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To Spin Off or Not To Spin Off?

A study investigating the value creation of spin-offs in the United States

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Abstract

This study investigates the value creation of U.S. spin-offs undertaken between 2010 and 2017 from three perspectives. Firstly, shareholder wealth creation is analyzed through tests on unadjusted abnormal announcement-day returns and unadjusted abnormal long-term returns. Secondly, shareholder wealth creation is assessed from an investment management perspective through tests on risk-adjusted abnormal long-term returns using the Sharpe ratio. Thirdly, operating performance following spin-offs is examined from an internal corporate perspective through tests on return on assets, operating margin, and asset turnover. Our results indicate that spin-offs create shareholder wealth at the announcement day, but not on a long-term basis absent risk-adjustment. After risk-adjustment, we find that the average post-spin-off entity underperforms the overall market in the long-term. In terms of changes in operating performance after spin-offs, no statistically significant pattern is found. To the best of our knowledge, risk-adjusted stock market performance following spin-offs has not been a focus point in previous research. We thus believe that this study contributes to the existing literature within the field of spin-offs with a holistic view on the value-creating elements of spin-offs.

Keywords:
Spin-offs, Corporate Focus, Abnormal Returns, Operating Performance, Sharpe Ratio

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1 Introduction

1.1 Background

One of many strategic decisions managers face is whether or not to diversify their operations. History has witnessed a considerable amount of diversification success stories, such as Procter & Gamble, General Electric, and Johnson & Johnson. However, many examples of failed diversification attempts can be cited, including Quaker Oats' endeavor in the fruit juice industry with Snapple, which is considered one of the biggest failures in corporate-merger history, and RCA's unsuccessful ventures into computers, carpets, and rental cars (Markides, 1997).

Following the so-called conglomerate boom of the 1960s[1], the reverse strategy of re-focusing firms' core operations became prevalent during the 1980s (Markides, 1993). Today, there is a growing academic consensus that excessive levels of diversification may reflect negatively on both firm operating performance and valuation in the capital markets (Berger and Ofek, 1995; Lang and Stulz, 1994; Qian et al., 2008).

Firms can choose between several corporate actions to decrease diversification and increase corporate focus. One of these actions is the corporate spin-off. As opposed to divesting a subsidiary in return for cash or stock, a spin-off occurs when the parent distributes shares in the subsidiary on a pro-rata basis to the existing shareholders of the parent company (Cusatis et al., 1993). The American market has witnessed a significant increase in the number of spin-offs in recent years, with high-profile transactions such as eBay spinning off PayPal and Hewlett-Packard spinning off its PC and printer unit in 2015 (Kotzen et al., 2016).

The existing literature in the field of spin-offs reports significant and positive abnormal returns at the day of the spin-off announcement (Hite and Owers, 1983; Miles and Rosenfeld, 1983; Schipper and Smith, 1983). Furthermore, evidence of positive abnormal long-term returns of focus-increasing spin-offs has been found (Cusatis et al., 1993; Desai and Jain, 1999). Similarly, studies find evidence of improvements in operating performance for focus-increasing spin-offs (Cusatis et al., 1993; Desai and Jain, 1999). The most noteworthy

[1] The conglomerate boom in America during the 1960s was triggered by the Celler-Kefauver antimerger act of 1950, which prompted firms to undertake acquisitions of unrelated businesses (Handler and Robinson, 1961).

hypotheses seeking to explain these phenomena are related to (i) improved corporate focus and elimination of negative synergies, (ii) reduced information asymmetry, and (iii) transfer of wealth from bondholders to shareholders following spin-offs.

Although an extensive amount of research has been conducted on long-term abnormal returns following spin-offs, none have, to the best of our knowledge, incorporated the concept of risk into the method approach. As per the Modern Portfolio Theory introduced by Markowitz (1952), it is imperative to evaluate risk and reward together when assessing investment decisions. Incorporating the riskiness of the post-spin-off entities into the context of long-term spin-off returns would thus possibly contribute to a more holistic perspective on the value creation of spin-offs. Similarly, previous studies have tested changes in operational improvements following spin-offs, using return on assets (ROA) as the primary proxy for operational performance. However, a disproportionately small share of these studies has further explored the underlying drivers of operating performance by assessing whether the changes primarily stem from increased profitability or efficiency of operations.

1.2 Purpose and Contribution

The main objective of this study is to examine if and how spin-offs create value. We approach the term value creation from three different perspectives, namely (i) unadjusted announcement-day returns and unadjusted long-term stock market returns to measure pure shareholder wealth creation, (ii) risk-adjusted long-term returns to capture shareholder wealth creation from a more practical investment management perspective, and (iii) changes in the accounting metrics ROA, operating margin, and asset turnover from an internal, corporate perspective.

We aim to contribute to the existing research within the field of spin-offs by undertaking tests based on the methodology of Daley et al. (1997) on the announcement-day abnormal return of the pre-spin-off parent entity and on long-term changes in ROA, operating margin and asset turnover of the post-spin-off entities. We seek to add to the existing literature by not only examining long-term unadjusted abnormal stock market returns through tests inspired by Cusatis et al. (1993) but the long-term risk-adjusted abnormal stock market returns of the respective entities using the Sharpe ratio. As previously described, we argue that solely examining abnormal returns absent risk-adjustment provides an incomplete view of the stock market performance of spin-offs from an investor's perspective. To the best of our knowledge, the risk-adjusted stock market performance of spin-offs has not yet been a focus point in

previous studies. In terms of operating performance, the study adds to the currently limited research into the underlying drivers of changes in operating performance following spin-offs in the form of operating margin and asset turnover. By investigating the potential value creation of spin-offs both from the three described perspectives, we hope that this study will contribute with a comprehensive view to previously conducted research within the field of spin-offs. Specifically, we seek to answer the research question:

Do spin-offs create value and, if so, how do spin-offs create value?

1.3 Delimitation

The data used in this study is limited to corporate spin-offs of public companies listed on the NYSE and Nasdaq with spin-off dates between 2010 and 2017 – after the global financial crisis and before the COVID-19 pandemic. To answer our research question of whether spin-offs create value and, if so, how spin-offs create value, three hypotheses are primarily used in our theoretical framework: the corporate focus and negative synergies hypothesis, first put forward by Cusatis et al. (1993), the information asymmetry hypothesis, as interpreted by Nanda and Narayanan (1999) and (Chemmanur and Liu, 2011), as well as the efficient market hypothesis developed by Sharpe (1964), Lintner (1965), Mossin (1966), Fama (1970) and Malkiel (2003). Furthermore, concepts from the Modern Portfolio Theory, presented by Markowitz (1952) are taken into account in relation to the efficient market hypothesis. To capture potential changes in performance following spin-offs, tests on stock market performance metrics and accounting metrics are conducted. Stock market performance is examined both on an unadjusted level using unadjusted abnormal returns and on a risk-adjusted basis through the Sharpe ratio, first introduced by Sharpe (1966). Broader research on the effects of diversification from authors including Lang and Stulz (1994), Berger and Ofek (1995), and Qian et al. (2008) have also inspired our research question.

2 Literature Review and Theoretical Framework

In this section of the paper, we present findings and hypotheses from existing literature related to diversification and spin-offs. The section begins with a review of research covering the effects of diversification, followed by a summary of initially performed tests on shareholder wealth in connection to spin-offs and subsequently potential sources and drivers that may explain these effects. Moreover, the efficient market hypothesis and the logic of relating an asset to its inherent risk are introduced.

2.1 Effects of Diversification

There is a growing academic consensus that excessive levels of industrial diversification may reflect negatively on firm operating performance. Lang and Stulz (1994) find a negative relationship between high levels of diversification (primarily measured by the number of firm segments) and firm performance (measured by Tobin's q). Berger and Ofek (1995) reinforce this finding from a capital markets perspective by concluding that high levels of diversification diminish firm value by 13-15 percent. A similar pattern is observed in terms of geographical diversification, as the negative effect of geographical diversification on firm value is approximately equal to that of industrial diversification (Denis et al., 2002).

Altogether, these findings indicate an inverted, curvilinear relation between diversification and firm performance, implying that the net marginal benefits of diversification are positive at low levels but negative at higher levels of diversification (Markides, 1995). Qian et al. (2008) confirm this U-shaped relationship when using ROA and profit margins as proxies for firm performance.

The research by Berger and Ofek (1995) outlining the above-mentioned diversification discount is consistent with the model developed by Rajan et al. (2000), which predicts that, given a diversified firm with similar company divisions and high degrees of investment opportunities, internal company funds will flow to the most inefficient firm division. This investment inefficiency is consequently reflected in trading discounts of diversified firms compared to single-segment peers. Nevertheless, there is still academic disagreement as to whether this phenomenon should be considered evidence of value destruction. Villalonga (2004) contends that, in the case of diversification, there are no available experimental data points to measure the contra-factual, i.e., that the same firm is not diversifying its operations.

By using econometric techniques to control for the endogeneity of the diversification decision, Villalonga (2004) concludes that diversification, in fact, does not destroy value. This finding is consistent with Campa and Kedia (2002) and Graham et al. (2002), who stress the importance of modeling the endogeneity of diversification when assessing its effect on company valuation.

2.2 Shareholder Wealth Effects of Spin-Offs

Companies may engage in various corporate actions to increase operational focus, including divestments of subsidiaries to private buyers and carve-outs, in which the parent sells shares in the subsidiary to the public through an initial public offering. However, the focus point of this study is the effects of corporate spin-offs, in which the parent company distributes shares in the subsidiary on a pro-rata basis to the existing shareholders of the parent company (Cusatis et al., 1993). Post this non-cash transaction, the shareholders will thus own shares in two different companies rather than shares in one combined entity. Below, we outline literature regarding spin-offs and their effects on shareholder wealth and firm performance.

The majority of academic literature investigating shareholder wealth effects of spin-offs originates from the United States. The first pivotal research papers within the field were all published in 1983 by the authors Hite and Owers (1983), Miles and Rosenfeld (1983), and Schipper and Smith (1983). When studying the effects on shareholder wealth during the two-day interval of the spin-off announcement, all papers find significant evidence of positive abnormal returns, indicating market expectations of future operational improvements following spin-offs. Hite and Owers (1983) also observe that spin-offs facilitating mergers or separating disparate business units, i.e., cross-industry spin-offs, exhibit greater abnormal announcement-day returns than the overall sample.

Cusatis et al. (1993) build on the previous literature by examining the long-term stock market performance of both the continuing and the spun-off entity. When measuring the share price performance during periods of up to three years after the spin-off, the paper finds evidence of abnormal returns for both the continuing and the spun-off entity. However, both post-spin-off entities exhibit a high incidence of takeovers, and the abnormal returns are limited to post-spin-off entities that become subject to takeovers within the measured time period. This indicates that spin-offs may serve as an efficient corporate action to transfer control of assets to buyers with superior value-creating abilities. Cusatis et al. (1993) further propose two potential factors facilitating value creation following spin-offs. Firstly, the value creation may stem from the

elimination of negative synergies between the two entities after the spin-off. Secondly, the separation of the two entities facilitates the capital market's valuation process of the respective entities, which in turn mitigates the adverse selection issue that may arise due to information asymmetry. This brings us to the potential drivers of value creation in relation to spin-offs.

