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Spin-offs and Shareholder Value Creation: Factors Affecting the Returns Associated with Spin-off Announcements

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ABSTRACT

We examine the effect of announcements of spin-offs on shareholder value. Using a sample of 153 spin-offs announced in the United States between 2007 and 2017 inclusive, we find that spin-offs on average are associated with a cumulative abnormal return over a three-day event window surrounding the announcement date of 4,20 %. This result is significant on the 1 % level. We further examine several factors that affect the size of the value creation associated with a spin-off. We find that spin-off announcements by firms in decline, in the sense that they are subject to long-term underperformance relative the market, are associated with larger value creation. We regress cumulative abnormal returns over the three-day event window on several spin-off characteristics. This yields the result that spin-offs announced by firms in decline on average are associated with cumulative abnormal returns 2,57 percentage points higher than those of otherwise comparable firms, over the event window. The result is significant on the 9 % level. This supports our hypothesis that underperforming firms are under more pressure and scrutiny from shareholders and hence have stronger incentives to conduct spin-offs that creates more shareholder value.

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KEYWORDS: spin-off; US equity markets; industrial focus; underperformance; abnormal returns, leverage, indebtedness

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1 Introduction

During the decade since the financial crisis some companies, primarily large technology firms, have performed astonishingly well. They have delivered superior returns and have entered ever more markets. However, numerous traditional companies and industries have struggled. In some industries, such as telecommunications and media content this has resulted in a rush to high profile mergers and acquisitions to gain scale. In other sectors, ailing conglomerates have sought to divest assets and spin off divisions. In light, of this it is interesting to examine spin-offs and their supposed value creation. In particular, it is interesting to examine the effect of spin-offs on ailing companies.

In this paper we examine whether corporate spin-offs create value for shareholders. Furthermore, we explore some aspects of spin-offs and their effect on the size of the value creation. We use a sample of 153 spin-offs in the United States announced between 2007 and 2017 inclusive, of which 128 were completed. We find that spin-offs on average are associated with a cumulative abnormal return over a three-day event window of 4,20 %. The result is significant on the 1 % level. Our expected return used to calculate the abnormal return is estimated using a three-factor market model in accordance with Fama and French (1993).

We examine four factors that might affect the size of the abnormal return associated with a spin-off. First, we find that spin-offs announced by companies that can be considered to be in decline, on average are associated with larger cumulative abnormal returns over a three-day event window than those that are not. The difference in mean is 3,71 percentage points and the results are significant on the 14 % level.

This result is confirmed by a regression of cumulative abnormal returns over the three-day event window on three of our four spin-off characteristics. In the model, spin-offs announced by firms in decline are on average associated with cumulative abnormal returns 2,57 percentage points higher than those of otherwise comparable firms, over the three-day event window. The result is significant on the 9 % level.

This is an interesting aspect of spin-offs because of primarily two reasons. For one, it indicates that spin-offs might be a sound way forward for ailing firms. It further supports the notion that firms in decline perform spin-offs that are sounder relative to those conducted by well performing firms. We believe this to be because declining firms are under more pressure and scrutiny from shareholders. Hence, they have stronger incentives to go through with spin-offs that creates more value by for example reducing negative synergies.

Second, we examine whether spin-offs where the company increases its industrial focus are associated with larger abnormal returns. If so it would confirm the commonly held belief that a spin-off designed to let the parent company focus on its core business, rids the firm of negative synergies. We find that over the three-day event window, the difference in mean between the samples of spin-offs with and without increasing industrial focus, is 1,18 percentage points. However, this is only significant on a 34 % level and can hence not be viewed with certainty. This result hence does not support the traditional notion that divesture of divisions outside of the core business of a company increases performance.

Third, we find that spin-offs that are relatively large are associated with higher abnormal returns than those that are not. In particular, over the three-day event window, the difference in mean between the sample of large spin-offs and the sample of those that are not is 3,23 percentage points. This is significant on the 1 % level. This result is not particularly surprising, it supports the hypothesis that the positive effects associated with a spin-off is in some way proportional to the size of the spin-off.

Fourth, we find that spin-offs performed by firms that are relatively highly levered result in lower cumulative abnormal returns, over the three-day event window, than those of firms with lower leverage. The difference in mean between the two groups is 1,94 percentage points. The result is significant on the 15 % level. This result is interesting since it contradicts our hypothesis that shareholders of highly levered companies would be able to extract more value from bondholders than those of companies with less leverage.

Overall, our results are in line with what have been found in earlier research. For instance, Veld and Veld-Merkulova (2004) find that spin-offs in Europe on average are associated with cumulative abnormal returns of 2,62 % over a three-day event window. In addition, Mulherin and Boone (2000) find an average cumulative abnormal return of 4,51 % over a similar event window. Moreover, researchers such as Miles and Rosenfeld (1983) find that large spin-offs are associated with significantly higher cumulative abnormal returns.

In conclusion it can be said that our paper contributes to the research on the topic of spin-offs, partly due to its use of more modern data than most previous research. However, of more interest, are the results relating to whether the company spinning off a division may be considered to be in decline. This area of the topic has, to our knowledge, not been examined to any substantial degree. Our findings may indicate a number of conclusions where we believe the reasoning, that ailing firms have stronger incentives to perform sound spin-offs, to be the most relevant.

The remainder of this paper is organized as follows. Section two provides a brief overview of current literature on the topic of spin-offs. Section three provides some theoretical framework helpful for understanding our paper. Section four relates to the empirical work made as part of the paper. It includes segments showing the main results, exploring the data underlying the paper and explaining the methods used. Section five concludes.

2 Literature review

The area of corporate spin-offs is a quite well examined topic of research in finance. What almost all papers and articles on the subject have in common, is that they find that spin-offs are associated with a significant increase in shareholder wealth. This is most commonly measured as cumulative abnormal returns, in particular over a three-day event window surrounding the date of announcement of the spinoff. A brief overview of a non-comprehensive selection of studies on spin-offs are provided in table 1.

Table 1. Some previous research into corporate spin-offs

Authors (year of publication)	Examined period	Estimation model	Sample size	Event window	$\overline{\text{CAR}}$ (%)
Hite and Owers (1983)	1963-1981	Market model – CRSP equally weighted index	123	-1 to 0	3,30
Miles and Rosenfeld (1983)	1963-1980	Mean Adjusted Return model	55	0 to +1	3,34
Krishnaswami and Subramaniam (1999)	1979-1993	Market model – CRSP equally weighted index	118	-1 to +1	3,28
Veld and Veld-Merkoulova (2004)	1987-2000	Market model – total return index from Datastream	156	-1 to +1	2,62
Maxwell and Rao (2003)	1974-1997	Market model – CRSP equally weighted index	80	2-day event window*	3,59
Wheatley, Brown and Johnsson (2005)	1980-1993	Market model – CRSP equally weighted index	114	Day 0	3,00
Sudarsanam and qian (2007)	1980-2005	Market model – total market return index from Datastream	157	-1 to +1	4,82
Chai, Lin and Veld (2016)	1999-2013	Market model – SIRCA value weighted market index	103	-1 to +1	2,93

* The two-day event window is not specified in their paper

As can be seen in table 1, although there already exists quite a lot of papers on the subject of corporate spin-offs, most papers either use quite small sample sizes or are relatively old. One way in which we would like to contribute to the research with this paper is by using a moderately large sample size and more modern data.

To further explain how we want to set ourselves apart from current literature on the subject, a more in depth look at some previous research might be necessary. For instance, Veld and Veld-Merkoulova (2004) use a sample of 156 spin-offs announced during the period 1987-2000 in 15 European countries, to test whether spin-offs are associated with abnormal returns. They also examine some factors that might potentially explain the size of these supposed abnormal returns, such as industrial scope, size of the spin-off and corporate governance. In the study, Veld and Veld-Merkoulova computes abnormal returns by comparing firm-specific returns to the Datastream Total Return Index for the corresponding country. Following this, they regress cumulative abnormal return on the factors they examine. They find that spin-offs, over the three-day event window surrounding the announcement date, are associated with a positive cumulative average abnormal return of 2,62 %. This result is significant at the 1 % level. Veld and Veld-Merkulova also find that spin-offs increasing industrial focus and relatively large spin-offs are associated with even larger positive abnormal returns. In contrast, corporate governance has no significant effect on abnormal returns.

In a less recent paper, Hite and Owers (1983) look at security prices around corporate spin-off announcements. In particular, they look at whether spin-offs are associated with wealth transfers from senior security holders to shareholders. They use a sample consisting of 123 spin-off announcements in the United States between the years of 1963 and 1981. Hite and Owers find a significant cumulative abnormal return of 3,3 % over a two-day event window leading up to and including the announcement date. They further find evidence for a drop in abnormal return after the announcement day.

In a more recent paper, Chai, Lin and Veld (2016) examine value creation through spin-offs in Australia. Their data is gathered from the Securities Industry Research Centre of Asia Pacific and the final sample consists of 103 unique announcements made during the period of 1999 to 2013. They find that spin-off announcements are associated with an average cumulative abnormal return, over a three-day event window, of 2,93%. The result is significant at the 1% level. Chai, Lin and Veld use the same methodology as Veld and Veld-Mekoulova (2004) in the sense that they use a value-weighted market index. To be more precise they compare actual return with the All Ordinary Index and the ASX200. Furthermore, Chai, Lin and Veld also examine factors that might explain the size of the abnormal returns that they find. Some factors they examine are industrial focus, geographical focus, information asymmetry and total debt level. However, they find no significant explanatory power for any of these variables.

To summarize, there is somewhat of a consensus in the literature that spin-offs create value for shareholders. There is also some agreement that relatively larger spin-offs and spin-offs that leads to increasing industrial focus creates more value. In light of this however, we would like to contribute to the field in primarily three ways. First, we use a moderately large sample and modern data. Second, we use a three-factor model to calculate the abnormal returns. Third, we examine the previously somewhat overlooked aspect, of whether the spinning-off company can be considered to be in decline.

3 Factors affecting the size of abnormal returns

This section explores some of the factors that might affect the size of the wealth effect associated with a corporate spin-off. It is divided into two different segments, one describing factors that we test in this paper and one describing factors that we do not test. The latter is included for completeness.

