Do Stock Markets Underreact to Spinoff Announcements?

The European Evidence

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Abstract

We examine whether European stock markets are efficient in valuing corporate spinoffs. Using several different return methodologies to adjust for cross-sectional return dependence, we find that post-spinoff firms in Europe do not earn significant long-run abnormal returns in the three-year post-spinoff period. Further analyses demonstrate that the accounting performance of post-spinoff firms is in line with several industry-based benchmarks, which is consistent with the evidence of insignificant long-run stock returns. Our results support the efficient markets hypothesis that stock markets do not underreact to corporate spinoff announcements.

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1 Introduction

Corporate spinoff is a special type of corporate restructuring. Through a spinoff, a publicly traded firm offers shares of a subsidiary to its shareholders on a pro rata distribution basis. Following this spinoff transaction, the newly floated company has an independent existence and is separately valued in the stock market. The divestor continues to exist, albeit downsized. In this paper, the divestor is referred to as the parent, the spunoff subsidiary as the offspring, and the portfolio of the continuing entity and the spunoff subsidiary as the post-spinoff firms.

Existing studies document consistent evidence that spinoff parent firms earn significant and positive stock returns during the spinoff announcement period (e.g. see Hite and Owers, 1983; Slovin, Sushka and Ferraro, 1995; Daley, Mehrotra and Sivakumar, 1997; Krishnaswami and Subramaniam, 1999, Veld and Veld-Merkoulova, 2004; among others). Earlier US studies also show that both spinoff parents and spunoff offspring earn significant and positive abnormal returns over the three-year post-spinoff period, indicating that stock markets may initially underreact to spinoff announcements (e.g. see Cusatis, Miles and Woolridge, 1993; Desai and Jain, 1999).

Recent research refutes the earlier evidence and demonstrates that post-spinoff firms do not earn superior stock returns in the long term (e.g. McConnell, Ozbilgin and Wahal, 2000; Veld and Veld-Merkoulova, 2004). However, extant empirical studies on corporate spinoffs suffer various methodological problems in long-run return calculation as discussed in Kothari and Warner (2004) and Mitchell and Stafford (2000). Thus, past empirical findings on the long-run spinoff performance are still open to question.

On the other hand, the press often recommends the strategy of investing in post-spinoff firms as a "beat the market" strategy. Based on the earlier empirical evidence of Cusatis et al. (1993) study, the press claims that a strategy of buying spunoff subsidiaries once they begin trading as independent stocks can provide a superior investment performance (e.g. Hayes, 1997; Serwer, 1992; Sivy, 1996; and Siwolop, 1997). Moreover, some professional investment funds, such as Investec's Global Strategic Value Fund and hedge fund Gotham Capital, still use this strategy in stock selection even though such investment strategy was discovered a decade ago[1]. Thus, the practitioner view of long-run superior returns to post-spinoff firms suggests that stock markets may initially underreact to the spinoff announcements.

In this study, we investigate both short-run and long-run market reactions to 157 completed corporate spinoffs in Europe during the period from 1987 to 2005. The null hypothesis is that European stock markets efficiently react to spinoff announcement news. There are two testable hypotheses with regard to the value gains to spinoff announcements.

The first one is related to the initial market reaction to spinoff announcements, which is stated below:

H1: Spinoff parent firms earn significant and positive announcement returns.

The second one is related to the long-run market reaction to spinoff announcements, which is presented as follows:

H2: Post-spinoff firms do not earn superior long-run stock returns.

We first test the hypothesis H1 to examine whether spinoff parent firms experience favourable market reactions during the spinoff announcement period. We use the standard event study methodology, the market model, to estimate the abnormal returns to spinoff parent firms during the spinoff announcement period (Brown and Warner, 1985; Campbell, Lo and MacKinlay, 1997; Dodd and Warner, 1983; Kothari and Warner, 2006). We also apply a world market model to compute the abnormal announcement-

[1] Neil Dennis, 'Just a mention of spin-off can unlock value for shareholders', 1 March 2006, Financial Times.

period returns in order to account for the impact of global stock markets and foreign exchange rates on the stock returns to spinoff parent firms (Park, 2004). With different models, we report qualitatively similar results that there is a significant and positive market reaction to spinoff announcements. Further analyses of announcement returns to UK spinoff and non-UK spinoffs show that the positive spinoff announcement effects exist for both UK and non-UK countries.