2.3 Drivers of Value Creation and Theoretical Framework

The academic literature outlining potential value creation sources of spin-offs can be categorized as (i) the corporate focus and negative synergies hypothesis, (ii) the information asymmetry hypothesis, and (iii) the transfer of wealth hypothesis. Among these hypotheses, the corporate focus and negative synergies hypothesis, together with the information asymmetry hypothesis, have obtained the broadest empirical support. Consequently, the theoretical framework in this paper is primarily derived from the corporate focus and negative synergies hypothesis and the information asymmetry hypothesis, through the perspective of the semi-strong form of the efficient market hypothesis.

Below, the transfer of wealth hypothesis is initially briefly summarized due to its lack of robust significant evidence. Subsequently, the corporate focus and negative synergies hypothesis, the information asymmetry hypothesis, and the efficient market hypothesis are described in greater detail.

2.3.1 Transfer of Wealth Hypothesis

Parrino (1997) studies shareholder gains from spin-offs by investigating spin-offs' effect on the relationship between shareholders and bondholders. He hypothesizes that spin-offs may result in a transfer of wealth from bondholders to shareholders as a consequence of debt restructuring related to the spin-off. This is exemplified in a qualitative case study of the Marriott spin-off, in which the debt restructuring diminished debtholders' collateral on the firm's existing liabilities. Consequently, this reflected positively in Marriott's share price and a decline in the market value of Marriott's bonds. On aggregate, the decline in the market value of Marriott's bonds exceeded the increase in Marriott's market value of equity.

On the other hand, Hite and Owers (1983) and Schipper and Smith (1983) find contrasting results when conducting quantitative event studies. Around the time of the announcement, both studies find that bond returns are not significantly affected, indicating that the transfer of wealth hypothesis proposed by Parrino (1997) may not hold in a broader context.

2.3.2 Corporate Focus and Negative Synergies Hypothesis

In line with Cusatis et al. (1993), Daley et al. (1997) hypothesize that the positive effect on shareholder wealth may stem from increased corporate focus and the elimination of negative synergies between the continuing and spun-off entities. The study is conducted by measuring the announcement-day returns of cross-industry and intra-industry spin-offs as well as the long-term operating performance of the respective entities within the cross- and intra-industry subsamples. Daley et al.'s (1997) results support the literature published by Comment and Jarell (1995), John and Ofek (1995), and Berger and Ofek (1995), all observing a positive relationship between firm value and corporate focus. Specifically, Daley et al. (1997) find significant value creation in the stock market around the announcement of cross-industry spin-offs, but none for intra-industry spin-offs.

A similar pattern is seen with regard to long-term operating performance, captured by ROA. The paper finds a significant improvement in ROA for cross-industry cases but not for intra-industry cases. Daley et al. (1997) further suggest that the value creation mainly stems from the separation of dissimilar business units and the opportunity for managers to concentrate on the business units that they are the most fitted to run. In the case of diversified firms, managers may be proficient at operating the firm's core business but inefficient in terms of the firm's non-core business. Separating the non-core business units as independent entities thus allows managers to focus on the operations they are best suited to manage. Furthermore, Daley et al. (1997) hypothesize that the improved operating performance may result from improved alignment of interest between management and shareholders through incentive plans that would not have been viable prior to the spin-off.

Similarly, Desai and Jain (1999) find that focus-increasing spin-offs exhibit both significantly greater long-term abnormal returns and operating performance than non-focus-increasing spin-offs. In terms of announcement-day returns, they also find that the average abnormal announcement-day return for focus-increasing spin-offs is roughly twice the size of non-focus-increasing spin-offs. These findings can be further explained by the previously mentioned diversification discount (Berger and Ofek, 1995). However, Desai and Jain (1999) contend that the motivation for non-focus-increasing spin-offs is likely to be the objective of separating underperforming business units from the parent. Put differently, in the case of non-focus-increasing spin-offs, any potential value creation from the combined entities as a result of the spin-off is likely to be disregarded by decision-makers. This discrepancy in the underlying

rationale to perform focus-increasing and non-focus-increasing spin-offs may thus partly explain the contrasting long-term stock market returns and operating performance of the two spin-off categories.

Ahn and Denis (2004) observe a significant relationship between spin-offs and shareholder wealth and expand the academic literature by incorporating changes in investment efficiency following spin-offs. Specifically, they observe that abnormal returns following spin-offs are positively related to increased investment efficiency. This is consistent with the previously mentioned study by Rajan et al. (2000), which finds significant evidence of investment inefficiency in diversified firms. Related to the diversification discount observed by Berger and Ofek (1995) and Lang and Stulz's (1994) study on diversification and Tobin's q, these results reinforce the hypothesis that diversified companies allocate capital less efficiently than focused firms, and consequently that a spin-off can serve as a mechanism to enhance investment efficiency for diversified firms (Ahn and Denis, 2004).

However, when taking endogeneity into account, Colak and Withed (2007) find contrasting results. As the underlying reasons that prompt firms to undertake spin-offs may in isolation improve investment efficiency, metrics such as Tobin's q easily become noisy proxies. After adjusting for the measurement error that may arise due to endogeneity, Colak and Withed (2007) find no significant evidence of improved investment efficiency following spin-offs.

2.3.3 Information Asymmetry Hypothesis

Nanda and Narayanan (1999) expand on the notion formulated by Cusatis et al. (1993) that spin-offs may mitigate the adverse selection problem related to information asymmetry in the context of valuation. A central assumption in their methodology is that the market can observe the collective cash flow of firms but not distinguish separate division cash flow. The study finds that firms being undervalued as a consequence of the mentioned information asymmetry generally seek to divest divisions when in need of external financing. In contrast, overvalued firms tend to utilize their relatively high share price by raising equity (Nanda and Narayanan, 1999). As spin-offs are non-cash generative, this implies that diversified firms trading at a discount would first spin off the division to close the information asymmetry gap, resulting in a more fair market valuation. The next step would be to issue equity to secure external financing at more favorable terms.

Related to the above, Gilson et al. (2001) do not only observe a significant increase in analyst coverage but also a 30-50 percent increase in analyst forecast accuracy after focus-increasing spin-offs, targeted rights issues, and carve-outs. The authors partly attribute these results, which are observed both for the continuing and the spun-off entities, to more detailed company disclosures as the divisions are trading as separate entities, which reduce the information asymmetry. Thus, even when spin-offs do not result in improved operating performance, the reduced information asymmetry can by itself serve as a rationale for performing a spin-off. Furthermore, focus-increasing spin-offs lead to increased coverage by analysts specializing in the respective industries of the two entities. As opposed to "generalist" analysts, the "specialist" analysts on average arrive at more precise forecasts (Gilson et al., 2001).

Krishnaswami and Subramaniam (1999) further analyze the information asymmetry hypothesis in the context of spin-offs. The study indicates that firms undertaking spin-offs exhibit higher degrees of information asymmetry than industry peers and that information asymmetry is substantially mitigated following spin-offs. Specifically, they find that shareholder returns following spin-offs are positively correlated with the initial level of information asymmetry. Krishnaswami and Subramaniam (1999) confirm Nanda and Narayanan's (1999) findings related to how spin-offs can serve to mitigate information asymmetry before raising equity. Companies in need of external financing are not only more likely to undertake a spin-off but also likely to raise more capital following the spin-offs.

Lastly, Chemmanur and Liu (2011) investigate firms' choices between spin-offs, carve-outs and rights issues in the context of various degrees of information asymmetry. All mentioned corporate actions mitigate the information gap between investors with insider information and external investors. Specifically, the most significant decrease in information asymmetry between these parties occurs following spin-offs. Consequently, when insiders hold the most positive private information, they choose to engage in spin-offs.

2.3.4 Efficient Market Hypothesis

As tests on stock market returns are conducted in this study, both on an unadjusted and risk-adjusted basis, it is further relevant to scrutinize the test results in relation to the efficient market hypothesis (EMH) and its implications on the share price performance of spin-offs.

The most noteworthy research on the EMH was published in Eugene Fama's article "Efficient Capital Markets: A Review of Theory and Empirical Work", in which Fama defines an efficient

market as a market where prices fully reflect all available information. At the core of the EMH are two critical assumptions: the market (i) consists of rational investors that (ii) can costlessly access all relevant market information. Fama introduced three forms of efficient markets, representing various levels of market efficiency (Fama, 1970):

Weak form	Assumes that all historical price information is fully reflected in the market price, implying that techniques such as the analysis of past price movements do not allow the investor to generate abnormal, risk-adjusted returns over time.
Semi-strong form	Expands the weak form of the theory by further assuming efficient price adjustability to public information. As a result, the semi-strong form further dismisses the use of fundamental analysis as a strategy to generate abnormal, risk-adjusted returns over time.
Strong form	Assumes that securities prices fully reflect both public and private information, implying that it is not possible for an investor to generate abnormal, risk-adjusted returns over time, even when using insider information.

The EMH is related to the concept of a "random walk", a term used to describe a series of prices in which all successive price changes are independently random from previous prices. The reasoning behind the random walk concept is that, as share prices instantly reflect new information, future price changes will solely reflect information released in the future. Thus, price changes of today and price changes of the future are argued to be independent of each other. As news by definition is arbitrary, so must be the case for future short-term price changes (Malkiel, 2003). In Malkiel's book "A Random Walk Down Wall Street", he famously exemplifies the idea of the random walk by stating that "a blindfolded monkey throwing darts at the stock listings could select a portfolio that would do just as well as one selected by the experts" (Malkiel, 1973).

After Fama presented the EMH in 1970, various research papers, including "Does the Stock Market Overreact?" by DeBondt and Thaler (1985), argued that substantial weak form inefficiencies existed in the market. Specifically, DeBondt and Thaler (1985) find that stocks that have performed well during a three- to five-year period tend to subsequently underperform the market and vice versa. These reversals of long-term returns, or efficient market anomalies, are attributed to investor overreaction, consistent with the behavioral decision theory presented by Kahneman and Tversky (1982).

Fama responds to these papers by conducting event studies on abnormal returns with the purpose of investigating the existence of potential price anomalies. Finding that price overreactions are as prevalent as price underreactions and that post-event continuation of pre-

event abnormal returns is as common as post-event reversal, he argues that the EMH still holds. Furthermore, Fama contends that anomalies may, or may not be, observed depending on the study methodology (Fama, 1998). Malkiel (2003) agrees with Fama and argues that studies claiming to disprove the EMH are generally conducted with disputable methodologies such as using time periods that are not representative of the long-term market characteristics.

Various other academics claim that stock market collapses serve as evidence that the EMH does not hold in practice. Schiller (2000) makes this statement with regard to the dot-com bubble of the late 1990s. Malkiel (2003) defends the EMH by arguing that, given the available information at the time, no arbitrage opportunities were prevalent as no investor truly knew when the collapse would take place.