3.1 Factors we test

3.1.1 Long-term underperformance

Spin-offs are often undertaken by ailing firms as part of a plan to turn the company around. We hypothesize that among the firms that undertakes spin-offs, those that are ailing and in decline will be subject to higher abnormal returns. Our reasoning is that ailing firms are under greater pressure to, and have larger incentives to, conduct spin-offs with a high degree of value creation for the shareholders. Thus, we expect the abnormal return associated with spin-offs undertaken by long-term poorly performing companies, to be greater than those for well performing firms.

3.1.2 Increasing industrial focus

One of the most common reasons given for spinning off a subsidiary is for the company to be able to focus more on its so-called core business and hence increase its performance. Kose and Ofek (1995) examines this hypothesis and find support for the notion that companies that divest assets in order to increase their industrial focus experience a long-term increase in performance. One possible explanation given is that the divesture of non-core businesses rids the company of negative synergies.

The case for increases in industrial focus being associated with superior performance of a company is strengthen by research by Daley, Mehrotra and Sivakumar (1996) and Hite and Owers (1983). These studies find that spin-offs resulting in increased industrial focus are associated with larger abnormal returns, compared to spin-offs that do not result in increased industrial focus.

3.1.3 Relative size of the spin-off

Several studies, such as Mulherin and Boone (2000) and Miles and Rosenfeld (1983), find that spin-offs where the spun off subsidiary is large relative to the parent company, are associated with higher abnormal returns. This is probably explained by the fact that if spin-offs are associated with positive abnormal returns, the larger the spin-off, the larger the positive effect. For instance, if increasing industrial focus of the spinning off company contributes to higher abnormal return, the effect is probably stronger the larger the spun-off subsidiary is because this means the focus increases even more.

3.1.4 Level of indebtedness

Maxwell and Rao (2003) provides evidence that one way in which spin-offs create value for shareholders is through expropriation of wealth from bondholders. They find that announcements of spin-offs are associated with negative abnormal returns on the bonds of the company around that time. One proposed reason for this is that spin-offs results in loss of collateral for debtholders of the company. In conclusion, they find that leverage is inversely related with bond returns due to wealth transfers. On the other hand, Schipper and Smith (1983) also test the wealth transfer hypothesis but only find weak evidence for it.

In conclusion, we expect firms with more relatively more debt to be associated with higher abnormal returns for shareholders. However, since there has been so little research done on the area, we would not find it surprising if the findings indicate the opposite or if they are not significant at all. It should further be noted that Maxwell and Rao (2003) examine a longer-term period than just a short event window. We thus expect the effect of relative indebtedness to be quite weak in our results and therefore also present results where this has not been accounted for.

3.2 Factors we do not test

3.2.1 Information asymmetry

Krishnaswami and Subramaniam (1999) find that the degree of information asymmetry of a company is positively related with the gain from a spin-off conducted by that company. They argue that one reason for divesting through a spin-off, rather than selling the assets to another company, is that the company believes the market will value the separate entities more accurately than the combined firm. They also find that firms with high levels of information asymmetry are more likely to pursue spin-offs than comparable firms.

3.2.2 Geographical focus

Spinning of a subsidiary in a foreign country may have both benefits and drawbacks. First, it may reduce negative synergies that might arise from the complexity of having operations in several countries. Second, it may reduce economies of scale and hence have a negative effect on performance. Furthermore, spinning off a foreign unit might signal that the choice of the company to expand its business abroad was not a good decision to begin with. Moreover, managers might have chosen to expand globally to reduce their own risk, despite the decision leading to lower shareholder value. Veld and Veld-Merkoulova (2004) examines these aspects but find no significant difference in abnormal returns related to the degree of increased geographical focus of a spin-off.

4 Empirical work

This section puts forth the empirical work of our paper. First there is a segment on the main results that we find. Then there is a section on the acquiring of data followed by an exploration of the methodology we use.

4.1 Main results

4.1.1 All spin-offs and completed spin-offs

A corporate spin-off is defined as one publicly listed corporation divesting a subsidiary by in turn having that subsidiary publicly listed. We show that the announcements of spin-offs are associated with positive abnormal returns for the company doing the announcement. We find, on average, cumulative abnormal returns over the three-day event window of 4,20 %. The figure decreases to 4,16 % when only completed spin-offs are examined. Both these results are significant on the 1 % level. We also find significant cumulative abnormal returns over several other event windows. An overview of these results can be found in table 2.

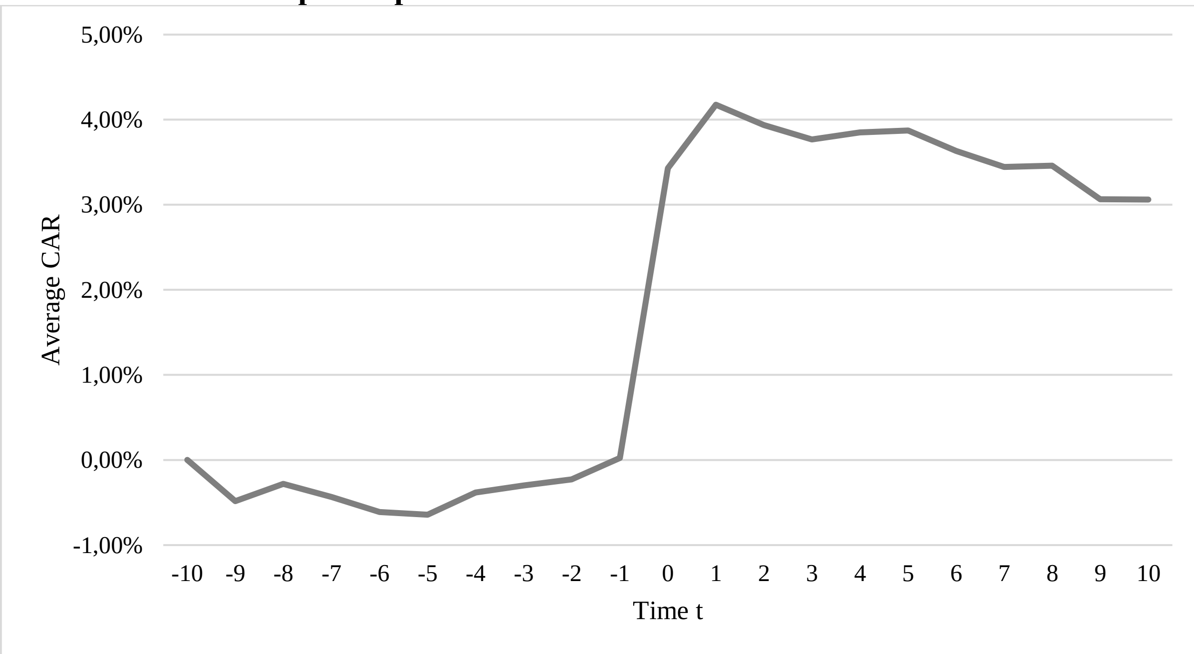
Table 2. Average cumulative abnormal returns for the full sample of spin-offs for different event windows

	Full sample				Completed spin-offs			
Event window	$\overline{CAR}$		Statistic	n	$\overline{CAR}$		Statistic	n
-10 to 10	0,0306	***	4,35	153	0,0299	***	4,03	128
-5 to 5	0,0450	***	8,80	153	0,0444	***	8,23	128
-1 to 1	0,0420	***	15,74	153	0,0416	***	14,75	128
-10 to 0	0,0343	***	6,73	153	0,0341	***	6,34	128
0 to 10	-0,0038		-0,74	153	-0,0043		-0,80	128

Cumulative abnormal return over different event windows. Abnormal return is derived by comparing actual return with an estimate return. This expected return is calculated using a three-factor market model in accordance with Fama and French (1993), estimated using daily returns and a two-year estimation window. The statistics are calculated using the approach suggested by MacKinlay (1997) further explored in section 4.3.3. Asterisks and dot indicate significance at the 15% (.), 10% (*), 5% (**) and 1% (***) level.

Furthermore, we find that following the first positive reaction of the stock market to the spin-offs announcement, abnormal returns decrease. Over the event window from day one to day ten, we find a cumulative abnormal return of around -1,12 %. Figure 1, shows how the cumulative abnormal returns develop over time.

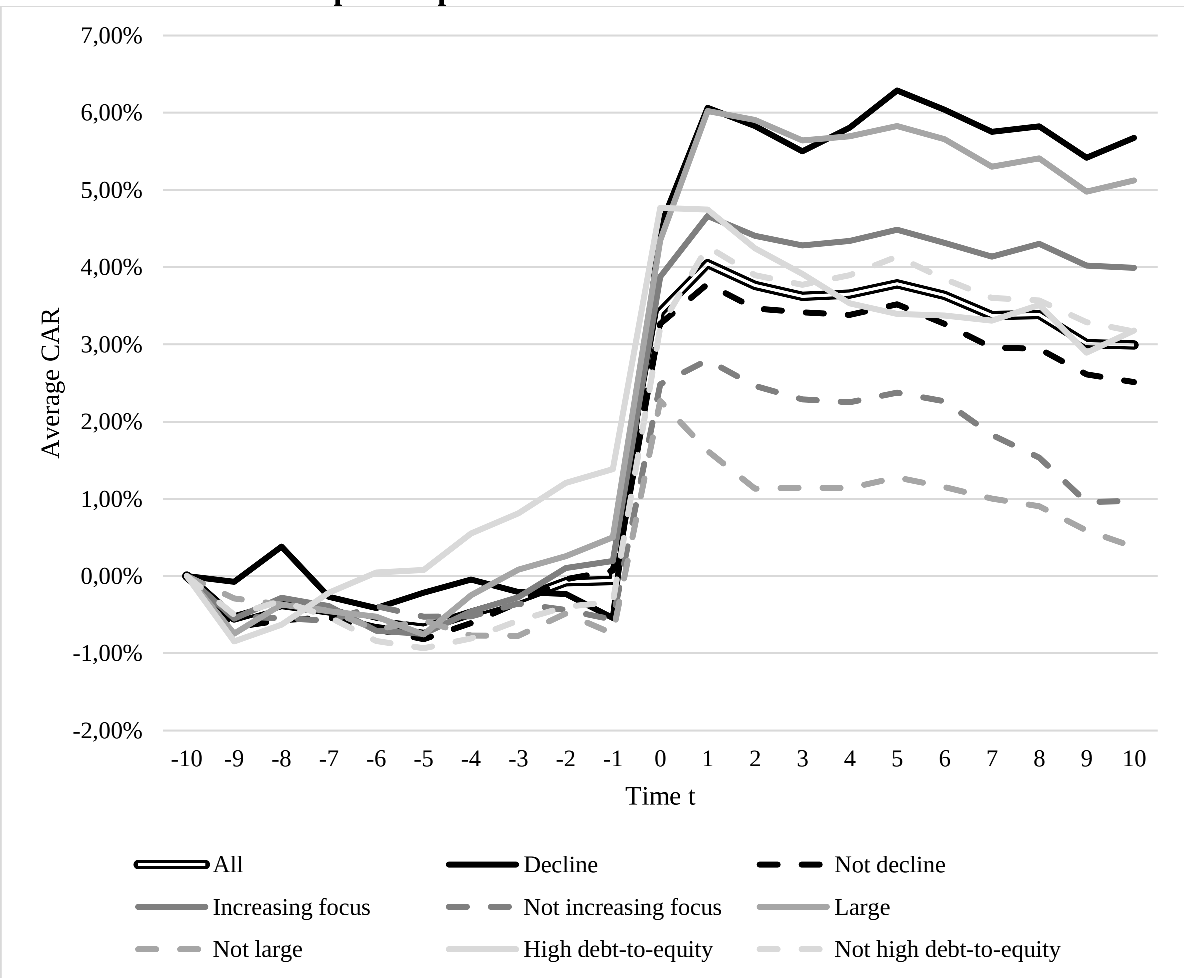
Figure 1. Average cumulative abnormal return for the full sample of spin-offs from -10 to time t



