Plc
02.02.2010	Cable & Wireless PLC	Cable & Wireless PLC-Worldwide
04.02.2010	CBR Gold Corp	CBR Gold Corp-Gold Assets
24.02.2010	Accor SA	Accor Services France SA; Edenred
08.04.2010	LRAD Corp	Parametric Sound Corp
19.04.2010	Modern Times Group MTG AB	CDON Group AB
21.04.2010	Fiat SpA	Fiat SpA-Auto Business
21.04.2010	Questar Corp	Questar Market Resources Inc

Spin-off transactions		
Announcement day	**Parent company**	**Spin-off**
29.04.2010	Bulova Technologies Group Inc	BulovaTech Labs Inc
04.05.2010	Pirelli & C SpA	Pirelli & C Real Estate SpA; Prelios SpA
06.05.2010	Wildcat Silver Corp	Riva Gold Corp
11.05.2010	Terra Ventures Inc	Terrex Energy Inc
24.05.2010	Sun Healthcare Group Inc	Sun Healthcare Group-RE
11.06.2010	Voyager Oil & Gas Inc	ante5 Inc
28.07.2010	ArcelorMittal SA	Arcelor Mittal-Stainless Div; APERAM
08.11.2010	Toromont Industries Ltd	Enerflex Ltd
18.11.2010	Cablevision Systems Corp	Rainbow Media Group LLC
02.12.2010	TNT NV; Post NL	TNT Express NV
08.12.2010	Fortune Brands Inc	Fortune Brands Inc-Home
23.12.2010	Diana Shipping Inc	Diana Containerships Inc
11.01.2011	Strategic Metals Ltd	Silver Range Resources Ltd
13.01.2011	Globex Mining Enterprises Inc	Chibougamau Independent Mines
13.01.2011	Marathon Oil Corp	Marathon Oil-Downstream Bus
18.01.2011	Northrop Grumman Corp	Huntington Ingalls Ind Inc
20.01.2011	Hinterland Metals Inc	Hinterland Metals Inc-Yukon
14.02.2011	Marriott International Inc	Marriott Intl Inc-Timeshare Op
23.02.2011	Full Metal Minerals Ltd	Full Metal Zinc Ltd
23.02.2011	Abertis Infraestructuras SA	Abertis-Car Parking & Logistic
24.02.2011	Carrols Restaurant Group Inc	Carrols Rest-Hispanic Brands
24.02.2011	Accelerator Nordic AB	SPAGO Imaging AB; PledPharma AB
28.02.2011	Carrefour SA	Dia
04.03.2011	East Asia Minerals Corp	Barisan Gold Corp
07.03.2011	Advantage Oil & Gas Ltd	Longview Oil Corp
22.03.2011	Rieter Holding AG	Autoneum Holding AG
22.03.2011	Punch Taverns PLC	Punch Taverns PLC-Spirit Bus
24.03.2011	Lumina Copper Corp	Lumina Copper Corp-Royalty
31.03.2011	Worlds Inc	Worlds.com Inc-Online &
05.04.2011	Selena Oil & Gas Holding AB	Emitor AB
06.04.2011	Aker Solutions ASA	Kvaerner ASA
07.04.2011	Expedia Inc	TripAdvisor LLC
05.05.2011	Maurel et Prom SA	Maurel & Prom Nigeria SA
17.05.2011	Firebird Resources Inc	GTO Resources Inc
18.05.2011	Vulcan Minerals Inc	Vulcan Minerals Inc-Cert Asts
27.05.2011	Radius Gold Inc	Radius Gold Inc-Yukon &
14.06.2011	Hillshire Brands Co	Sara Lee-Intl Coffee,Tea Bus
14.06.2011	Landore Resources Ltd	Lamaune Iron Inc
29.06.2011	Fjordland Exploration Inc	Woodjam North & South Copper-