As evident from the above, despite the EMH being a widely accepted theory, few academics claim that the market is constantly fully efficient. According to Malkiel (2003), most EMH advocates believe that investors do not always make fully rational decisions, which may result in temporary market inefficiencies. However, as soon as these arbitrage opportunities present themselves, market participants will pursue them until they are no longer profitable.

Various models adopting the EMH framework have been widely accepted by the academic community. The Capital Asset Pricing Model[2] (CAPM) was the first coherent model relating an asset's expected rate of return to its inherent risk. Independently developed in the 1960s by Sharpe (1964), Lintner (1965), and Mossin (1966), building on the findings of Markowitz (1952), CAPM seeks to explain abnormal returns by relating the asset's risk to that of the overall market (its systematic risk). The beta coefficient β in the formula represents the systematic risk, calculated as a linear regression of an asset's price changes against the overall market[3]. When the abnormal return of an asset exceeds the return predicted by CAPM, the asset is described to have exhibited positive alpha for the measured period and vice versa. Consequently, a positive alpha may be interpreted as positive risk-adjusted abnormal returns. From the perspective of the EMH, an alpha that is different from zero is considered a market inefficiency. Various other models, such as the Fama French three-factor model, developed by Fama and French (1992), expand the CAPM by introducing two additional explanatory factors

[2] The Capital Asset Pricing Model formula: $(E(R_{i,t}) - Rf_t = \beta_i \times (E(R_{mkt,t}) - Rf_t)$

[3] The ordinary least squares (OLS) expression of the beta coefficient: $\beta_i = \frac{Cov(r_i, r_i)}{Var(r_{mkt})}$

to account for the general outperformance of small-cap companies and companies with high book-to-value ratios.

The logic of relating the expected return of an asset to its risk may partly have explanatory power of the stock market performance results found in this study. Modern Portfolio Theory (Markowitz, 1952) contends that risk and reward must be evaluated together when making investment decisions. Specifically, as the risk, captured through volatility, increases in a portfolio, the portfolio's expected return correspondingly increases (Markowitz, 1952). The theory further presumes that when investors compare two securities with the same expected return, they will prefer the less risky security. For this purpose, the Sharpe ratio is a relevant metric as it puts the return of a security in relation to its inherent risk.

The Sharpe Ratio was first developed by William F. Sharpe (1966) as a metric that captures the excess risk-adjusted returns of securities. Whereas the ratio does not incorporate the beta coefficient, it instead uses the volatility of the selected security as the proxy for risk. The Sharpe ratio addresses risk along with reward when comparing investment opportunities and is thus a highly relevant metric in the context of risk-adjusted abnormal returns of spin-offs. Mathematically, the Sharpe ratio represents the excess return generated by a security per unit of volatility, or risk. Put differently, the ratio adjusts a security's excess returns for additional risk stemming from not holding a risk-free asset. The general definition of the Sharpe ratio of a security for a specific period is as follows:

$$Sharpe\ ratio_{i,t} = \frac{r_{i,t} - r_f}{\sigma_{i,t}} \qquad \text{(eq. 1)}$$

where (i) $r_{i,t}$ represents the return of the individual security over the time interval t, (ii) $rf_{i,t}$ represents the return of the risk-free rate during the corresponding time interval t, and (iii) $\sigma_{i,t}$ represents the volatility of asset i over the time interval t. Furthermore, $r_{i,t} - r_f$ denotes the excess return of the individual security over time interval t.

In this paper, we apply the semi-strong form of the EMH as we assume that share prices reflect all publicly available information and that investors act rationally to this information. Specifically, we adopt the semi-strong form of the EMH from the perspective of the Modern Portfolio Theory, in which an increase in risk, over time, is expected to result in an increased expected return.

2.4 Research Question and Hypotheses

With the objective of assessing the value creation of spin-offs with spin-off dates between 2010 and 2017, we argue that the two most central categories of performance indicators are stock market performance and operating performance. The hypotheses regarding the value creation of spin-offs that have received the broadest academic support are the corporate focus and negative synergies hypothesis and the information asymmetry hypothesis. These hypotheses, together with the semi-strong form of the EMH, have inspired our research question and may have explanatory power on our test results.

Based on the two above-mentioned categories of performance indicators, we approach the term value creation from three different perspectives. Firstly, the announcement-day return of the pre-spin-off parent entity and the unadjusted long-term stock market returns of the post-spin-off entities serve as proxies for pure value creation in the capital markets. Secondly, risk-adjusted long-term stock market returns capture value creation in the capital markets from a more practical perspective of investors, as the relation between risk and reward should be considered when making investment decisions (Markowitz, 1952). Thirdly, changes in the accounting measures ROA, operating margin, and asset turnover serve as proxies for value creation from an internal, corporate perspective.

For the stock market performance metrics, we test both the announcement-day return of the pre-spin-off parent entity and the long-term one-, two- and three-year abnormal returns of the continuing and the spun-off entities. We both measure the performance of the individual entities and compare the returns of the entities against each other. Furthermore, tests on long-term abnormal returns are conducted on a risk-adjusted basis by testing the Sharpe ratios of the continuing- and spun-off entities against the Sharpe ratio of the S&P 500.

To capture potential changes in operating performance post the spin-off, yearly changes in the ROA of the two entities are measured, starting from one year prior to the spin-off date and ending three years post the spin-off date. The ROA components, namely operating margin and asset turnover[4] are further measured for the corresponding periods to add depth to the test by investigating the underlying drivers of potential ROA changes. The mentioned accounting

[4] $ROA = \frac{Operating\ profit}{Total\ assets} = \frac{Operating\ profit}{Total\ revenue} \times \frac{Total\ revenue}{Total\ assets} = Operating\ margin \times Asset\ turnover$

metrics are analyzed on an unadjusted basis and on an industry-adjusted basis, with the purpose of more efficiently isolating spin-off effects absent of industry-wide variations.

To test the corporate focus and negative synergies hypothesis more proficiently, the sample is segmented into two subsamples: cross-industry spin-offs and intra-industry spin-offs. In line with Daley et al. (1997), cross-industry spin-offs are assumed to be of focus-increasing nature, and intra-industry spin-offs are assumed to be non-focus-increasing.

By examining value creation from the three above-mentioned perspectives in the context of the corporate focus and negative synergies hypothesis, the information asymmetry hypothesis, and the semi-strong form of the EMH, we seek to answer the research question:

Do spin-offs create value and, if so, how do spin-offs create value?

Specifically, we aim to answer the research question by assessing announcement-day returns, unadjusted and risk-adjusted long-term abnormal returns, combined with changes in ROA, operating margin, and asset turnover. A considerable number of studies have investigated long-term abnormal returns following spin-offs, but none have, to the best of our knowledge, yet taken volatility and risk into account. Thus, we believe that this research question has not previously been examined using the same method as described above. Furthermore, this study adds to the limited research on the underlying drivers of changes in operating performance following spin-offs in the form of operating margin and asset turnover.

2.4.1 Tests on Stock Market Performance

To test the stock market performance of spin-offs through the lens of the corporate focus and negative synergies hypothesis, the information asymmetry hypothesis, and the semi-strong form of the EMH, several tests are conducted, as presented below.

Announcement-Day Abnormal Returns (Hypothesis 1.0)

Hypothesis 1.0 tests the abnormal return of the pre-spin-off parent entity at the date of the spin-off announcement. Given a semi-strong efficient market, the corporate focus and negative synergies hypothesis claims that the abnormal returns should be greater than zero for the average spin-off case but that the returns of cross-industry spin-offs should exceed that of intra-industry spin-offs due to the different focus-increasing characteristics. Specifically, Desai and Jain (1999) find that the average abnormal announcement-day return for cross-industry spin-offs is approximately twice the size of intra-industry abnormal announcement-

day returns. As undertaking a spin-off is a means of mitigating adverse selection problems for diversified firms, and insiders with the most positive private information choose to engage in spin-offs (Chemmanur and Liu, 2011), the information asymmetry hypothesis also predicts that the average announcement-day returns should be greater than zero in a semi-strong efficient market.

These predictions are consistent with the broader literature on the effects of diversification on firm value, as described by Berger and Ofek (1995). Given that rational investors interpret the news of the spin-off announcement as critical to firm value, the semi-strong form of the EMH predicts the share price to instantly reflect this new information (Malkiel, 2003).

Hypothesis 1.0 is expressed below:

$H_{1.0,0}$: The average abnormal announcement-day return of the pre-spin-off parent share price is equal to zero.
$H_{1.0,1}$: The average abnormal announcement-day return of the pre-spin-off parent share price is not equal to zero.

Long-Term Unadjusted and Risk-Adjusted Abnormal Returns (Hypotheses 2.0 and 2.1)

Hypothesis 2.0 tests the long-term one-, two, and three-year abnormal returns of the continuing and the spun-off entities. The tests are conducted on a compound annual growth rate (CAGR) basis.

According to Cusatis et al. (1993), positive abnormal long-term returns are limited to cases in which the entities become acquired within the event window. We thus expect the subsample of firms being acquired within the measured three-year period to exhibit positive abnormal returns as a consequence of commonly required takeover premiums. As issues related to information asymmetry should already have been mitigated prior to the spin-off date, the information asymmetry hypothesis does not make any claims regarding the long-term stock market performance. The semi-strong form of the EMH, however, does not dismiss that the average returns may differ from zero. Instead, this may be the case if the average risk of the respective entities deviates from that of the market. It is nevertheless challenging to proficiently determine the risk of entities that have not previously traded on a stand-alone basis. Desai and Jain (1999) find significant positive abnormal returns over the three-year holding period. From the

perspective of the semi-strong form of the EMH (assuming no efficiency anomalies), this implies that the risk of the spin-off sample is greater than that of the overall market.

Hypothesis 2.0 is expressed below:

$H_{2.0,0}$: The average abnormal return of the continuing and the spun-off entities, respectively, is equal to zero.
$H_{2.0,1}$: The average abnormal return of the continuing and the spun-off entities, respectively, is not equal to zero.

a) From the spin-off date to 12 months post the spin-off date.
b) From the spin-off date to 24 months post the spin-off date.
c) From the spin-off date to 36 months post the spin-off date.

Hypothesis 2.1 tests the difference between the annualized S&P 500 Sharpe ratio and the annualized Sharpe ratio of the respective entities for the corresponding periods. The difference between the two Sharpe ratio metrics may be described as "the abnormal Sharpe ratio" of the respective entities. As the Sharpe ratio is a measure of risk-adjusted returns, the abnormal Sharpe ratio of the entities is used as a proxy for abnormal risk-adjusted returns. Although the semi-strong form of the EMH theoretically allows for the average abnormal return, tested in Hypothesis 2.0, to be significantly different from zero, it does not allow the same on a risk-adjusted basis. The core of the hypothesis is the assertion that, over time, the risk-adjusted performance of the overall market is superior to that of individual stocks and portfolios. Based on our theoretical framework, we are thus not able to make any specific predictions regarding Hypothesis 2.0, but for Hypothesis 2.1, we expect the abnormal Sharpe ratio of the respective spun-off entities to be negative for all tested time periods.