The graph illustrates the average cumulative abnormal return from day -10 to day t for the full sample of spin-offs. Abnormal return is derived by comparing actual return with an estimate return. This expected return is calculated using a three-factor market model in accordance with Fama and French (1993), estimated using daily returns and a two-year estimation window.

It seems to be true that abnormal returns fall to negative levels during the time following the announcement for the subset of completed spin-offs as well. However, within this subset some differences between subgroups seem to exist. An overview of these can be seen in figure 2. For instance, the returns of companies in decline and those increasing industrial focus see only slightly negative abnormal returns during the days following the announcement.

Figure 2. Average cumulative abnormal return for the subsample of completed spin-offs from -10 to time t



The graph illustrates the average cumulative abnormal return from day -10 to day t for different subgroups in the subsample of completed spin-offs. Abnormal return is derived by comparing actual return with an estimate return. This expected return is calculated using a three-factor market model in accordance with Fama and French (1993), estimated using daily returns and a two-year estimation window.

4.1.2 Long-term underperforming companies

We find that companies in decline experience larger abnormal returns on the announcement of spin-offs than companies that are not in decline. The difference in mean cumulative abnormal return over the three-day event window between these two groups is 3,71 percentage points. This result is significant on the 14 % level. When only completed spin-offs are examined, this result loses some of its significance. A presentation of these results can be found in table 3 and table 4.

Table 3. Average cumulative abnormal returns in the full sample of spin-offs over different event windows for firms in decline and firms not in decline

Event window	Sample of firms in decline (n = 29)	Sample of firms not in decline (n = 122)	Difference in mean between the subsamples (n = 151)		
	$\overline{CAR}$	$\overline{CAR}$	$\overline{CAR}$	t-statistic	p-value
-10 to 10	0,0595	0,0250	0,0344	1,43	0,1625
-5 to 5	0,0724	0,0414	0,0309	1,16	0,2530
-1 to 1	0,0734	0,0362	0,0371 .	1,54	0,1347
-10 to 0	0,0565	0,0300	0,0265	1,21	0,2332
0 to 10	0,0030	-0,0050	0,0080	0,49	0,6261

Cumulative abnormal return over different event windows. Abnormal return is derived by comparing actual return with an estimate return. This expected return is calculated using a three-factor market model in accordance with Fama and French (1993), estimated using daily returns and a two-year estimation window. The differences in mean are tested using a Welch-test included in R further explored in section 4.3.3. Asterisks and dot indicate significance at the 15% (.), 10% (*), 5% (**) and 1% (***) level.

Table 4. Average cumulative abnormal returns in the subsample of completed spin-offs over different event windows for firms in decline and firms not in decline

Event window	Sample of firms in decline (n = 24)	Sample of firms not in decline (n = 102)	Difference in mean between the subsamples (n = 126)		
	$\overline{CAR}$	$\overline{CAR}$	$\overline{CAR}$	t-statistic	p-value
-10 to 10	0,0568	0,0251	0,0316	1,12	0,2723
-5 to 5	0,0650	0,0431	0,0219	0,76	0,4563
-1 to 1	0,0661	0,0378	0,0282	1,21	0,2390
-10 to 0	0,0452	0,0327	0,0125	0,55	0,5878
0 to 10	0,0116	-0,0076	0,0192	1,13	0,2686

Cumulative abnormal return over different event windows. Abnormal return is derived by comparing actual return with an estimate return. This expected return is calculated using a three-factor market model in accordance with Fama and French (1993), estimated using daily returns and a two-year estimation window. The differences in mean are tested using a Welch-test included in R further explored in section 4.3.3. Asterisks and dot indicate significance at the 15% (.), 10% (*), 5% (**) and 1% (***) level.

The results when analyzing the full sample is interesting. If spin-offs conducted by firms in decline creates more value, it further strengthens the case for having divestiture of divisions as a strategy for turning around an ailing company. Furthermore, it gives support to our hypothesis that firms in decline have stronger incentives, and are under more pressure to, conduct more sensible spin-offs.

4.1.3 Spin-offs increasing industrial focus

We examine whether spin-offs resulting in increasing industrial focus of the company create more value for shareholders, than those that do not. In line with previous research we find some weak evidence for this. The difference in mean cumulative abnormal return over the three-day event window is only about 1,18 percentage points and has low significance. However, the difference in mean over a 21-day event window is 3,02 percentage points and is significant on the 8 % level. These results can be seen in table 5.

Table 5. Average cumulative abnormal returns in the subsample of completed spin-offs over different event windows for spin-offs increasing industrial focus and spin-offs not increasing industrial focus

Event window	Sample of spin-offs increasing industrial focus (n = 86)	Sample of spin-offs not increasing industrial focus (n = 42)	Difference in mean between the subsamples (n = 128)			
	$\overline{CAR}$	$\overline{CAR}$	$\overline{CAR}$		t-statistic	p-value
-10 to 10	0,0399	0,0098	0,0302	*	1,80	0,0755
-5 to 5	0,0519	0,0290	0,0229		1,40	0,1658
-1 to 1	0,0454	0,0336	0,0118		0,96	0,3376
-10 to 0	0,0387	0,0248	0,0139		1,12	0,2668
0 to 10	0,0010	-0,0151	0,0160		1,30	0,1971

Cumulative abnormal return over different event windows. Abnormal return is derived by comparing actual return with an estimate return. This expected return is calculated using a three-factor market model in accordance with Fama and French (1993), estimated using daily returns and a two-year estimation window. The differences in mean are tested using a Welch-test included in R further explored in section 4.3.3. Asterisks and dot indicate significance at the 15% (.), 10% (*), 5% (**) and 1% (***) level.

4.1.4 Relatively large spin-offs

Examining the size of spin-offs, in terms of the relative size of the spun off company compared to that of the parent company, we find that relatively larger spin-offs are associated with larger abnormal returns. The difference in mean for the two groups over the three-day event window is 3,23 percentage points and this difference is significant on the 1 % level. These results are further presented in table 6.

Table 6. Average cumulative abnormal returns in the subsample of completed spin-offs over different event windows for large spin-offs and not large spin-offs

Event window	Sample of relatively large spin-offs (n = 71)	Sample of relatively large spin-offs (n = 57)	Difference in mean between the subsamples (n = 128)			
	$\overline{\text{CAR}}$	$\overline{\text{CAR}}$	$\overline{\text{CAR}}$		t-statistic	p-value
-10 to 10	0,0512	0,0038	0,0475	***	2,92	0,0041
-5 to 5	0,0651	0,0185	0,0466	***	2,97	0,0036
-1 to 1	0,0559	0,0236	0,0323	***	2,79	0,0061
-10 to 0	0,0435	0,0227	0,0208	.	1,54	0,1269
0 to 10	0,0074	-0,0189	0,0263	**	2,37	0,0196

Cumulative abnormal return over different event windows. Abnormal return is derived by comparing actual return with an estimate return. This expected return is calculated using a three-factor market model in accordance with Fama and French (1993), estimated using daily returns and a two-year estimation window. The differences in mean are tested using a Welch-test included in R further explored in section 4.3.3. Asterisks and dot indicate significance at the 15% (.), 10% (*), 5% (**) and 1% (***) level.

4.1.5 Level of indebtedness

We test whether there is a difference in mean abnormal returns between spin-offs conducted by highly levered firms and those conducted by firms that are not. Over the three-day event-window we find a difference of negative 1,94 percentage points with highly levered firms having the lower average cumulative abnormal returns. This result is significant on the 15 % level.

Our findings in this area are not what we had expected and contradicts one of our hypotheses. We had expected that the shareholders of highly levered firms would be able to extract relatively more value from bondholders than those of firms with less leverage. An overview of our findings can be seen in table 7 and table 8.

Table 7. Average cumulative abnormal returns in the full sample of spin-offs over different event windows for firms in with high leverage and firms without high leverage

Event window	Sample of firms with relatively high leverage (n = 38)	Sample of firms with relatively low leverage (n = 102)	Difference in mean between the subsamples (n = 140)			
	$\overline{CAR}$	$\overline{CAR}$	$\overline{CAR}$		t-statistic	p-value
-10 to 10	0,0319	0,0333	-0,0014		-0,07	0,9458
-5 to 5	0,0336	0,0522	-0,0186		1,05	0,2990
-1 to 1	0,03014	0,0495	-0,0194	.	-1,48	0,1435
-10 to 0	0,0475	0,0331	0,0144		0,92	0,3620
0 to 10	-0,0156	0,0000	-0,0156		-1,11	0,2720

Cumulative abnormal return over different event windows. Abnormal return is derived by comparing actual return with an estimate return. This expected return is calculated using a three-factor market model in accordance with Fama and French (1993), estimated using daily returns and a two-year estimation window. The differences in mean are tested using a Welch-test included in R further explored in section 4.3.3. Asterisks and dot indicate significance at the 15% (.), 10% (*), 5% (**) and 1% (***) level.