Spin-off transactions		
Announcement day	**Parent company**	**Spin-off**
14.07.2011	ConocoPhillips Co	ConocoPhillips-Refining ,Mktg
14.07.2011	Ralcorp Holdings Inc	Post Holdings Inc
15.07.2011	Grand Peak Capital Corp	Acana Capital Corp
18.07.2011	Weatherly International PLC	China Africa Resources PLC
21.07.2011	De Longhi SpA	De' Longhi Clima SpA; Delclima SpA
28.07.2011	L-3 Communications Holdings	L-3 Commun Hldg Inc-Engility
04.08.2011	Kraft Foods Inc	Kraft Foods Inc-N Amer Grocery
06.09.2011	Open Range Energy Corp	Poseidon Concepts Corp
26.09.2011	RXI Pharmaceuticals Corp	Galena-Oncology & Gene Bus
29.09.2011	Eagle Plains Resources Ltd	Yellowjacket Resources Ltd
17.10.2011	Chevron Corp	Atlas Energy-Natural Gas Asset
19.10.2011	Abbott Laboratories	Abbott Laboratories-Research
21.10.2011	NSGold Corp	NSX Silver Inc
16.11.2011	NovaGold Resources Inc	NovaGold Resources-NovaCopper
30.11.2011	Mawson Resources Ltd	Darwin Resources Corp
15.12.2011	Covidien PLC	Covidien PLC-Pharm Business
06.01.2012	RPM Dental Inc	RPM Dental Systems LLC
11.01.2012	Comverse Technology Inc	Comverse Inc
12.01.2012	Mountain Province Diamonds Inc	Mountain Province-Kennady
09.02.2012	US Rare Earth Minerals Inc	Bio Multimin Inc
23.02.2012	Sears Holdings Corp	Sears Holdings Corp-Hometown
28.02.2012	Andes Energia PLC	Andina Plc
19.03.2012	Vitrolife AB	Xvivo Perfusion AB
20.03.2012	Raimount Energy Inc	Mount Rainey Silver Inc
12.04.2012	Subsea 7 SA	Veripos Ltd
12.04.2012	Betsson AB	Angler Gaming PLC
31.05.2012	Metall Zug AG	Zug Estates Holding AG
25.06.2012	Bigben Interactive	Mobile phone distribution
26.06.2012	L-3 Communications Holdings	Engility Holdings Inc
27.06.2012	News Corp	News Corp-Publishing Business
28.06.2012	NACCO Industries Inc	Hyster-Yale Materials Handling
01.08.2012	United Online Inc	FTD Group Inc
08.08.2012	Liberty Media Corp	Liberty Spinco Inc
13.08.2012	Elan Corp PLC	Prothena Corp PLC
28.08.2012	Ahlstrom OYJ	Munksjo Oyj
30.08.2012	Leidos Holdings Inc	SAIC-Govt Technical Svcs Bus
27.09.2012	Rogue Iron Ore Corp	Rapier Gold Inc
01.10.2012	Underberg AG	Schlumberger AG-Herbal Liqueur

Spin-off transactions		
Announcement day	**Parent company**	**Spin-off**
09.10.2012	Innovaro Inc	Strategos Inc
16.10.2012	Murphy Oil Corp	Murphy USA Inc
01.11.2012	Cookson Group PLC (Vesuvius)	Cookson Group PLC-Performance (Alent Plc)
05.11.2012	Dover Corp	Dover Corp-Certain Bus
28.11.2012	Siemens AG	OSRAM Licht AG
10.12.2012	Ingersoll-Rand PLC	Allegion PLC
14.01.2013	SEACOR Holdings Inc	Era Group Inc
19.02.2013	Demand Media Inc	Demand Media Inc-Domain
21.02.2013	YIT Oyj	YIT Oyj-Building Systems Bus
06.03.2013	Time Warner Inc	Time Inc
25.03.2013	Metso Oyj	Metso-Pulp, Paper & Power Bus
25.03.2013	Harvard Bioscience Inc	Harvard Apparatus Regenerative
07.05.2013	IDT Corp	Straight Path Communications
27.06.2013	Provexis PLC	SiS(Science in Sport)Ltd
23.07.2013	ONEOK Inc	ONEOK-Natural Gas Business
30.07.2013	Oil States International Inc	Oil States-Accommodations Bus
08.08.2013	Synergy Pharmaceuticals Inc	ContraVir Pharmaceuticals Inc
22.08.2013	SunEdison Inc	SunEdison Semiconductor Ltd
05.09.2013	Timken Co	TimkenSteel Corp
19.09.2013	Agilent Technologies Inc	Keysight-Technologies Inc
24.09.2013	Noble Corporation PLC	Paragon Offshore PLC
24.09.2013	National Oilwell Varco Inc	National Oilwell Varco-Distn
01.10.2013	Concordia Resource Corp	Meryllion Resources Corp
29.10.2013	Sears Holdings Corp	Lands' End Inc
07.11.2013	The Ensign Group Inc	Ensign Group Inc-RE Businesses
14.11.2013	Kimberly-Clark Corp	Kimberly-Clark Health Care Inc

Source: Thomson Reuters

Curriculum Vitae

Personal Information

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Education

09/2010 – 06/2013	HEC Paris, (M.Sc.), France
	Information Financière, Audit et Conseil
09/2007 – 08/2010	University of Mannheim (B.Sc.), Germany
	Economics