Hypothesis 2.1 is expressed below:

$H_{2.1,0}$: The average difference between the S&P 500 Sharpe ratio and the Sharpe ratio of the continuing and spun-off entities, respectively, is equal to zero.
$H_{2.1,1}$: The average difference between the S&P 500 Sharpe ratio and the Sharpe ratio of the continuing and spun-off entities, respectively, is not equal to zero.

a) From the spin-off date to 12 months post the spin-off date.
b) From the spin-off date to 24 months post the spin-off date.
c) From the spin-off date to 36 months post the spin-off date.

2.4.2 Tests on Operating Performance

Operating performance is measured by investigating yearly changes in the last twelve months (LTM) ROA of the combined entities, starting from one year prior to the spin-off date and ending three years post the spin-off date. Tests on changes in LTM operating margin and LTM asset turnover are further conducted with the objective of determining whether any potential ROA changes primarily occur because of changes in profitability or changes in the efficiency in which spin-off firms are utilizing their assets to generate revenue. All tests on operating performance are (i) conducted on an unadjusted basis and (ii) conducted on an industry-adjusted basis. The industry-adjustment is motivated to isolate potential spin-off effects on operating performance, absent potential changes in the wider industry.

Yearly Change in ROA (Hypothesis 3.0)

Hypothesis 3.0 tests whether the average yearly change in ROA, starting from one year before the spin-off date to three years after the spin-off date, is significantly different from zero. The broader academic literature on diversification generally concludes that diversification may reflect negatively on firm operating performance. As undertaking a focus-increasing spin-off may serve as a tool to achieve increased corporate focus, we thus expect the cross-industry subsample to exhibit positive changes in ROA following the spin-off date. These predictions, which are in line with Daley et al.'s (1997) results, do not apply to the intra-industry subsample, as these spin-offs are merely separating similar business units and should consequently not result in any operational improvements, according to the corporate focus and negative synergies hypothesis.

Although Denis et al. (2002) find that the negative effect of geographical diversification is roughly equal to that of industrial diversification, they do not test this claim in the context of spin-offs. Thus, despite the fact that geographical de-diversification may occur in the intra-industry subsample, we cannot make any specific predictions regarding the ROA change of the intra-industry subsample. This is further consistent with Desai and Jain's (1999) study, finding significant positive ROA effects for focus-increasing spin-offs, but none for non-focus-increasing spin-offs. Daley et al. (1997) only find significant positive ROA changes within the cross-industry subsample during the first year following the spin-off date. Despite these results, from the perspective of our theoretical framework, we cannot make any specific predictions as to which specific year following the spin-off any potential improvements in ROA may materialize.

Hypothesis 3.0 is expressed below:

$H_{3.0,0}$: The average change in ROA between the periods is equal to zero.
$H_{3.0,1}$: The average change in ROA between the periods is not equal to zero.

a) From 12 months before the spin-off date to 12 months after the spin-off date.
b) From the spin-off date to 12 months after the spin-off date.
c) From 12 months after the spin-off date to 24 months after the spin-off date.
d) From 24 months after the spin-off date to 36 months after the spin-off date.

Yearly Change in Operating Margin and Asset Turnover (Hypothesis 4.0 & 4.1)

Given any potential changes in ROA during the mentioned periods, we argue that it is relevant to further test whether these changes stem from changes in operating margin, asset turnover, or both. Hypothesis 4.0 tests whether the change in operating margin is significantly different from zero between the respective years. Hypothesis 4.1 tests the same with regard to asset turnover. These tests may provide a more granular perspective on the expected positive impact on ROA as a result of increased corporate focus following focus-increasing spin-offs.

Hypothesis 4.0 is expressed below:

$H_{4.0,0}$: The average change in operating margin between the periods is equal to zero.
$H_{4.0,1}$: The average change in operating margin between the periods is not equal to zero.

a) From 12 months before the spin-off date to 12 months after the spin-off date.
b) From the spin-off date to 12 months after the spin-off date.
c) From 12 months after the spin-off date to 24 months after the spin-off date.
d) From 24 months after the spin-off date to 36 months after the spin-off date.

Hypothesis 4.1 is expressed below:

$H_{4.1,0}$: The average change in asset turnover between the periods is equal to zero.
$H_{4.1,1}$: The average change in asset turnover between the periods is not equal to zero.

a) From 12 months before the spin-off date to 12 months after the spin-off date.
b) From the spin-off date to 12 months after the spin-off date.
c) From 12 months after the spin-off date to 24 months after the spin-off date.
d) From 24 months after the spin-off date to 36 months after the spin-off date.

3 Method

3.1 Research Approach

Quantitative tests are conducted on the share price performance and operating performance of the pre-spin-off parent entity and the post-spin-off entities with the objective of investigating our research question and testing the previously described hypotheses.

Our research approach is divided into three categories, seeking to test:

1. the abnormal return of the pre-spin-off parent entity at the day of the spin-off announcement;
2. the long-term abnormal returns of the respective post-spin-off entities on an unadjusted and risk-adjusted basis;
3. changes in operating performance, captured by ROA, operating margin, and asset turnover.

The research approach for the announcement-day abnormal returns is based on tests conducted by Daley et al. (1997), and the long-term unadjusted abnormal returns are inspired by Cusatis et al. (1993). However, we are unable to find previous studies testing risk-adjusted stock market performance following spin-offs. Lastly, the tests on operating performance are based on tests conducted by Daley et al. (1997).

To distinguish between focus-increasing and non-focus-increasing spin-offs, our sample is segmented into cross-industry spin-offs (assumed to be focus-increasing) and intra-industry spin-offs (assumed to be non-focus-increasing). Cross-industry spin-offs are defined as spin-offs in which the continuing and spun-off entities operate in different two-digit Standard Industry Classification (SIC) codes, whereas intra-industry spin-offs are defined as spin-offs in which the respective entities operate in the same two-digit SIC code.

To test the significance of our sample data, standard t-tests are conducted both on the average of the full sample and on the 90 percent winsorized average. Specifically, the 90 percent winsorization sets all data points greater than the 95th percentile equal to the value of the 95th percentile and all data points below the 5th percentile equal to the value of the 5th percentile. Removing extreme outliers through winsorization facilitates the establishment of more robust statistical relationships when conducting parametric tests such as the t-test. Since we use t-tests to investigate the statistical significance of our results, we assume that the full sample, as well

as the two subsamples, follow the student's t-distribution. The student's t-distribution is similar to the normal distribution but has heavier tails as it can be applied when the population standard deviation is not known.

As we split the total sample into the two cross- and intra-industry spin-off subsamples, the number of observations inevitably decreases. Due to the total sample size already being relatively limited, this makes it more difficult to confirm statistically significant results for the two subsamples.

3.2 Announcement-Day Abnormal Returns

The abnormal return of the pre-spin-off parent entity at the day of the spin-off announcement is tested by comparing the closing price of the day prior to the announcement day with the closing price of the announcement day. As the tests on abnormal announcement-day returns are only computed using an event window of two days, and that the semi-strong form of the EMH only makes claims about long-term risk-adjusted returns (Fama, 1970), the abnormal announcement-day returns are only calculated on an unadjusted basis.

Abnormal return (AR) is defined as:

$$AR_{i,t} = r_{i,t} - r_{m,t} \quad \text{(eq. 2)}$$

where (i) $r_{i,t}$ represents the return of the individual stock over the time interval t and (ii) $r_{m,t}$ represents the return of the market for the corresponding time interval t.

Using equation 2, we compute the abnormal return of the pre-spin-off parent entity at the day of the spin-off announcement. We then report the average abnormal announcement-day return.

3.3 Long-Term Unadjusted and Risk-Adjusted Abnormal Returns

One-, two- and three-year abnormal returns of the post-spin-off continuing and spun-off entities are measured on a CAGR basis. The returns are measured both on an unadjusted basis and on a risk-adjusted basis.

In cases when either of the entities becomes acquired within the respective time periods, the return of S&P 500 is substituted for the remainder of the period to account for the opportunity cost that would arise if the stock return were to be held fixed after its de-listing date. We thus assume that the average investor buys the S&P 500 with the net proceeds of the acquisition.

Risk-adjusted abnormal returns are captured by the difference between the annualized Sharpe ratio of the individual stock and the annualized Sharpe ratio of S&P 500 for the respective time periods. Although the Sharpe ratio is a widely accepted metric for capturing risk-adjusted returns, the metric is limited to capturing risk-adjusted returns only in cases when the excess return is positive. As a negative Sharpe ratio does not convey any useful meaning, observations in which the excess return is negative have been set to zero, both for the Sharpe ratio of the individual stock and the Sharpe ratio of the S&P 500. This may create a positive bias in the described Sharpe ratio difference, as the market tends to exhibit positive excess returns over time, whereas this may not be the case for individual stocks. However, as neither the continuing nor the spun-off entities have been publicly traded on a stand-alone basis prior to the spin-off date, no pre-period exists to compute an equity beta in order to calculate expected returns using models such as CAPM. We thus argue that the Sharpe ratio, despite its mentioned limitations, is an appropriate way of measuring risk-adjusted abnormal returns for the purpose of this study.

The formula for CAGR is defined as follows:

$$CAGR_{i,t} = (1 + r_{i,t})^{\frac{1}{t}} - 1 \qquad \text{(eq. 3)}$$

where $r_{i,t}$ represents the return of the individual stock over the time interval t.

The abnormal CAGR (ACAGR) of the individual stock is computed by calculating the CAGR of the abnormal return using equation 2 and equation 3. We then report the average ACAGR.

The annualized Sharpe ratio is given by:

$$Annualized\ Sharpe\ Ratio_{i,t} = \frac{CAGR_{i,t} - rf_{i,t}}{\sigma_{i,t}} \qquad \text{(eq. 4)}$$

where (i) $CAGR_{i,t}$ represents the CAGR of an individual security over time interval t, (ii) $rf_{i,t}$ represents the return of the risk-free rate during the corresponding time interval t, proxied by the yield to maturity of a 10-year U.S. treasury bond, and (iii) $\sigma_{i,t}$ represents the annualized volatility of security i over the time interval t.

Using equation 4, the difference between the annualized Sharpe ratio of the individual stock and the annualized Sharpe ratio of the S&P 500 for the corresponding period is computed by subtracting the annualized Sharpe ratio of the S&P 500 from the annualized Sharpe ratio of the individual stock. We then report the average annualized Sharpe ratio difference.

3.4 Operating Performance

The primary measure for operating performance selected in this study is ROA. Since ROA is the product of operating margin and asset turnover, changes in operating margin and asset turnover are further investigated. Given any potential changes in ROA, investigating changes in operating margin and asset turnover may provide an understanding of the underlying drivers of the ROA change.