Table 8. Average cumulative abnormal returns in the subsample of completed spin-offs over different event windows for firms in with high leverage and firms without high leverage

Event window	Sample of firms with relatively high leverage (n = 30)	Sample of firms with relatively low leverage (n = 88)	Difference in mean between the subsamples (n = 118)		
	$\overline{CAR}$	$\overline{CAR}$	$\overline{CAR}$	t-statistic	p-value
-10 to 10	0,0318	0,0317	0,0001	0,00	0,9965
-5 to 5	0,0332	0,0503	-0,0171	-0,81	0,4224
-1 to 1	0,0336	0,0467	-0,0131	-0,89	0,3774
-10 to 0	0,0477	0,0322	0,0155	0,87	0,3885
0 to 10	-0,0159	-0,0007	-0,0152	-0,91	0,3681

Cumulative abnormal return over different event windows. Abnormal return is derived by comparing actual return with an estimate return. This expected return is calculated using a three-factor market model in accordance with Fama and French (1993), estimated using daily returns and a two-year estimation window. The differences in mean are tested using a Welch-test included in R further explored in section 4.3.3. Asterisks and dot indicate significance at the 15% (.), 10% (*), 5% (**) and 1% (***) level.

Several reasons can be put forward to explain this interesting finding. First, it should be noted that the results have a quite low significance. For the sample of completed spin-offs the significance level is 38 % which does not give much support for the findings even though the 15 % level for the full sample is more convincing.

Second, it might be the case that wealth extraction from bondholders associated with spin-offs only materialize over time. For instance, the findings of Maxwell and Rao

(2003) are based on a more long-term approach than our short event window. Furthermore, other researchers looking at event windows of similar length to that of ours such as Schipper and Smith (1983) have also found that there is no wealth transfer from bondholders to shareholders.

4.1.6 Overall regression

Finally, we want to test all our examined spin-off characteristics and their effect on the size of the wealth creation at once. We therefore regress cumulative abnormal return over the three-day event window on our examined aspects. We do four regressions, in models (1) and (2) we exclude data on the indebtedness of the parent firms, in model (3) and (4) we include it. In model (2) and (4) we use continuous variables rather than dummy variables for the size of the spin-off and the leverage of the firm. The results are shown in table 9 and table 10.

Table 9. Regression of cumulative abnormal returns over the -1 to +1 event window for completed spin-offs

	(1)			**(2)**		
	Coefficient	t-value	p-value	Coefficient	t-value	p-value
intercept	0,0137 (0,0128)	1,07	0,2866	0,0264** (0,012)	2,28	0,0245
decline	0,0257* (0,0154)	1,67	0,0979	0,0269* (0,0157)	1,71	0,0891
not_same_ industry	0,0098 (0,0129)	0,76	0,4506	0,0077 (0,0132)	0,58	0,5605
large_ spinoff	0,0325*** (0,0121)	2,68	0,0083			
daughter_ relative_size				0,0171 . (0,0111)	1,55	0,1240
Number of observations	125			125		
R^2	0,0828			0,0474		
Adjusted R^2	0,0603			0,0240		

Regression of cumulative abnormal returns over event window -1 to +1 on several aspects of a spin-off. Abnormal return is derived by comparing actual return with an estimate return. This expected return is calculated using a three-factor market model in accordance with Fama and French (1993), estimated using daily returns and a two-year estimation window. The regression is made using simple OLS in R. "dte" means debt-to-equity ratio. Asterisks and dot indicate significance at the 15% (.), 10% (*), 5% (**) and 1% (***) level.

Table 10. Regression of cumulative abnormal returns over the -1 to +1 event window for completed spin-offs

	(3)			(4)		
	Coefficient	t-value	p-value	Coefficient	t-value	p-value
intercept	0,0067 (0,0147)	0,45	0,6504	0,0198 . (0,0132)	1,49	0,1382
decline	0,0214 (0,0153)	1,39	0,1650	0,0231 . (0,0154)	1,50	0,1364
not_same_ industry	0,0200 (0,0141)	1,38	0,1690	0,0163 (0,0136)	1,20	0,2348
large_ spinoff	0,0385*** (0,0123)	3,12	0,0023			
daughter_ relative_size				0,0341*** (0,0120)	2,83	0,0055
high_dte	0,00024 (0,0152)	0,02	0,9873			
dte				-0,0022 (0,0039)	-0,56	0,5781
Number of observations	125			125		
R^2	0,1158			0,1038		
Adjusted R^2	0,0839			0,0715		

Regression of cumulative abnormal returns over event window -1 to +1 on several aspects of a spin-off. Abnormal return is derived by comparing actual return with an estimate return. This expected return is calculated using a three-factor market model in accordance with Fama and French (1993), estimated using daily returns and a two-year estimation window. The regression is made using simple OLS in R. “dte” means debt-to-equity ratio. Asterisks and dot indicate significance at the 15% (.), 10% (*), 5% (**) and 1% (***) level.

When trying the set of models where data on firm leverage is not included we find the following. In model (1), using only dummy variables, we find that the abnormal return associated with spin-offs conducted by firms in decline, on average are associated with cumulative abnormal returns over the three-day event window, 2,57 percentage point higher than otherwise equal firms. This result is significant on the 10 % level. The result for relatively large spin-offs is 3,25 percentage points and this is significant on the 1 % level. Other coefficients are not significant. When measuring relative size as a continuous variable rather than a dummy with a cutoff, this parameter loses its significance.

The adjusted R-squared of our model is low, only 0,0603. This indicates that there are a lot of other factors that are not included in our model which explains the size of the value creation associated with a spin-off. This is in line with earlier research in the sense that we cannot entirely explain why spin-offs create value. Rather, we can just highlight some factors which effect the size of the value creation.

In regressions (3) and (4) we control for the leverage of the spinning off firm. This yields some interesting results. In neither of the cases is the coefficient on the variable relating to the debt-to-equity ratio significant. This strengthens our conclusions drawn when examining the difference in mean cumulative abnormal return between firms with and without high leverage, namely that this has little explanatory power at all in the short term.

Interestingly, our coefficients change in peculiar ways when we introduce a control for the leverage of the parent company. The coefficient on the variable indicating whether a firm is in decline stays at around the same magnitude but loses some of its significance. In model (3) it has a p-value of about 17 % and in in model (4) it has a p-value of about 14 %.

Furthermore, the coefficient on the variable indicating whether a spin-off is large keeps it high significance and is about the same in magnitude. However, in model (4) we suddenly see that the coefficient on the variable indicating the relative size of the spun off company is of a larger magnitude and is significant on the 1 % level. In particular, it says that if the relative size of the spun off company increases by one percentage point, the cumulative abnormal return over the three-day event window increases by 0,0341 percentage points. The adjusted R-square for models (3) and (4) remain low, 0,0839 and 0,0715 respectively.

In conclusion it can be said that our regression results are in line with those found in earlier research. They confirm some results found when comparing means of different subgroups and reject some of them. Of particular interest is that whether the parent company may be considered to be in decline, has significant explanatory power of the size of the wealth creation associated with a spin-off.

Our findings are further in line with earlier research in the sense that they have a low R-squared, that is, low explanatory power. This is testament to the problem we and other researcher have in explaining exactly why spin-offs create value.

4.2 Data

In this section we go over the selection and collection of data. First, we discuss the list of spin-offs and data relating to them. Second, we present the collection of financial data. In this section we do not do an elaborate description of the data, for this, please refer to appendix A.

4.2.1 List of spin-offs

In this thesis we examine corporate spin-offs filed for between January 2008 and December 2017. A spin-off is defined as when a publicly listed company decides to publicly list the shares of one of its subsidiaries. When a company in the United States wants to spin off a subsidiary, they must hand in a 10-12b filing to the Securities and Exchange Commission (SEC).

We acquire a list of all 297 10-12b filings made from January 2008 to December 2017, from the Edgar database of the SEC. We filter out 169 which contain so-called EX99.1 attachments. These are supposed to contain information to the shareholders about announcement date etcetera. Of these 169 spin-offs 11 observations are removed due to insufficient information about the announcement date. A further three observations are excluded because they were announced during periods when there was no trading in the stock markets. One observation is dropped because the stock of the spinning-off company was traded over the counter and hence no price data was available. Finally, one observation is later removed due to lack of stock price data during the days leading up to the announcement. This resulted in a final sample of 153 spin-offs.

One limitation of this data is that the sample drawn may not be exactly representative of the population of announced spin-offs. It may be the case that some announced spin-offs never make it all the way to filing and hence they would not be captured by our data. Moreover, the choice to only consider spin-offs that had been filed for including a so-called EX99.1 attachment result in some announced spin-offs being excluded from our sample. However, those excluded would have been hard to find reliable announcement dates for. Furthermore, we have no convincing reason to believe that which filing contain this attachment follow any kind of systematics.

4.2.2 Financial and company data

The financial data used in this paper ranges from stock prices to market factors used in the three-factor model. Furthermore, data on Standard Industrial Classification (SIC) codes are used. All this data was retrieved from the Center for Research in Security Prices (CRSP) via Wharton Research Data Services (WRDS). Data on the performance of the S&P 500 stock index is retrieved from Yahoo Finance. Accounting data for the examined companies is retrieved from Compustat via WRDS.

To be able to merge the spin-off dataset with financial data and with accounting data, the Committee on Uniform Securities Identification Procedures (CUSIP) codes is retrieved for each company from CRSP via Wharton Research Data Services (WRDS).

4.3 Method

The method used in this paper can be divided into four subsegments. First, the method used to calculate expected returns for the securities. Second, the method used to calculate abnormal returns. Third, the method used to test the significance of the results. Fourth, proxies used for control variables.

4.3.1 Calculation of expected returns

Expected returns for stocks are calculated using the three-factor model put forward by Fama and French (1993). The expected returns are estimated using the procedure in equation 1.

$$\widehat{R_{\iota t}} = rf_t + \widehat{\beta_{mrkrf;\iota}} \cdot mrkrf_t + \widehat{\beta_{smb;\iota}} \cdot smb_t + \widehat{\beta_{hml;\iota}} \cdot hml_t \quad (1)$$

In this equation, $\widehat{R_{\iota t}}$ is the expected return of stock i on time period t, rf_t is the risk-free rate at time t, $mrkrf_t$ is the market risk premium at time t, smb_t is the so-called small-minus-big factor at time t and hml_t is the so-called high-minus-low factor at time t. $\widehat{\beta_{mrkrf;\iota}}$, $\widehat{\beta_{smb;\iota}}$ and $\widehat{\beta_{hml;\iota}}$ are the estimated coefficients for stock i for the respective factors.