We choose to use the operating version of ROA, defined as operating profit over total assets. Consequently, operating margin is defined as operating profit over total revenue, and asset turnover is defined as total revenue over total assets. There are two primary reasons for using this definition of ROA as the main metric of operating performance. Firstly, we aim to capture changes in operating performance absent of tax and bonding effects. As bonding effects could in part emerge in the interest expense and through the tax-deductibility of the interest expense, these elements of net income are omitted in this definition of ROA. Secondly, this definition of ROA further disregards any special one-time charges to net income.

The yearly changes in the operating performance metrics of the combined entities are consequently measured, starting from one year prior to the spin-off date and ending three years after the spin-off date [(-1, 0) ; (0, +1) ; (+1, +2) ; (+2, +3)]. As spin-offs are recorded at book value, the combined book value of assets and profit figures held by the continuing and spun-off entities directly after the spin-off are identical to the book value of the parent prior to the spin-off. Calculating combined financial statement amounts may thus be achieved by taking the sum of the respective entities' income and balance sheet items, with the exception being per-share figures. Consequently, it is possible to compare the ROA of the pre-spin-off parent entity to the ROA of the combined continuing and spun-off entity following the spin-off.

The formula for ROA is defined as:

$$ROA_{i,t} = \frac{Operating\ profit_{i,t}}{Total\ assets_{i,t}} \qquad \text{(eq. 5)}$$

where $Operating\ profit_{i,t}$ and $Total\ assets_{i,t}$ represent the operating profit and the total assets of the pre-spin-off parent entity before the spin-off date (t = -1), and the operating profit and the total assets of the combined continuing and spun-off entity after the spin-off date (t = 0, 1, 2, 3).

Using equation 5, we then compute the yearly change in $ROA_{i,t}$:

$$\Delta ROA_{i,t} = ROA_{i,t} - ROA_{i,t-1} \quad \text{(eq. 6)}$$

The formula for operating margin is defined as:

$$Operating\ margin_{i,t} = \frac{Operating\ profit_{i,t}}{Total\ revenue_{i,t}} \quad \text{(eq. 7)}$$

where $Operating\ profit_{i,t}$ and $Total\ revenue_{i,t}$ represent the operating profit and the total revenue of the pre-spin-off parent entity before the spin-off date (t = -1), and the operating profit and the total revenue of the combined continuing and spun-off entity after the spin-off date (t = 0, 1, 2, 3).

Using equation 7, we then compute the yearly change in $operating\ margin_{i,t}$:

$$\Delta Operating\ margin_{i,t} = Operating\ margin_{i,t} - Operating\ margin_{i,t-1} \quad \text{(eq. 8)}$$

Asset turnover is defined as:

$$Asset\ turnover_{i,t} = \frac{Operating\ profit_{i,t}}{Total\ assets_{i,t}} \quad \text{(eq. 9)}$$

where $Operating\ profit_{i,t}$ and $Total\ assets_{i,t}$ represent the operating profit and the total assets of the pre-spin-off parent entity before the spin-off date (t = -1), and the operating profit and the total assets of the combined continuing and spun-off entity after the spin-off date (t = 0, 1, 2, 3).

Using equation 9, we then compute the yearly change in $asset\ turnover_{i,t}$:

$$\Delta Asset\ turnover_{i,t} = Asset\ turnover_{i,t} - Asset\ turnover_{i,t-1} \quad \text{(eq. 10)}$$

Subsequently, we report the average changes in;

- $\Delta ROA_{i,t}$,
- $\Delta Operating\ margin_{i,t}$; and
- $\Delta Asset\ turnover_{i,t}$, respectively.

The selected operating performance measures are calculated on an unadjusted basis and on an industry-adjusted basis. Industry-adjusted measures are computed with the purpose of more efficiently isolating spin-off effects absent industry-wide effects during the respective time periods. The industry-adjusted ROA (IAROA) is computed using the industry ROA (IROA). IROA is calculated by taking the median ROA of all firms, excluding the spin-off firm, that

share the same two-digit SIC code with the spin-off firm. The corresponding method is used to calculate the industry-adjusted operating margin and industry-adjusted asset turnover.

Specifically, IAROA is given by:

$$IAROA_{i,t} = ROA_{i,t} - IROA_{i,t} \quad \text{(eq. 11)}$$

where $ROA_{i,t}$ represents the ROA of the pre-spin-off parent entity before the spin-off date (t = -1), and the ROA of the combined continuing and spun-off entity after the spin-off date (t = 0, 1, 2, 3). Furthermore, $IROA_{i,t}$ represents the industry ROA for the time period *t*, calculated as described above.

Using equation 11, we then compute the yearly change in $IAROA_{i,t}$:

$$\Delta IAROA_{i,t} = IAROA_{i,t} - IAROA_{i,t-1} \quad \text{(eq. 12)}$$

The same procedure is undertaken to calculate the yearly changes in industry-adjusted operating margin and industry-adjusted asset turnover. We then report the average changes in;

- $\Delta IAROA_{i,t}$,
- $\Delta Industry - adjusted\ operating\ margin_{i,t}$; and
- $\Delta Industry - adjusted\ asset\ turnover_{i,t}$, respectively

4 Data Collection Process

This study analyses a sample of spin-offs listed on the NYSE and Nasdaq with spin-off dates between January 1st, 2010 to March 31st, 2017. This period was purposefully selected to avoid the inclusion of disrupting events such as the global financial crisis in 2008 and the outbreak of COVID-19 in 2020. The primary data collection source used is CapitalIQ, complemented by missing transactions and data points from FactSet. The S&P 500 index is used as a benchmark representing the market portfolio when measuring abnormal returns for the sample.

The initial sample included 146 spin-offs that occurred in the selected time period. After a manual check, certain transactions were excluded due to the following reasons:

Initial sample of spin-offs	**146**
Missing share price data for continuing or spun-off entity	-21
Not trading on the NYSE or Nasdaq	-19
Continuing or spun-off entity not identifiable	-12
Real estate investment trust (REIT) companies	-10
Financial institutions and investment firms	-9
Bankruptcy procedures or firms experiencing financial distress	-7
Final sample of spin-offs	**68**

Spin-offs undertaken on stock exchanges other than the NYSE and Nasdaq on unregulated markets such as over-the-counter exchanges were excluded due to lack of market liquidity. Moreover, financial institutions, investment firms, and REIT-firms are excluded due to disparate capital structures.

After reducing the number of spin-offs as per the above-described procedure, the final sample consists of 68 spin-off cases, with a total number of 136 post-spin-off entities. The sample was further segmented into cross-industry and intra-industry spin-offs. This resulted in a split of 36 cross-industry spin-offs (72 post-spin-off entities) and 32 intra-industry spin-offs (62 post-spin-off entities).

As for the operational performance metrics, ten additional spin-offs were excluded due to insufficient accounting data. Furthermore, eight post-spin-off entities were acquired within the three-year horizon following the spin-off date. As a result of the firms being taken private, no accounting data were available to calculate the combined accounting metrics. For the first, second, and third years following the spin-off date, one, four, and three observations were thus excluded, respectively.

5 Results and Analysis

Below, we present our findings from the tests on the stock market- and operating performance. All tests are (i) performed on the overall sample and (ii) further segmented into the intra-industry subsample and into (iii) the cross-industry subsample. T-tests are conducted against zero, both for the averages of the full sample and the 90 percent winsorized averages.

5.1 Stock Market Performance

5.1.1 Announcement-Day Abnormal Returns

To investigate Hypothesis 1.0, tests on the abnormal share price return of the pre-spin-off parent entity at the date of the spin-off announcement are conducted.

Table 1. Announcement-Day Abnormal Returns (Hypothesis 1.0)

	All spin-offs	**Intra-industry spin-offs**	**Cross-industry spin-offs**
Full sample mean	2.65%***	3.13%***	2.24%***
Full sample p-value	(0.00)	(0.01)	(0.00)
Winsorized sample mean	2.44%***	2.76%***	2.00%***
Winsorized sample p-value	(0.00)	(0.00)	(0.00)
Sample size	68	32	36

Note: Table 1 shows the average of the unadjusted abnormal announcement-day returns of the pre-spin-off parent entities. Asterisks indicate significance at the 10 percent (*), 5 percent (**), and 1 percent (***) level.

The results of the total sample indicate positive abnormal announcement-day returns at the 1 percent significance level, both for the full sample average and the winsorized sample average. The same is true for the intra-industry and cross-industry subsamples, respectively. Furthermore, the announcement-day abnormal returns of the intra-industry subsample on average exceed that of the cross-industry subsample.

The positive and strong statistical significance of abnormal announcement-day returns is not only consistent with the broader existing literature in the field of spin-offs, but also with our previously outlined predictions. The corporate focus and negative synergies hypothesis in combination with the semi-strong form of the EMH anticipate that the abnormal announcement-day returns should be greater than zero, as undertaking a spin-off may increase corporate focus and eliminate negative synergies.

Furthermore, since spin-offs have the potential of mitigating adverse selection problems for diversified firms, and insiders with the most positive private information choose to engage in spin-offs (Chemmanur and Liu, 2011), these results are in line with the information asymmetry

hypothesis. The significant and positive abnormal announcement-day returns may further be explained by the previously mentioned diversification discount (Berger and Ofek, 1995). As new information is released to the public at the announcement-day, the market takes this information into account as reflected in the observed price changes, consistent with the idea of the random walk and the semi-strong form of the EMH (Malkiel, 2003).

However, when examining the abnormal returns of the respective subsamples, the corporate focus and negative synergies hypothesis generally expects cross-industry cases to exhibit greater returns than intra-industry cases in a semi-strong efficient market, given the assumption that cross-industry spin-offs may be classified as more focus-increasing than intra-industry spin-offs. For example, Desai and Jain (1999) find superior returns for cross-industry spin-offs compared to intra-industry spin-offs.

5.1.2 Long-Term Unadjusted and Risk-Adjusted Abnormal Returns

To investigate Hypotheses 2.0 and 2.1, tests on the unadjusted abnormal returns and risk-adjusted abnormal returns (using the described Sharpe ratio difference) are conducted on the continuing and spun-off entities.

Table 2. Unadjusted Long-Term Abnormal Returns (Hypothesis 2.0)

	All spin-offs			**Intra-industry spin-offs**			**Cross-industry spin-offs**		
	Year 1	Year 2	Year 3	Year 1	Year 2	Year 3	Year 1	Year 2	Year 3
	Panel A: Continuing entities								
Full sample mean	-1.80%	-0.73%	-1.86%	1.24%	0.57%	0.01%	-4.50%	-1.89%	-3.52%
Full sample p-value	(0.60)	(0.73)	(0.30)	(0.82)	(0.86)	(1.00)	(0.32)	(0.49)	(0.13)
Winsorized sample mean	-3.12%	-0.84%	-2.11%	0.11%	0.38%	-0.07%	-6.22%*	-0.84%	-1.77%*
Winsorized sample p-value	(0.26)	(0.67)	(0.21)	(0.98)	(0.90)	(0.98)	(0.07)	(0.45)	(0.08)
Sample size	68	68	68	32	32	32	36	36	36
	Panel B: Spun-off entities								
Full sample mean	7.54%	4.17%	-1.61%	7.43%	3.50%	0.38%	7.64%	4.76%	-3.38%
Full sample p-value	(0.60)	(0.22)	(0.58)	(0.41)	(0.49)	(0.93)	(0.25)	(0.30)	(0.40)
Winsorized sample mean	7.64%	4.84%*	-1.22%	7.64%	4.93%	1.14%	6.88%	4.86%	-3.20%
Winsorized sample p-value	(0.13)	(0.10)	(0.63)	(0.34)	(0.20)	(0.73)	(0.25)	(0.26)	(0.40)
Sample size	68	68	68	32	32	32	36	36	36

Note: Table 2 shows the average of the abnormal CAGRs of the post-spin-off entities for the respective periods. Asterisks indicate significance at the 10 percent (*), 5 percent (**), and 1 percent (***) level.