The coefficients in equation 1 are estimated for each stock separately with a linear model, using a two-year estimation window. Following the approach recommended by Brown and Warner (1985) we used daily stock returns to do this estimation.

In addition to using the three-factor model to calculate estimated returns we also use the Capital Asset Pricing Model (CAPM). The coefficient in CAPM is estimated using daily stock data over two years, in line with the method used to estimate coefficients in Fama and French’s three factor model. The results using CAPM do not differ much from the results using the three-factor model but are included in appendix B for completeness.

4.3.2 Calculation of abnormal returns

Abnormal returns for stocks are calculated using the approach in equation 2.

$$AR_{it} = R_{it} - \widehat{R_{\iota t}} \quad (2)$$

In this equation AR_{it} is the abnormal return of stock i at time t, R_{it} is the actual return of stock i at time t and $\widehat{R_{it}}$ is the expected return from equation 1.

The individual abnormal returns of the companies examined are then used to calculate average cumulative abnormal returns for specific event windows. This is done using the approach put forward in equation 3.

$$\overline{CAR}(t_1;t_2) = \frac{1}{n}\sum_{i=1}^{n} CAR_i(t_1;t_2) \tag{3}$$

In equation 3, $\overline{CAR}(t_1;t_2)$ is the average cumulative abnormal return over an event window starting at time t_1 and ending at time t_2, n is the number of considered companies and $CAR_i(t_1;t_2)$ is the cumulative abnormal return of firm i over the event window starting at starting at time t_1 and ending at time t_2. This last term is calculated as specified in equation 4.

$$CAR_i(t_1;t_2) = \sum_{t=t_1}^{t_2} AR_{it} \tag{4}$$

4.3.3 Testing the significance of the results

In order to test the significance of our results we primarily follow the approach put forward by MacKinlay (1997). A statistic θ is calculated following the approach in equation 5.

$$\theta = \frac{\overline{CAR}(t_1;t_2)}{\sqrt{Var\left(\overline{CAR}(t_1;t_2)\right)}} \tag{5}$$

Under the null hypothesis that announcements of spin-offs are not associated with any abnormal returns, then we have: $H_0: \theta \sim N(0,1)$.

In equation 5 $\overline{CAR}(t_1;t_2)$ is calculated as described in equation 3 and $Var\left(\overline{CAR}(t_1;t_2)\right)$ is calculated as in equation 6.

$$Var\left(\overline{CAR}(t_1;t_2)\right) = \frac{1}{n^2}\sum_{i=1}^{n} \sigma_i^2(t_1;t_2) \tag{6}$$

The term $\sigma_i^2(t_1;t_2)$ in equation 6 is in turn calculated as described in equation 7.

$$\sigma_i^2(t_1;t_2) = (t_2 - t_1 + 1)\sigma_{\varepsilon_i}^2 \tag{7}$$

In equation 7 the expression $\sigma_{\varepsilon_i}^2$ is firm specific and in turn calculated as follows in equation 8.

$$\sigma_{\varepsilon_i}^2 = \frac{1}{L-5}\sum_{t=T_0}^{T_1}\left(R_{it} - \widehat{R_{it}}\right)^2 \tag{8}$$

In equation 8 L is the length of the estimation window, T_0 andT_1 are the beginning and end respectively of the estimation window, R_{it} and $\widehat{R_{it}}$ is the return and estimated expected return respectively of stock i at time t.

When testing the significance of the difference in mean when controlling for variables, a simple Welch Two Sample t-test is used, where A and B denotes the respective samples. In the Welch-test the t-statistic is formed as in equation 9.

$$t = \frac{\overline{CAR}_A(t_1;t_2) - \overline{CAR}_B(t_1;t_2)}{\sqrt{\frac{Var\left(CAR_A(t_1;t_2)\right)}{n_A} + \frac{Var\left(CAR_B(t_1;t_2)\right)}{n_B}}} \tag{9}$$

Since the two samples have different variances the sample variances are added, before deriving the standard error in the denominator. Finally, degrees of freedom are calculated by equation 10, to be able to determine a significance level.

$$df = \frac{\left[\frac{Var\left(CAR_A(t_1;t_2)\right)}{n_A} + \frac{Var\left(CAR_B(t_1;t_2)\right)}{n_B}\right]^2}{\frac{\left[Var\left(CAR_A(t_1;t_2)\right)\right]^2/n_A}{n_A - 1} + \frac{\left[Var\left(CAR_B(t_1;t_2)\right)\right]^2/n_B}{n_B - 1}} \tag{20}$$

4.3.4 Proxies for control variables

4.3.4.1 Long-term underperformance

To control for whether a firm can be considered to be in decline some kind of measure of long term underperformance is needed. We decided to define a firm as in decline if its stock price over the past two years had had a negative return and that the return in turn was more than 25 percentage points lower than that of the S&P 500 index over the same time. The name of this variable is then "decline" and is equal to 1 if the above-mentioned conditions are satisfied and otherwise equal to 0.

There are some limitations to this approach. First, the specific threshold of 25 percentage points underperformance compared to the S&P 500 index is somewhat arbitrary. Second, this definition of decline does not account for the type of decline. It does not specify whether it is the specific firm that is ailing or whether the firm is just part of a declining industry.

4.3.4.2 Increasing industrial focus

To measure whether a spin-off results in increasing industrial focus we look at Standard Industrial Classification (SIC) codes of the spinning off company and the spun off company. SIC codes consist of four digits where the first two indicate a so called "major industry sector". The third and fourth digit then represent subgroups within that major industry sector.

We define a spin-off as resulting in increased industrial focus if the two-digit SIC code of the spun off company is different from that of the parent company. In doing so we follow the approach of for instance Veld and Veld-Merkulova (2004). The name of this variable is then "not_same_industry" and is equal to 1 if the two-digit SIC-codes differ and otherwise equal to 0.

This approach to defining increasing industrial focus has one primary drawback. It is based on an ex-post approach, implying that we incorporate data in our analysis which was not available at the point of announcement. A more desirable, yet cumbersome, way to classify whether a spin-off was designed to increase industrial focus, would be to systematically go through the corresponding filings of each spin-off. From this a classification of whether the spun-off subsidiary is to be in another industry could be made. However, this approach is also to some extent based on ex-post data since it incorporates data from the filing date, not the announcement date. We cannot think of an efficient way to do this classification without using some form of data not available at the time of the announcement.

4.3.4.3 Large spin-off

When defining whether a spin off is large we follow an altered version of the approach used by Miles and Rosenfeld (1983). The relative size of a spin-off is measured by comparing the market value of equity of the spun off company on the close of first day of trading with the market value of equity of the spinning off company on the day of announcement. Spin-offs where this ratio exceed 25 % are defined as large spin-offs. The name of this variable is then "large_spinoff" and is equal to 1 if the above-mentioned conditions are satisfied and otherwise equal to 0.

Similar to our approach to defining increasing industrial focus, this definition suffers from the problem of using ex-post data. At the time of announcement, nothing is known about the future market value of equity of the spun-off company. Once again this could be somewhat mediated by using information about the spin-off provided in the 10-12b filing though this would not eliminate the problem.

Furthermore, one problem with our approach is that quite a lot may have happened to the market between the time of announcement and the first day of trading of the spun off company. A high measure of relative size might reflect a positive development of the market overall.

4.3.4.4 Level of indebtedness

When controlling for the relative indebtedness of the parent firm we do this by using the debt-to-equity ratio of the firm. This is calculated by dividing the debt in current liabilities added with long-term debt, by total stockholder equity. The numbers used are from the end of the fiscal year prior to the year of announcement. We then use a cutoff of debt-to-equity ratio of 1,25 to classify firms as highly levered. The name of this variable is then "high_dte" where "dte" stands for debt-to-equity ratio, and is equal to 1 if the firm is highly levered and otherwise equal to 0.

One limitation to this approach is that it might suffer from data irrelevance. If a spin-off is announced at the end of the year, then data on its balance sheet of the year before may indicate something very different from what may be the case at the day of the announcement. Furthermore, another issue that might not be an upright problem, is the variation in general leverage of American firms over time. Our threshold of 1,25 debt-to-equity ratio might be too low one year and too high another year. This is because the average leverage of comparative firms changes over time.

One solution to this problem would be to use a threshold related to the average debt-to-equity ratio of some index for each year. However, we do not want to use that approach since our hypothesis is that it is the absolute leverage that should matter for abnormal returns, not the leverage relative to other firms.

5 Conclusions

In this paper we examine corporate spin-offs. Using a sample of 153 spin-offs we find that announcements of spin-offs on average are associated with a cumulative abnormal return of 4,20 % over a three-day event window. This result is significant on the 1 % level. We further examine several factors that might affect the size of the abnormal returns associated with an announcement of a spin-off.

Of the factors we examine, the one yielding the most interesting and novel results, is whether the parent company may be considered to be in decline, where decline means a long-term underperformance compared to the market. We compare the average cumulative abnormal return over a three-day event window surrounding a spin-off announcement, for firms that are in decline with firms that are not. We find that the difference in mean is 3,71 percentage points, this is significant on the 14 % level. These results are confirmed by a regression in which we control for other spin-off characteristics. We find that firms in decline on average experience cumulative abnormal returns 2,57 percentage points higher than otherwise equal firms, this result is significant on the 10 % level. The model overall has a low explanatory value with an adjusted R-squared of 0,0603.

We take these results to give support for our hypothesis. We believe ailing firms to be under more pressure and scrutiny from shareholders. They therefore have stronger incentives to conduct spin-offs that to a higher degree makes sense and create shareholder value.

Overall our results are in line with the findings of previous research. We confirm the significance of some factors in determining the size of the value creation associated with the announcement of a spin-off. We further contribute with one new factor that affects the size of the value creation. We furthermore find that all factors taken together still have low explanatory value, this is in line with the difficulty of researchers to explain exactly why spin-offs create value.

There is one aspect of this thesis that we would have liked to improve on and that could be the subject of future work. We have reason to believe our data suffers from clustering, that is, that some event windows overlap each other. The primary reason for this would be that companies often announce several spin-offs at once. We believe the problem with clustering to be quite small and have little impact on our results. However, if possible a robustness check would be desirable.

6 References

6.1 Papers published in periodicals

Brown, S. J., & Warner, J. B. (1985). Using daily stock returns: The case of event studies. Journal of Financial Economics, 14(1), pp. 3-31. Retrieved from http://www.sciencedirect.com.ez.hhs.se/science/article/pii/0304405X8590042X.
Date retrieved 2018-04-23 ; 10:52.

Daley, L., Mehrotra, V., & Sivakumar, R. (1997). Corporate focus and value creation evidence from spinoffs. *Journal of Financial Economics,* 45(2), pp. 257-281. Retrieved from http://www.sciencedirect.com.ez.hhs.se/science/article/pii/S0304405X97000184
Date Retrived: 2018-04-28 ; 10:58

Fama, E. F., & French, K. R. (1993). Common risk factors in the returns on stocks and bonds. Journal of Financial Economics, 33(1), pp. 3-56. Retrieved from http://www.sciencedirect.com.ez.hhs.se/science/article/pii/0304405X93900235
Date retrieved 2018-04-30 ; 11:30.

Hite, G. L., & Owers, J. E. (1983). Security price reactions around corporate spin-off announcements. Journal of Financial Economics, 12(4), pp. 409-436.Retrieved from http://www.sciencedirect.com.ez.hhs.se/science/article/pii/0304405X83900429
Date retrieved 2018-04-21 ; 10:00

John, K., & Ofek, E. (1995). Asset sales and increase in focus. Journal of Financial Economics, 37(1), pp. 105-126. Retrieved from http://www.sciencedirect.com.ez.hhs.se/science/article/pii/0304405X94007942
Date retrieved 2018-04-28 ; 10:43.

Krishnaswami, S., & Subramaniam, V. (1999). Information asymmetry, valuation, and the corporate spin-off decision. Journal of Financial Economics, 53(1), pp. 73-112. Retrieved from http://www.sciencedirect.com.ez.hhs.se/science/article/pii/S0304405X99000173
Date retrieved 2018-04-21 ; 10:04.

MacKinlay, A. C. (1997). Event studies in economics and finance. Journal of Economic Literature, 35(1), pp. 13-39. Retrieved from http://www.jstor.org/stable/2729691
Date retrieved 2018-04-21 ; 09:37.

Maxwell, W. F., & Rao, R. P. (2003). Do spin-offs expropriate wealth from bondholders? The Journal of Finance, 58(5), pp. 2087-2108. Retrieved from http://www.jstor.org/stable/3648184
Date retrieved 2018-04-21 ; 10:12.

Miles, J. A., & Rosenfeld, J. D. (1983). The effect of voluntary spin-off announcements on shareholder wealth. The Journal of Finance, 38(5), pp. 1597-1606. Retrieved from http://www.jstor.org/stable/2327589
Date retrieved 2018-04-21 ; 10:14.

Mulherin, J. H., & Boone, A. L. (2000). Comparing acquisitions and divestitures. Journal of Corporate Finance, 6(2), pp. 117-139. Retrieved from http://www.sciencedirect.com.ez.hhs.se/science/article/pii/S0929119900000109
Date retrieved 2018-04-28 ; 12:51.

Schipper, K., & Smith, A. (1983). Effects of recontracting on shareholder wealth: The case of voluntary spin-offs. Journal of Financial Economics, 12(4), pp. 437-467. Retrieved from http://www.sciencedirect.com.ez.hhs.se/science/article/pii/0304405X83900430
Date retrieved 2018-05-10 ; 11:56.

Veld, C., & Veld-Merkoulova, Y. V. (2004). Do spin-offs really create value? the european case. Journal of Banking & Finance, 28(5), pp. 1111-1135. Retrieved from http://www.sciencedirect.com.ez.hhs.se/science/article/pii/S0378426603000451
Date retrieved 2018-04-21 ; 09:40.

Wheatley, C. M., Brown, R. M., & Johnson, G. A. (2005). Line-of-business disclosures and spin-off announcement returns. Review of Quantitative Finance and Accounting, 24(3), pp. 277-293. Retrieved from http://ez.hhs.se/login?url=http://search.ebscohost.com/login.aspx?direct=true&AuthType=ip&db=eoh&AN=0798777&site=ehost-live
Date retrieved 2018-05-12 ; 11:59.

6.2 Unpublished working papers

Chai, D., Lin, K., & Veld, C. (2016). Value-creation through spin-offs: Australian evidence. Working paper. Retrieved from https://ssrn.com/abstract=2832528
Date retrieved 2018-05-12 ; 12:14.

Sudarsanam, P., & Qian, B. (2007). Catering theory of corporate spinoffs: Empirical evidence from europe. Working paper. Retrieved from https://ssrn.com/abstract=891101
Date retrieved 2018-05-12 ; 12:10.

7 Appendix A – overview of examined spin-offs

Figure 3. Number of spin-offs per year

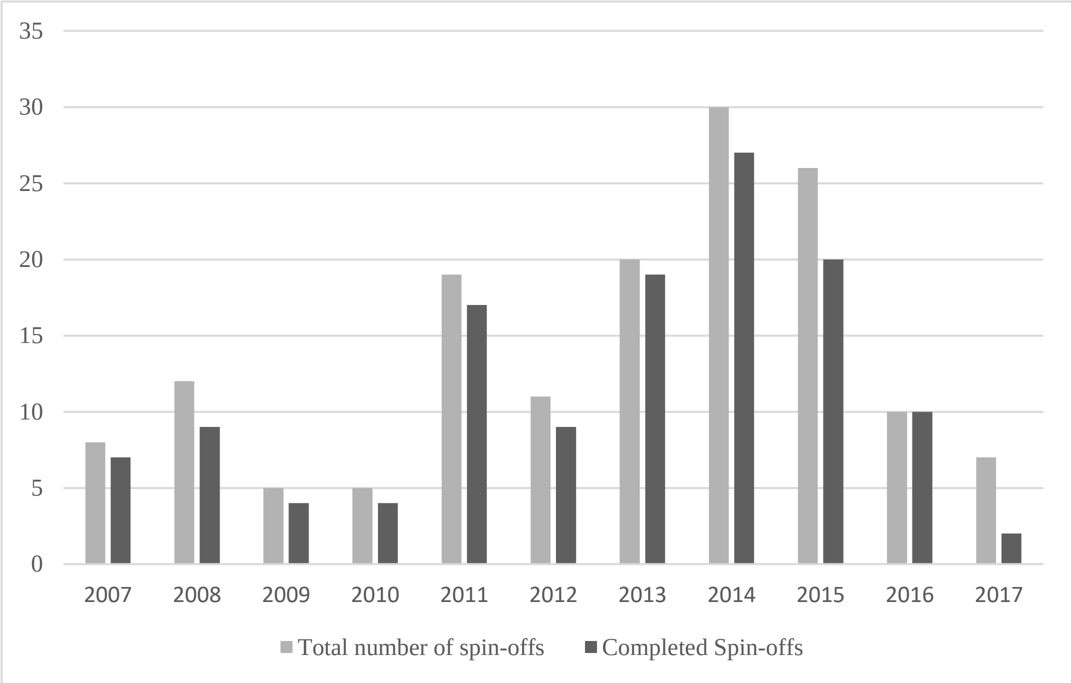
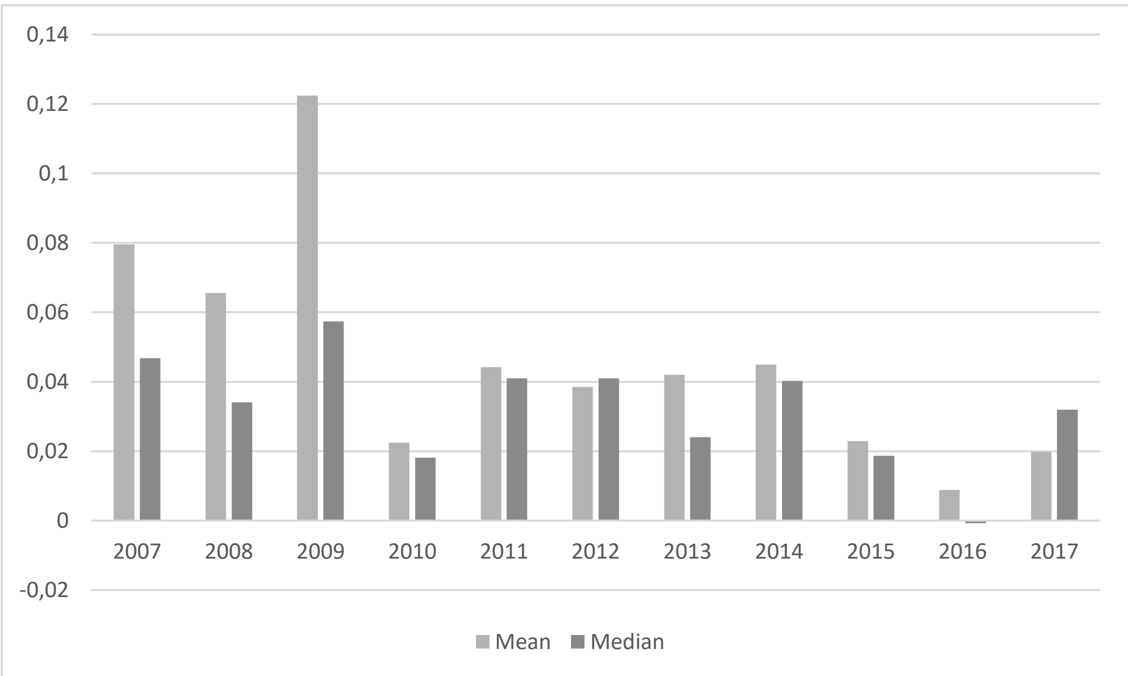
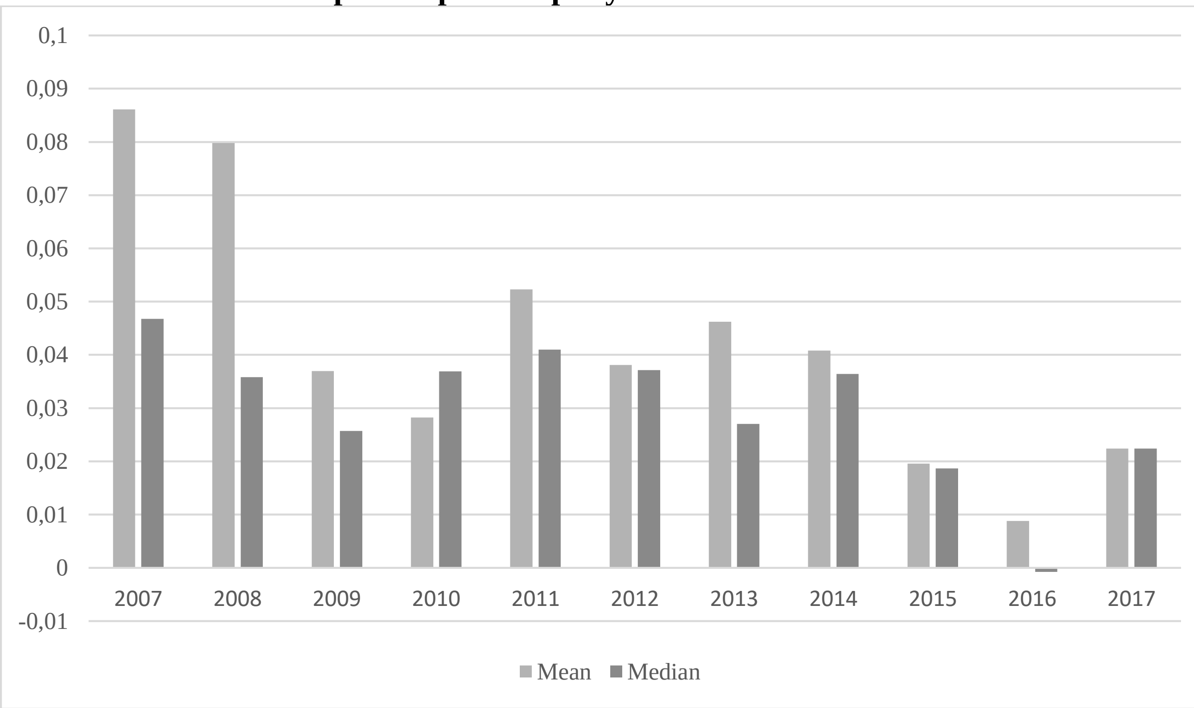