For the total sample of continuing entities, the one-, two- and three-year average abnormal returns are negative. However, the data is not statistically different from zero. As shown in Table 2, the negative average abnormal returns of the total sample of continuing entities predominantly stem from the underperformance of the cross-industry subsample. Specifically,

the abnormal return averages of the continuing cross-industry subsample are negative during all time periods, whereas this is not the case for the intra-industry subsample.

Conclusively, a discrepancy is observed with regard to the average abnormal long-term returns of the cross- and intra-industry subsamples, with intra-industry continuing entities outperforming the cross-industry continuing entities on a CAGR basis during the three time periods. Nevertheless, conclusions regarding this discrepancy are only limited to the specific sample of this study, as no consistent pattern of statistical significance is found.

However, when comparing the corresponding average abnormal returns of the spun-off entities to the continuing entities, the spun-off entities overall outperform the continuing counterparts. Despite the absence of statistical significance, the pattern of the spun-off entities outperforming the continuing entities potentially stems from the continuing entities being characterized by more stable and mature operations compared to the spun-off entities. This, in turn, may imply a lower average risk and volatility of the continuing sample compared to the spun-off sample. The logic of relating the expected rate of return of an asset to its inherent risk is thus consistent with the outperformance of spun-off entities compared to continuing entities on an unadjusted level.

When examining the two subsamples of the spun-off entities, a pattern akin to the continuing entities is observed, namely that the spun-off intra-industry subsample outperforms the spun-off cross-industry subsample across all periods after removing outliers through winsorization.

In line with Cusatis et al.'s (1993) findings, we expected the subsample of firms becoming acquired to exhibit positive abnormal returns. In this sample of spin-offs, only four continuing entities and four spun-off entities were taken private within the observed three-year period. For the acquired continuing entities and spun-off entities, the average three-year abnormal CAGR returns amount to 6.7 percent and 4.4 percent, respectively. Despite the abnormal returns being clearly positive, most likely as a result of takeover premiums, the limited number of firms being acquired does not allow for any statistical tests to be conducted.

From the perspective of our theoretical framework, neither the corporate focus, negative synergies hypothesis, the information asymmetry hypothesis, nor the broader literature on diversification makes any claims regarding the observed unadjusted long-term returns. The corporate focus and negative synergies hypothesis primarily emphasize operational improvements following spin-offs, particularly in the case of focus-increasing spin-offs.

However, the hypothesis does not explicitly relate these expected operational improvements to long-term share price returns. Likewise, as potential information asymmetry issues should already have been mitigated before the spin-off date, the information asymmetry hypothesis does not make any specific claims regarding long-term abnormal returns of the respective entities.

The broader literature on diversification find that diversified firms are trading at a discount to single-segment peers (Berger and Ofek, 1995). However, although the diversification discount may be apparent in capital markets, its existence does not allow for any conclusions as to whether the gap gradually appears over long-term horizons. Rather, as per the idea of the random walk (Malkiel, 2003), news of de-diversification should directly be reflected in the share price at the day of the spin-off announcement. Any delay in accurate price changes would imply market inefficiencies and arbitrage opportunities.

Still, Desai and Jain (1999) find significant and positive three-year abnormal returns for both post-spin-off entities and further observe that cross-industry spin-offs outperform intra-industry spin-offs during the three-year holding period. In contrast, the empirics of this study indicate no distinct pattern of statistically significant long-term abnormal returns. From the perspective of the semi-strong form of the EMH, this could potentially be explained by the average risk of the post-spin-off sample being approximately in line with the overall market.

Even in the case of strong statistical significance of positive long-term abnormal returns, the semi-strong form of the EMH would expect these hypothetically positive abnormal returns to be reflected in a higher share price volatility. Consequently, when adjusting for this expected higher volatility, the hypothesis anticipates that the spin-off sample conversely should underperform the overall market on a risk-adjusted basis, as the hypothesis dismisses the possibility of generating abnormal, risk-adjusted returns over time (Fama, 1970). This brings us to Hypothesis 2.1, which assesses risk-adjusted long-term abnormal returns using the Sharpe ratio.

Table 3. Risk-Adjusted Long-Term Abnormal Returns (Hypothesis 2.1)

	All spin-offs			Intra-industry spin-offs			Cross-industry spin-offs		
	Year 1	Year 2	Year 3	Year 1	Year 2	Year 3	Year 1	Year 2	Year 3
	Panel A: Continuing entities								
Full sample mean	-0.62***	-0.38***	-0.39***	-0.88***	-0.47***	-0.34***	-0.39	-0.29***	-0.43***
Full sample p-value	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.03)	(0.00)	(0.00)
Winsorized sample mean	-0.63***	-0.36***	-0.39***	-0.94***	-0.46***	-0.34***	-0.34***	-0.26***	-0.43***
Winsorized sample p-value	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)	(0.00)	(0.00)
Sample size	68	68	68	32	32	32	36	36	36
	Panel B: Spun-off entities								
Full sample mean	-0.29*	-0.24**	-0.37***	-0.42%*	-0.36**	-0.34***	-0.17	-0.14	-0.39***
Full sample p-value	(0.08)	(0.02)	(0.00)	(0.10)	(0.02)	(0.00)	(0.41)	(0.32)	(0.00)
Winsorized sample mean	-0.27***	-0.35***	-0.35***	-0.41*	-0.47***	-0.34***	-0.11	-0.21**	-0.37***
Winsorized sample p-value	(0.08)	(0.00)	(0.00)	(0.09)	(0.00)	(0.00)	(0.52)	(0.04)	(0.00)
Sample size	68	68	68	32	32	32	36	36	36

Note: Table 3 shows the average difference between the annualized Sharpe Ratio of the respective post-spin-off entities and the annualized Sharpe ratio of the market, for the respective time periods. Asterisks indicate significance at the 10 percent (*), 5 percent (**), and 1 percent (***) level.

After adjusting the abnormal returns for risk using the Sharpe ratio, an evident pattern of statistically significant and negative risk-adjusted abnormal returns is observed with regard to the total sample of both the continuing and spun-off entities during the one-, two- and three-year intervals following the spin-off date. The null hypothesis (Hypothesis 2.1) is rejected at significance levels of 10, 5, or 1 percent in 32 of 36 subtests. Moreover, all 36 subtests indicate a negative Sharpe ratio difference against the market for the respective periods.

For the continuing entity sample, the Sharpe ratio difference against the market is negative and significantly different from zero at the 5 or 1 percent significance level across all three periods. In contrast to the observed data on unadjusted abnormal returns, in which the sample of cross-industry continuing entities generally underperforms intra-industry spin-offs, a reverse pattern is identified with regard to the risk-adjusted abnormal returns. For the full sample mean, the Sharpe ratio difference of the continuing intra-industry subsample is more negative than the continuing cross-industry subsample during all periods. However, after adjusting for outliers through winsorization, this is only true for the one- and two-year intervals following the spin-off date. Nevertheless, the observed discrepancy between the average abnormal returns of the two subsamples decreases after risk-adjusting the returns, which is consistent with the semi-strong form of the EMH.

The sample of spun-off entities similarly exhibits negative risk-adjusted abnormal returns across the one-, two- and three-year periods. For the total sample of spun-off entities, the null

hypothesis (Hypothesis 2.1) is rejected at significance levels of 10, 5, or 1 percent in all six subtests. Further, for the sample of intra-industry spun-off entities, the null hypothesis (Hypothesis 2.1) is rejected at the same significance levels in five of six subtests. However, for the sample of cross-industry spun-off entities, the null hypothesis (Hypothesis 2.1) is rejected with the corresponding statistical significance in only three of six subtests. Thus, although the Sharpe ratio difference is statistically different from zero with regard to the full sample of spun-off entities, the statistical significance is generally lower for the two subsamples of spun-off entities.

When examining the Sharpe ratio differences of the spun-off entity subsample and the continuing entity subsample, the magnitude of the spun-off entity outperformance is indeed not as great as on an unadjusted level. In fact, as seen in Table 3, the Sharpe ratio difference between the two post-spin-off entities diminishes over time. In other words, the sample of spun-off entities generally outperforms the sample of continuing entities on a risk-adjusted basis, but not with the same distinction as on an unadjusted basis. This, in turn, motivates using the Sharpe ratio to account for risk-levels when comparing the long-term returns of the two-post-spin-off entities. The semi-strong form of the EMH does not allow for long-term risk-adjusted abnormal return differences between two portfolios over time (Fama, 1970). Beyond the measured three-year time period, the semi-strong form of the EMH thus contends that this discrepancy would, over time, go towards zero.

As in the case of the tests on unadjusted long-term abnormal returns, the corporate focus and negative synergies hypothesis, as well as the information asymmetry hypothesis, do not make any claims regarding risk-adjusted long-term returns. However, the overall pattern of negative risk-adjusted abnormal returns is both consistent with our previously outlined expectations and the semi-strong form of the EMH. Lastly, the mentioned performance discrepancy between the two subsamples is lower when examining risk-adjusted metrics compared to the unadjusted metrics, supporting the notion that the Sharpe ratio appropriately accounts for risk levels.

5.2 Operating Performance

To capture potential changes in operating performance, yearly changes in ROA of the combined entities are measured, starting from one year prior to the spin-off date and ending three years after the spin-off date [(-1, 0) ; (0, +1) ; (+1, +2) ; (+2, +3)]. To capture the underlying drivers of potential ROA changes, changes in operating margin and asset turnover

are further tested during the respective periods. To isolate changes in operating performance absent industry-wide variations, the accounting metrics are both measured on an unadjusted and industry-adjusted basis.

Due to insufficient accounting data, the initial sample sizes for the operating performance tests are smaller than the sample sizes for the stock market performance tests. As several post-spin-off entities become acquired within the three-year period following the spin-off date, the number of observations gradually decreases across the measured time periods. We thus acknowledge that the smaller sample sizes make it more difficult to confirm statistically significant results.