Figure 4. Mean and median cumulative abnormal returns from day -1 to +1 for spin-offs per year



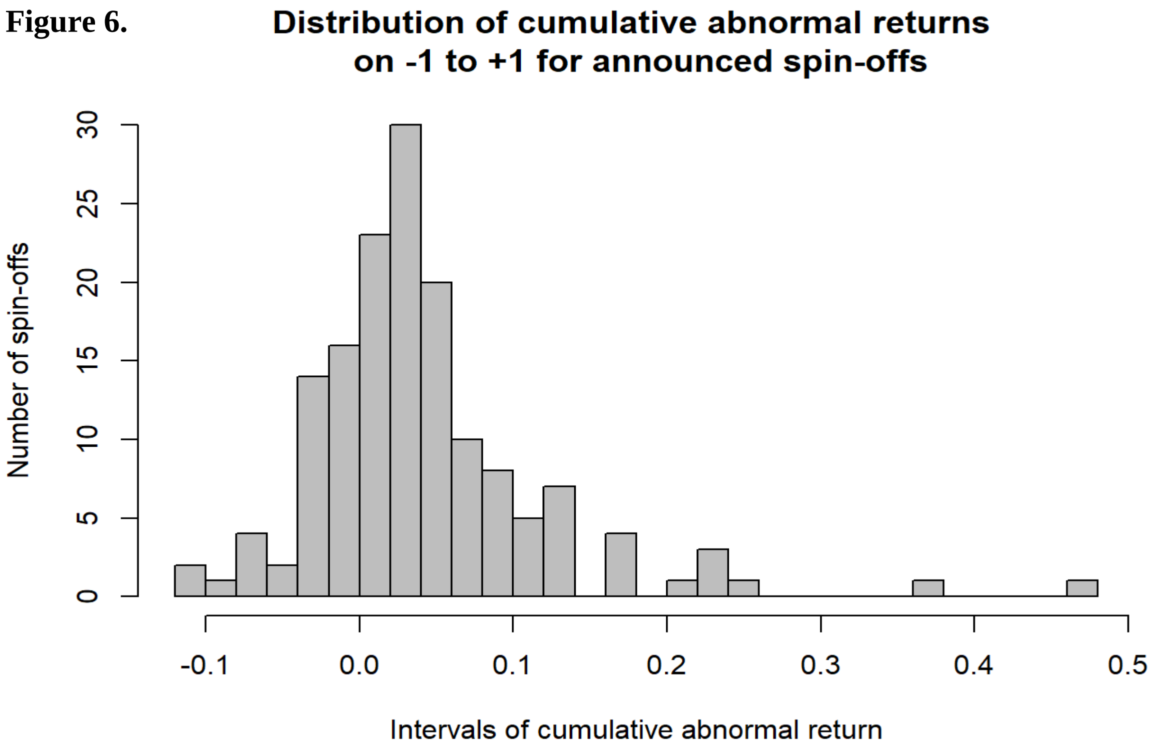
Abnormal return is derived by comparing actual return with an estimate return. This expected return is calculated using a three-factor market model in accordance with Fama and French (1993), estimated using daily returns and a two-year estimation window.

Figure 5. Mean and median cumulative abnormal returns from day -1 to +1 for completed spin-offs per year



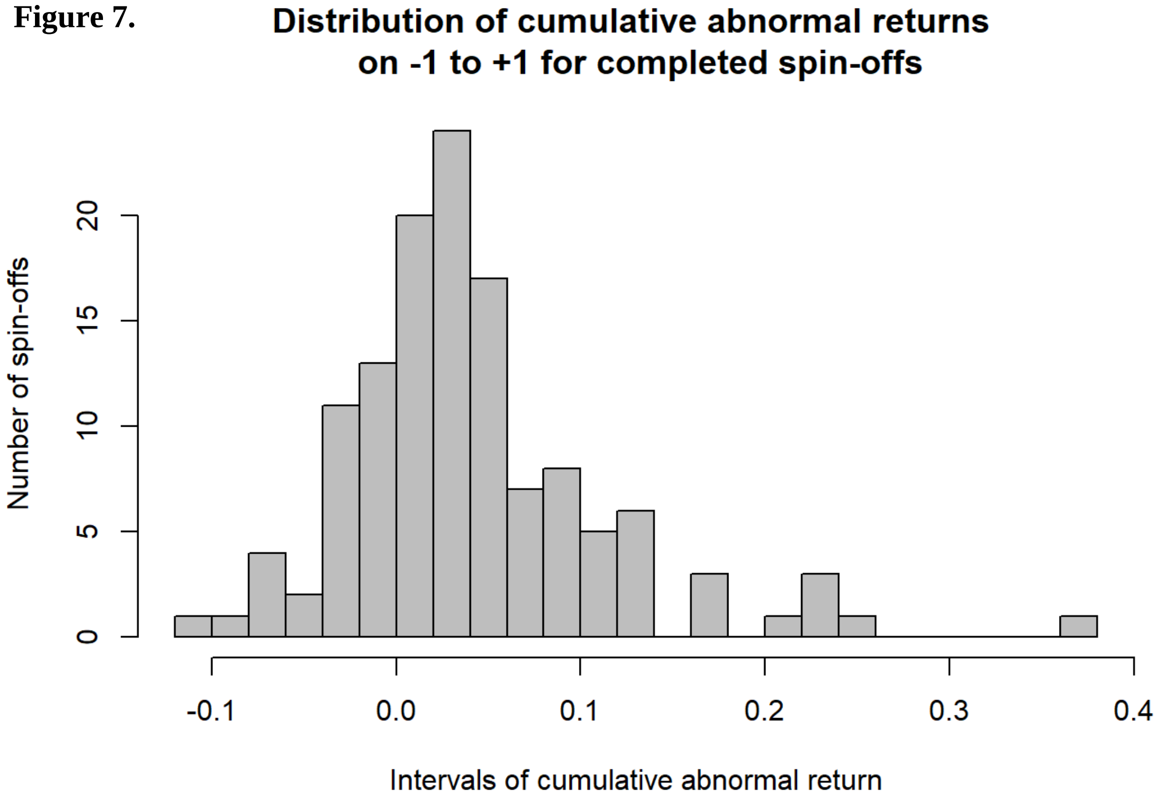
Abnormal return is derived by comparing actual return with an estimate return. This expected return is calculated using a three-factor market model in accordance with Fama and French (1993), estimated using daily returns and a two-year estimation window.

Figure 6.



Abnormal return is derived by comparing actual return with an estimate return. This expected return is calculated using a three-factor market model in accordance with Fama and French (1993), estimated using daily returns and a two-year estimation window.

Figure 7.



Abnormal return is derived by comparing actual return with an estimate return. This expected return is calculated using a three-factor market model in accordance with Fama and French (1993), estimated using daily returns and a two-year estimation window.

8 Appendix B – results using CAPM

The tables presented in this appendix are identical to those with corresponding table number in the main text with on difference. These tables display results where CAPM has been used to estimate expected returns rather than a three-factor model. The tables here are numbered exactly as those in the main text but suffixed with "B".

Table 2B. Average cumulative abnormal returns for the full sample of spin-offs for different event windows

	Full sample				Completed spin-offs			
Event window	$\overline{\text{CAR}}$		Statistic	n	$\overline{\text{CAR}}$		Statistic	n
-10 to 10	0,0264	***	3,68	153	0,0262	***	3,46	128
-5 to 5	0,0424	***	8,16	153	0,0423	***	7,72	128
-1 to 1	0,0419	***	15,45	153	0,0415	***	14,48	128
-10 to 0	0,0317	***	6,10	153	0,0319	***	5,83	128
0 to 10	-0,0054		-1,04	153	-0,0059		-1,07	128

Cumulative abnormal return over different event windows. Abnormal return is derived by comparing actual return with an estimate return. This expected return is calculated using CAPM, estimated using daily returns and a two-year estimation window. The statistics are calculated using the approach suggested by MacKinlay (1997) further explored in section 4.3.3. Asterisks and dot indicate significance at the 15% (.), 10% (*), 5% (**) and 1% (***) level.