Table 4. Yearly Change in ROA (Hypothesis 3.0)

	All spin-offs				**Intra-industry spin-offs**				**Cross-industry spin-offs**			
	(- 1, 0)	(0, + 1)	(+ 1, + 2)	(+ 2, + 3)	(- 1, 0)	(0, + 1)	(+ 1, + 2)	(+ 2, + 3)	(- 1, 0)	(0, + 1)	(+ 1, + 2)	(+ 2, + 3)
	Panel A: Unadjusted											
Full sample mean	0.11%	0.50%*	-0.41%	-0.50%	0.02%	0.41%	-0.42%	-0.17%	0.19%	0.59%	-0.40%	-0.76%
Full sample p-value	(0.70)	(0.08)	(0.27)	(0.20)	(0.97)	(0.50)	(0.47)	(0.67)	(0.58)	(0.38)	(0.23)	(0.23)
Winsorized sample mean	0.01%	0.47%*	-0.28%	-0.39%	-0.11%	0.42%	-0.20%	-0.10%	0.19%	0.45%	-0.29%	-0.62%
Winsorized sample p-value	(0.49)	(0.07)	(0.33)	(0.18)	(0.76)	(0.42)	(0.60)	(0.73)	(0.54)	(0.45)	(0.46)	(0.20)
Sample size	58	57	53	50	27	27	23	22	31	30	30	28
	Panel B: Industry-adjusted											
Full sample mean	-0.2%	0.4%	-0.1%	-0.6%	-0.2%	1.0%	0.2%	-0.2%	-0.1%	0.0%	-0.3%	-0.9%
Full sample p-value	(0.67)	(0.38)	(0.90)	(0.16)	(0.75)	(0.17)	(0.78)	(0.65)	(0.79)	(0.97)	(0.65)	(0.17)
Winsorized sample mean	-0.2%	0.5%	-0.61%*	-0.62%*	-0.1%	1.0%	-0.3%	-0.4%	-0.1%	-0.1%	-0.89%*	-0.9%
Winsorized sample p-value	(0.58)	(0.33)	(0.08)	(0.08)	(0.75)	(0.13)	(0.43)	(0.29)	(0.82)	(0.33)	(0.08)	(0.11)
Sample size	58	57	53	50	27	27	23	22	31	30	30	28

Note: Table 4 shows the average change in ROA for each year, calculated as the average of $ROA_{i,t} – ROA_{i,t-1}$. Asterisks indicate significance at the 10 percent (*), 5 percent (**), and 1 percent (***) level.

The unadjusted change in ROA is only statistically different from zero between the spin-off date and one year after the spin-off date, in which the change is positive. Despite that the broader literature on diversification as well as the corporate focus and negative synergies hypothesis generally contend that spin-offs may result in positive changes in firm operating performance, no other unadjusted change in ROA across the measured time periods is significantly different from zero. Additionally, no distinct pattern of the direction of the unadjusted ROA changes over the years is observed. This is further true for the industry-adjusted ROA changes, both in terms of the general direction of the ROA changes over the years and the lack of statistical significance. Specifically, after industry-adjustment, the null hypothesis (Hypothesis 3.0) is only rejected in two of eighteen subtests at the 10 percent significance level.

The previously outlined predictions regarding the yearly ROA changes around spin-offs was that the cross-industry subsample would exhibit a generally positive trend in ROA changes for the measured time periods. No specific predictions for the intra-industry subsample were explicitly stated, in line with the corporate focus and negative synergies hypothesis as well as previously conducted studies, including Daley et al. (1997). Thus, our empirical results on the ROA changes around spin-offs, overall contradict our predictions as well as the corporate focus and negative synergies hypothesis.

However, the results are partly similar to that of Daley et al. (1997), finding a significant and positive change in ROA between the spin-off date and one year after the spin-off date for cross-industry spin-offs. On the other hand, the by Daley et al. (1997) observed ROA change for the period is greater in magnitude (+3.0 percent) than the observed results in our sample (+0.5 percent).

Table 5. Yearly Change in Operating Margin (Hypothesis 4.0)

	All spin-offs				**Intra-industry spin-offs**				**Cross-industry spin-offs**			
	(- 1, 0)	(0, + 1)	(+ 1, + 2)	(+ 2, + 3)	(- 1, 0)	(0, + 1)	(+ 1, + 2)	(+ 2, + 3)	(- 1, 0)	(0, + 1)	(+ 1, + 2)	(+ 2, + 3)
	Panel A: Unadjusted											
Full sample mean	0.04%	-0.41%	-0.48%	-1.45%	0.05%	-1.49%	-0.25%	-0.10%	0.04%	0.57%	-0.65%	-2.52%
Full sample p-value	(0.92)	(0.74)	(0.33)	(0.25)	(0.95)	(0.45)	(0.78)	(0.90)	(0.90)	(0.71)	(0.21)	(0.25)
Winsorized sample mean	0.17%	-0.33%	-0.23%	-0.36%	0.15%	-0.97%	0.08%	-0.57%	0.13%	0.36%	-0.44%	-0.93%
Winsorized sample p-value	(0.54)	(0.58)	(0.49)	(0.25)	(0.81)	(0.34)	(0.90)	(0.19)	(0.62)	(0.45)	(0.21)	(0.29)
Sample size	58	57	53	50	27	27	23	22	31	30	30	28
	Panel B: Industry-adjusted											
Full sample mean	-0.76%	-0.67%	-0.71%	-1.79%	-0.73%	-1.57%	-0.55%	-0.47%	-0.79%	0.14%	-0.84%	-2.83%
Full sample p-value	(0.16)	(0.59)	(0.59)	(0.10)	(0.46)	(0.43)	(0.60)	(0.57)	(0.10)	(0.31)	(0.32)	(0.16)
Winsorized sample mean	-0.53%	-0.33%	-0.73%	-1.04%**	-0.55%	-1.01%	-0.29%	-0.97%*	-0.70%*	0.25%	-0.88%	-1.68%
Winsorized sample p-value	(0.22)	(0.63)	(0.14)	(0.02)	(0.51)	(0.37)	(0.71)	(0.05)	(0.10)	(0.44)	(0.14)	(0.13)
Sample size	58	57	53	50	27	27	23	22	31	30	30	28

Note: Table 5 shows the average change in operating margin for each year, calculated as the average of Operating margin$_{i,t}$ – Operating margin$_{i,t-1}$. Asterisks indicate significance at the 10 percent (*), 5 percent (**), and 1 percent (***) level.

Table 6. Yearly Change in Asset Turnover (Hypothesis 4.1)

	All spin-offs				Intra-industry spin-offs				Cross-industry spin-offs			
	(- 1, 0)	(0, + 1)	(+ 1, + 2)	(+ 2, + 3)	(- 1, 0)	(0, + 1)	(+ 1, + 2)	(+ 2, + 3)	(- 1, 0)	(0, + 1)	(+ 1, + 2)	(+ 2, + 3)
	Panel A: Unadjusted											
Full sample mean	0.03%	0.37%	-2.03%	-1.10%	-1.06%	-0.55%	-3.05%	-0.01%	0.99%	1.20%	-1.26%	-1.95%
Full sample p-value	(0.98)	(0.87)	(0.28)	(0.37)	(0.58)	(0.82)	(0.15)	(1.00)	(0.59)	(0.75)	(0.67)	(0.19)
Winsorized sample mean	-0.02%	-1.15%	-1.57%	-0.67%	-1.18%	-1.54%	-2.76%	1.08%	0.97%	-0.77%	0.07%	-1.47%
Winsorized sample p-value	(0.99)	(0.33)	(0.22)	(0.41)	(0.36)	(0.22)	(0.14)	(0.34)	(0.48)	(0.70)	(0.97)	(0.22)
Sample size	58	57	53	50	27	27	23	22	31	30	30	28
	Panel B: Industry-adjusted											
Full sample mean	1.17%	2.41%	0.65%	-1.15%	-0.51%	1.58%	-1.45%	1.66%	2.62%	3.15%	2.25%	-3.36%*
Full sample p-value	(0.40)	(0.32)	(0.78)	(0.52)	(0.78)	(0.53)	(0.54)	(0.62)	(0.12)	(0.43)	(0.54)	(0.08)
Winsorized sample mean	1.39%	0.71%	1.00%	-2.06%*	-0.33%	0.15%	-1.39%	0.56%	2.89%**	1.14%	3.56%	-3.58%**
Winsorized sample p-value	(0.21)	(0.64)	(0.55)	(0.07)	(0.76)	(0.85)	(0.53)	(0.47)	(0.04)	(0.65)	(0.21)	(0.04)
Sample size	58	57	53	50	27	27	23	22	31	30	30	28

Note: Table 6 shows the average change in asset turnover for each year, calculated as the average of Asset turnover$_{i,t}$ – Asset turnover$_{i,t-1}$. Asterisks indicate significance at the 10 percent (*), 5 percent (**), and 1 percent (***) level.

Given a pattern of statistically significant change in ROA around the spin-off, we suggested it relevant to further test whether these changes would stem from changes in operating margin or asset turnover. Consonant with the empirics of ROA change, no clear patterns of the direction of the changes nor statistically significant results are observed for the two accounting metrics. With regard to changes in operating margin, the null hypothesis (Hypothesis 4.0) is only rejected in three of 36 subtests at the ten and five percent significance levels. Similarly, for the observed changes in asset turnover, the null hypothesis (Hypothesis 4.1) is only rejected in four of 36 subtests at the same significance levels.

6 Discussion

Taking the observed empirics into account, both in terms of shareholder wealth effects and changes in operating performance, one can observe value creation from the perspective of some, but not all, conducted tests. From a stock market perspective, significant value is created at the announcement day of the spin-off. Shareholders of the pre-spin-off parent entity prior to the spin-off announcement earn positive and significant abnormal announcement-day returns. However, from a long-term stock market perspective, unadjusted abnormal returns are not significantly different from zero overall, and risk-adjusted returns are even negative compared to the overall market. An investor purchasing shares in the two post-spin-off entities is thus

better off by owning the S&P 500 index portfolio. As for operating performance, no pattern of value creation is observed on a statistically significant level in terms of ROA, operating margin, or asset turnover.

Below, we provide a brief summary of our results and expand on our empirics' most interesting dimensions. We further relate these observations to previous studies, our theoretical framework as well as the broader literature on diversification effects.

Share Price Performance

From a capital markets perspective, the announcement-day returns are inherently positive, implying the creation of shareholder wealth as well as that market expects future improvements in operating performance following spin-offs. The corporate focus and negative synergies hypothesis in combination with the semi-strong form of the EMH, generally expect positive abnormal announcement-day returns. Furthermore, the information asymmetry hypothesis relates the positive abnormal announcement-day returns to reduced information asymmetry. Both hypotheses may partly explain the positive abnormal announcement-day returns. However, no conclusion can with confidence be drawn in terms of which hypothesis has the most explanatory power with regard to the announcement-day empirics.

An interesting finding is that the intra-industry subsample, assumed to be non-focus-increasing, exhibits greater announcement-day returns than the cross-industry subsample. However, this contradicts previous studies, including tests conducted by Desai and Jain (1999) as well as the corporate focus and negative synergies hypothesis.