Table 3B. Average cumulative abnormal returns in the full sample of spin-offs over different event windows for firms in decline and firms not in decline

Event window	Sample of firms in decline (n = 29)	Sample of firms not in decline (n = 122)	Difference in CAR between the two subsamples (n=151)			
	$\overline{\text{CAR}}$	$\overline{\text{CAR}}$	$\overline{\text{CAR}}$		t-statistic	p-value
-10 to 10	0,0524	0,0216	0,0309		1,32	0,1948
-5 to 5	0,0668	0,0395	0,0272		1,02	0,3147
-1 to 1	0,0728	0,0362	0,0366	.	1,48	0,1500
-10 to 0	0,0533	0,0274	0,0259		1,16	0,2548
0 to 10	-0,0009	-0,0061	0,0052		0,33	0,7433

Cumulative abnormal return over different event windows. Abnormal return is derived by comparing actual return with an estimate return. This expected return is calculated using CAPM, estimated using daily returns and a two-year estimation window. The differences in mean are tested using a Welch-test included in R further explored in section 4.3.3. Asterisks and dot indicate significance at the 15% (.), 10% (*), 5% (**) and 1% (***) level.

Table 4B. Average cumulative abnormal returns in the subsample of completed spin-offs over different event windows for firms in decline and firms not in decline

Event window	Sample of firms in decline (n = 24)	Sample of firms not in decline (n = 102)	Difference in mean between the subsamples (n = 126)		
	$\overline{\text{CAR}}$	$\overline{\text{CAR}}$	$\overline{\text{CAR}}$	t-statistic	p-value
-10 to 10	0,0480	0,0226	0,0254	0,94	0,3548
-5 to 5	0,0582	0,0421	0,0161	0,56	0,5799
-1 to 1	0,0652	0,0379	0,0273	1,16	0,2572
-10 to 0	0,0426	0,0305	0,0121	0,51	0,6135
0 to 10	0,0053	-0,0080	0,0134	0,79	0,4349

Cumulative abnormal return over different event windows. Abnormal return is derived by comparing actual return with an estimate return. This expected return is calculated using CAPM, estimated using daily returns and a two-year estimation window. The differences in mean are tested using a Welch-test included in R further explored in section 4.3.3. Asterisks and dot indicate significance at the 15% (.), 10% (*), 5% (**) and 1% (***) level.

Table 5B. Average cumulative abnormal returns in the subsample of completed spin-offs over different event windows for spin-offs increasing industrial focus and spin-offs not increasing industrial focus

Event Window	Sample of spin-offs increasing industrial focus (n = 86)	Sample of spin-offs not increasing industrial focus (n = 42)	Difference in mean between the subsamples (n = 128)		
	$\overline{\text{CAR}}$	$\overline{\text{CAR}}$	$\overline{\text{CAR}}$	t-statistic	p-value
-10 to 10	0,0349	0,0085	0,0264 .	1,58	0,1184
-5 to 5	0,0488	0,0290	0,0198	1,21	0,2300
-1 to 1	0,0450	0,0343	0,0107	0,87	0,3879
-10 to 0	0,0360	0,0238	0,0121	0,98	0,3305
0 to 10	-0,0013	-0,0153	0,0140	1,12	0,2682

Cumulative abnormal return over different event windows. Abnormal return is derived by comparing actual return with an estimate return. This expected return is calculated using CAPM, estimated using daily returns and a two-year estimation window. The differences in mean are tested using a Welch-test included in R further explored in section 4.3.3. Asterisks and dot indicate significance at the 15% (.), 10% (*), 5% (**) and 1% (***) level.

Table 6B. Average cumulative abnormal returns in the subsample of completed spin-offs over different event windows for large spin-offs and not large spin-offs

Event window	Sample of relatively large spin-offs (n = 71)	Sample of relatively large spin-offs (n = 57)	Difference in mean between the subsamples (n = 128)			
	$\overline{\text{CAR}}$	$\overline{\text{CAR}}$	$\overline{\text{CAR}}$		t-statistic	p-value
-10 to 10	0,0448	0,0033	0,0415	**	2,60	0,0106
-5 to 5	0,0629	0,0167	0,0462	***	2,98	0,0034
-1 to 1	0,0558	0,0237	0,0321	***	2,75	0,0068
-10 to 0	0,0393	0,0228	0,0165		1,21	0,2290
0 to 10	0,0051	-0,0195	0,0246	**	2,22	0,0280

Cumulative abnormal return over different event windows. Abnormal return is derived by comparing actual return with an estimate return. This expected return is calculated using CAPM, estimated using daily returns and a two-year estimation window. The differences in mean are tested using a Welch-test included in R further explored in section 4.3.3. Asterisks and dot indicate significance at the 15% (.), 10% (*), 5% (**) and 1% (***) level.

Table 7B. Average cumulative abnormal returns in the full sample of spin-offs over different event windows for firms in with high leverage and firms without high leverage

Event window	CAR for the sample of firms with relatively high leverage (n=38)	CAR for the sample of firms relatively low leverage(n=102)	Difference in CAR between the two subsamples (n=140)			
	$\overline{\text{CAR}}$	$\overline{\text{CAR}}$	$\overline{\text{CAR}}$		t-statistic	p-value
-10 to 10	0,0267	0,0282	-0,0015		-0,07	0,9426
-5 to 5	0,0316	0,0490	-0,0174		-0,99	0,3255
-1 to 1	0,0294	0,0493	-0,0199	.	-1,51	0,1335
-10 to 0	0,0441	0,0302	0,0140		0,92	0,3621
0 to 10	-0,0174	-0,0022	-0,0152		-1,09	0,2809

Cumulative abnormal return over different event windows. Abnormal return is derived by comparing actual return with an estimate return. This expected return is calculated using CAPM, estimated using daily returns and a two-year estimation window. The differences in mean are tested using a Welch-test included in R further explored in section 4.3.3. Asterisks and dot indicate significance at the 15% (.), 10% (*), 5% (**) and 1% (***) level.

Table 8B. Average cumulative abnormal returns in the subsample of completed spin-offs over different event windows for firms in with high leverage and firms without high leverage

Event window	Sample of firms with relatively high leverage (n = 30)	Sample of firms with relatively low leverage (n = 88)	Difference in mean between the subsamples (n = 118)		
	$\overline{\text{CAR}}$	$\overline{\text{CAR}}$	$\overline{\text{CAR}}$	t-statistic	p-value
-10 to 10	0,0288	0,0264	0,0024	0,099	0,9218
-5 to 5	0,0326	0,0470	-0,0144	-0,69	0,4914
-1 to 1	0,0335	0,0465	-0,0129	-0,88	0,3836
-10 to 0	0,0450	0,0298	0,0152	0,89	0,3771
0 to 10	-0,0162	-0,0035	-0,0126	-0,76	0,4526

Cumulative abnormal return over different event windows. Abnormal return is derived by comparing actual return with an estimate return. This expected return is calculated using CAPM, estimated using daily returns and a two-year estimation window. The differences in mean are tested using a Welch-test included in R further explored in section 4.3.3. Asterisks and dot indicate significance at the 15% (.), 10% (*), 5% (**) and 1% (***) level.

Table 9B. Regression of cumulative abnormal returns over the -1 to +1 event window for completed spin-offs

	(1)			(2)		
	Coefficient	t-value	p-value	Coefficient	t-value	p-value
intercept	0,0145 (0,0129)	1,12	0,2633	0,0270** (0,0117)	2,31	0,0226
decline	0,0249 . (0,0156)	1,60	0,1118	0,0261 . (0,0158)	1,65	0,1016
not_same_ industry	0,0088 (0,0130)	0,68	0,5004	0,0067 (0,0133)	0,51	0,6139
large_ spinoff	0,0323*** (0,0122)	2,65	0,0092			
daughter_ relative_size				0,0175 . (0,0112)	1,57	0,1186
Number of observations	125					
R^2	0,0788			0,0453		
Adjusted R^2	0,0562			0,0218		

Regression of cumulative abnormal returns over event window -1 to +1 on several aspects of a spin-off. Abnormal return is derived by comparing actual return with an estimate return. This expected return is calculated using CAPM, estimated using daily returns and a two-year estimation window. The regression is made using simple OLS in R. "dte" means debt-to-equity ratio. Asterisks and dot indicate significance at the 15% (.), 10% (*), 5% (**) and 1% (***) level.

Table 10B. Regression of cumulative abnormal returns over the -1 to +1 event window for completed spin-offs

	(3)			(4)		
	Coefficient	t-value	p-value	Coefficient	t-value	p-value
intercept	0,0073 (0,0148)	0,49	0,6240	0,0198 . (0,0133)	1,49	0,1390
decline	0,0208 (0,0154)	1,35	0,1810	0,0224 (0,0155)	1,45	0,1509
not_same_ industry	0,0189 (0,0142)	1,33	0,1866	0,0157 (0,0137)	1,15	0,2542
large_ spinoff	0,0380*** (0,0124)	3,06	0,0028			
daughter_ relative_size				0,0346*** (0,0121)	2,86	0,0051
high_dte	0,0001 (0,0153)	0,01	0,9931			
dte				-0,0021 (0,0039)	-0,54	0,5884
Number of observations	125			125		
R^2	0,1107			0,1024		
Adjusted R^2	0,0786			0,0701		

Regression of cumulative abnormal returns over event window -1 to +1 on several aspects of a spin-off. Abnormal return is derived by comparing actual return with an estimate return. This expected return is calculated using CAPM, estimated using daily returns and a two-year estimation window. The regression is made using simple OLS in R. “dte” means debt-to-equity ratio. Asterisks and dot indicate significance at the 15% (.), 10% (*), 5% (**) and 1% (***) level.

9 Appendix C – citation of statistical packages used

In accordance we the wishes of the contributors, we would like to cite the statistical packages we have used in the production of this thesis. We are thankful for the contributions of their authors without which the writing of this thesis would not have been possible.

Hadley Wickham, Springer-Verlag New York. (2009). *ggplot2: Elegant Graphics for Data Analysis*. (978-0-387-98140-6) http://ggplot2.org

Hadley Wickham, Romain Francois, Lionel Henry and Kirill Müller. (2017). *dplyr: A Grammar of Data Manipulation, R package version 0.7.4.* https://CRAN.R-project.org/package=dplyr

Kevin Ushey. (2015). *RcppRoll: Efficient Rolling / Windowed Operations, R package version 0.2.2.* https://CRAN.R-project.org/package=RcppRoll

R Core Team, R Foundation for Statistical Computing, Vienna, Austria. (2018). *R: A Language and Environment for Statistical Computing.* https://www.R-project.org/