On the other hand, the broader literature on diversification effects may partly have explanatory power regarding this unexpected discrepancy. As previously stated, Denis et al. (2002) find that the negative effect of geographical diversification on firm value is roughly equal to that of industrial diversification. Although geographical diversification is not specifically tested in this paper, the abnormal announcement-day returns of the intra-industry subsample could thus potentially still be motivated by the intra-industry subsample hypothetically being highly geographically diversified prior to the spin-off. Even though intra-industry spin-offs do not result in increased corporate focus, a potential increase in geographical focus following the spin-off may thus be positively viewed upon by the market. Furthermore, although the assumption that cross-industry spin-offs exhibit greater focus-increasing characteristics than intra-industry spin-offs may still hold, this does not necessarily preclude negative synergies

from being eliminated only within the cross-industry spin-off subsample, but potentially also within the intra-industry subsample.

With regard to long-term unadjusted share price returns, in contrast to Desai and Jain's (1999) findings, neither of the two post-spin-off subsamples exhibit any pattern of significant long-term returns in excess of the market. However, as per the semi-strong form of the EMH, an investor purchasing stock in the respective entities at the spin-off date would have been better off by owning the index portfolio from a risk-adjusted perspective. The observed discrepancy between the unadjusted and risk-adjusted abnormal returns further motivates the claim that risk-adjusting long-term abnormal returns have the potential to provide a more holistic view of the value creation of spin-offs from a capital markets perspective.

Operating Performance

In a semi-strong efficient market, the significant and positive announcement-day abnormal returns imply that the market expects future improvements in operating performance following spin-offs. However, no pattern of significant changes in operating performance is found over the measured three-year period. Despite a significant and slightly positive change in ROA during the first year following the spin-off date, no other pattern of significant change is observed.

As stated in the literature review section of the paper, there is a growing academic consensus that excessive levels of diversification may affect firm operating performance negatively (Denis et al., 2002; Lang and Stulz, 1994). Specifically, an inverted U-shaped relationship between diversification and operating performance is found (Qian et al., 2008). When applying this suggested relationship to the corporate focus and negative synergies hypothesis, the hypothesis implicitly assumes that the pre-spin-off degree of firm diversification is at a level where the marginal benefits of de-diversification exceed the marginal costs of de-diversification. In terms of the proposed inverted U-shaped relationship, the hypothesis thus assumes that the typical firm undertaking a spin-off exhibits excessive levels of diversification prior to the spin-off.

In light of the above, one dimension that potentially could explain the lack of statistical significance of the observed ROA changes may be that the average level of pre-spin-off diversification within the spin-off sample is not ideal (as per the U-shaped relationship) from the perspective of improving operating performance. As previously stated, decision-makers

may choose to engage in spin-offs for other reasons, including closing potential information asymmetry gaps to increase firm valuation (Krishnaswami and Subramaniam, 1999).

Another aspect that should be scrutinized with regard to the operating performance is the time scope of the study. The fact that the empirics on operating performance in this study overall are not statistically different from zero does not preclude the possibility that operational improvements may be generated beyond the three-year mark after the spin-off date. Based on this data, one cannot reject the potential scenario of negative synergies being eliminated, as per the corporate focus and negative synergies hypothesis, after three years from the spin-off date. Similarly, this data does not necessarily reject the notion that diversified firms on average exhibit suboptimal investment efficiency (Rajan et al., 2000), as it is not unlikely that it may take more than three years following the spin-off for the proposed improved investment efficiency to be reflected in ROA, operating margin and asset turnover.

Lastly, it is important to accurately model the endogeneity of diversification effects (Campa and Kedia, 2002; Colak and Withed, 2007; Graham et al., 2002; Villalonga, 2004). Regardless of if the firm operating performance, in fact, would have been positively changed, negatively changed, or not even changed at all following the spin-off, one cannot relate these changes to the contra-factual, i.e., that the spin-off sample is not undertaking spin-offs.

7 Conclusion

After having conducted various tests with the objective of assessing the potential value creation of spin-offs, some elements of value creation are found. As previously outlined, this study approaches the term value creation from three different perspectives. The first perspective aims to capture value creation absent of risk in the capital markets by analyzing unadjusted announcement-day returns of the pre-spin-off parent entity and unadjusted long-term stock market returns of the two post-spin-off entities. The second perspective evaluates the same long-term stock market returns of the two post-spin-off entities, but on a risk-adjusted basis. The third perspective approaches value creation from an internal, corporate perspective by focusing on operating performance in the form of ROA, operating margin, and asset turnover.

The observed results indeed elucidate the versatile nature of our research question of whether spin-offs create value and, if so, how spin-offs create value. In terms of unadjusted abnormal returns, significant creation of shareholder wealth is found at the day of the spin-off

announcement. In contrast, no pattern of significance is found with regard to unadjusted long-term returns of the two post-spin-off entities. In other words, spin-offs *do* create value in the form of shareholder wealth at the announcement day, but *not* on a long-term basis absent risk-adjustment. After risk-adjustment, the post-spin-off entities significantly underperform the overall market on a long-term basis, indicating that an investor would achieve superior long-term risk-adjusted abnormal returns by owning the market portfolio rather than investing in the average post-spin-off entity at the spin-off date. Thus, from a long-term investment decision perspective, the average post-spin-off entity does *not* generate risk-adjusted abnormal long-term returns to investors. Lastly, no statistically significant trends of changes in the selected accounting measures are found. No definite conclusions can thus be drawn regarding the described operating performance perspective in relation to spin-offs.

Given the observed empirics and our theoretical framework, we cannot draw a universal conclusion stating that the observed value-creating elements of spin-offs may be solely explained by one specific hypothesis. The corporate focus and negative synergies hypothesis contends that spin-offs may serve as an efficient corporate action to separate dissimilar business units and eliminate negative synergies, ultimately resulting in increased corporate focus and improved operating performance as well as investment efficiency (Ahn and Denis, 2004; Cusatis et al., 1993; Daley et al., 1997; Rajan et al., 2000). However, in the context of the broader literature on diversification effects, the hypothesis implicitly assumes that the typical firm undertaking a spin-off exhibits excessive levels of diversification prior to the spin-off. On the other hand, researchers proposing the information asymmetry hypothesis find that firms may choose to undertake spin-offs to mitigate adverse selection issues in the capital markets (Krishnaswami and Subramaniam, 1999).

The above, in combination with the fact that we *can* draw conclusions regarding abnormal announcement-day returns but *not* with regard to long-term operating performance, sheds light on a possible tension within our theoretical framework. Specifically, the information asymmetry hypothesis claims that managers may undertake spin-offs without any explicit intentions to increase operating performance, in contrast to the corporate focus and negative synergies hypothesis. Considering the above, combined with our observed empirics, we cannot draw any definite conclusions about which hypothesis has the most explanatory power of our results. However, we still argue that the hypotheses within our theoretical framework have the potential to manifest a holistic view of the value-creating elements of spin-offs.

We acknowledge that our research method and design is subject to limitations, such as the issue of endogeneity, the limited sample size and the measured time period. Altogether, these limitations may have impacted our analysis, the statistical significance of our results as well as the fact that some of our empirics contradict previously conducted studies. Thus, we recognize that our research design may be subject to potential revisions. The issue of endogeneity could be mitigated by using econometric techniques, as proposed by Villalonga (2004). To achieve more robust statistical significance, an increase in sample size may be achieved by increasing the chosen time span in future studies. As previously discussed, no conclusions regarding changes in operating performance can be drawn based on the empirics in this study. By increasing the measured time period beyond three years following the spin-off date in future studies, one could potentially arrive at more precise conclusions of long-term changes in operating performance, as they may materialize after the three-year mark. However, increasing the measured time period risks resulting in further insufficient data points as the post-spin-off entities tend to be acquired over time (Cusatis et al., 1993).

Conclusively, we believe that this study contributes to the existing spin-off literature by presenting a comprehensive view of the value-creating elements of spin-offs. As spin-offs have become increasingly prevalent in the capital markets (Kotzen et al., 2016), we hope that our findings will inspire other researchers to explore this highly relevant topic further. After having investigated our research question, we have discovered various ideas that may extend the existing literature. Given the absence of previous studies incorporating risk into the context of long-term stock market performance following spin-offs, our ambition is that this study may encourage researchers to also utilize models such as CAPM or other multi-factor models to assess the risk-adjusted long-term returns following spin-offs. Furthermore, in future studies, a more granular perspective on geographical de-diversification in the context of spin-offs could potentially help explain the observed intra-industry announcement-day outperformance. Lastly, qualitative case studies focusing on the underlying rationale of decision-makers to undertake spin-offs may provide a more nuanced view of the previously described tension between the information asymmetry hypothesis and the corporate focus and negative synergies hypothesis.

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9 Appendix

9.1 Definitions

- **Abnormal return (AR):**

  The abnormal return refers to the return of a stock in excess of the market return during a given period of time. The mathematical definition is as follows:

  $AR_{i,t} = r_{i,t} - r_{m,t}$

  where (i) $r_{i,t}$ represents the return of the individual stock during the time interval *t* and (ii) $r_{m,t}$ represents the return of the market during the corresponding time interval *t*.

- **Announcement day:**

  The announcement day refers to the day when the company communicates its intent of spinning-off a business unit or division.

- **Continuing entity:**

  The continuing entity refers to the parent entity following the spin-off.

- **Cross-industry spin-off:**

  A spin-off in which the continuing and spun-off entities operate in different two-digit SIC codes.

- **Excess return:**

  The return of a security in excess of the risk-free rate during a given period of time. The mathematical definition is as follows:

  $Excess\ return_{i,t} = r_{i,t} - rf_{i,t}$

  where: (i) $r_{i,t}$ represents the return of the individual security during the time interval *t* and (ii) $rf_{i,t}$ represents the return of the risk-free rate during the corresponding time interval *t*.

- **Intra-industry spin-off:**

  A spin-off in which the continuing entity and the spun-off entity operate in the same two-digit SIC code.

- **Sharpe ratio:**

  The Sharpe ratio adjusts a security's excess returns for additional risk stemming from not holding a risk-free asset. The mathematical definition of the Sharpe ratio of a security for a specific period is as follows:

$$Sharpe\ ratio_{i,t} = \frac{r_{i,t} - r_f}{\sigma_{i,t}}$$

where (i) $r_{i,t}$ represents the return of the individual security over the time interval *t*, (ii) $rf_{i,t}$ represents the return of the risk-free rate during the corresponding time interval *t*, and (iii) $\sigma_{i,t}$ represents the volatility of security *i* over the time interval *t*.

- **Standard Industry Classification (SIC) code:**

  The SIC code is a six-digit universal standard describing firms' primary industry or business activity.

- **Spin-off date:**

  The date on which the two post-spin-off entities start trading separately.

- **Spun-off entity:**

  The spun-off entity refers to the newly created independent entity following the spin-off.

  Pre-spin-off parent:
  The pre-spin-off parent entity refers to the combined firm prior to the spin-off (before the spin-off separates the combined firm into one continuing entity and one spun-off entity).