We then examine the long-run stock returns to post-spinoff firms, which are related to the hypothesis H2. The empirical investigation employs three different return calculation approaches, including the characteristic-based matching approach or the BHAR approach, the calendar-time regression approach or the CTRG approach and the calendar-time portfolio abnormal return approach or the CTAR approach. The use of different return methodologies is motivated by the argument of Fama (1998) that long-run event studies should use alternative return approaches to test market efficiency.

Barber and Lyon (1997) argue that the buy-and-hold approach accurately measures the true investment experience of investors and the characteristic-based matching approach has significant powers in detecting the long-run abnormal returns. The BHAR approach in this study uses two different benchmarks, returns to size- and book-to-market control portfolio and returns to industry- and size- matching firm (Barber and Lyon, 1997; Ikenberry, Lakonishok and Vermaelen. 1995; Lyon et al. 1999). The size- and book-to-market- control portfolio construction is used to capture two important risk factors identified in Fama and French (1993). The industry- and size- matching firm construction is employed to capture the industry-specific risks which are not considered in current asset pricing models (Fama and French, 1997). In addition, this industry- and size-matching firm approach facilitates the comparison of our results with evidence from earlier studies such as Desai and Jain (1999) and Veld and Veld-Merkoulova (2004).

Fama (1998) and Mitchell and Stafford (2000) prefer the calendar time regression (CTRG) approach to the BHAR approach because the BHAR approach can boost the abnormal returns over a long period even if there is no true abnormal return. The CTRG approach in this study employs two different benchmarks, Fama-French (1993) three-factor model and Carhart (1997) four-factor model. As suggested in Jegadeesh and Karceski (2004), the calendar-time regression approach requires at least five firms in the post-spinoff firm portfolio at each point in time to control for the heteroskedasticity problem.[2] When this data requirement is applied, the calendar-time regression approach is only applicable for post-spinoff firms in the UK since other sample countries do not have sufficient spinoff events. I also weight calendar months by the number of post-spinoff firm observations in the month to take into account the managers' timing decision to undertake corporate spinoffs (Fama, 1998; Kothari and Warner, 2006). Loughran and Ritter (2000) contend that a calendar-time approach that simply averages event observations over "hot" and "cold" periods will have lower power in detecting the long-run abnormal returns to event firms. The calendar time approach adjusting monthly observation numbers used in this study can mitigate the problem as discussed in Loughran and Ritter (2000).

We further use the calendar time portfolio abnormal returns (CTAR) approach to calculate average abnormal returns to post-spinoff firms for each calendar month, where the expected returns on the event portfolio are proxied by returns to size- and book-to-market- control portfolios and returns to industry- and size- matching firms. Mitchell and Stafford (2000) advocate the CTAR approach because it has sufficient power to detect abnormal performance relative to the CTRG approach. In addition, Mitchell and Stafford argue that the CTAR approach is less subject to the event-firm-return correlation problem than the BHAR approach since the potentially correlated sample observations are grouped over calendar months. Finally, the CTAR approach is easier to understand and implement for professional investment practitioners than the BHAR approach. For the CTAR approach, the performance of post-spinoff firms is reported on the calendar time basis, which is consistent with the performance reporting practice of fund managers.

[2] Mitchell and Stafford (2000) require at least ten firms in the event portfolio at each point in time in order to achieve the sufficient diversification effect of the portfolio residual variance. However, an application of such requirement for my sample will yield only 48 calendar months of return data for the UK spinoff sample to measure the regression coefficients.

As a robustness check, the long-run abnormal BHARs to post-spinoff parent/offspring combined firms are regressed on the cumulative abnormal returns to spinoff announcements. This approach allows us to detect whether the positive and significant announcement returns are followed by long-run price drifts. The regressions of BHARs with different holding periods present consistent evidence that European stock markets efficiently react to spinoff announcement news. Specifically, the coefficient of spinoff announcement returns is insignificant across different regression models and all regression models have very low adjusted R-squared.

Finally, we investigate the long-run accounting returns to spinoff parents and spunoff subsidiaries, which test the hypothesis H2. Following Barber and Lyon (1996) and Ghosh (2001), three different methods are employed to obtain the benchmark accounting returns, including the industry-adjusted returns on assets (ROAs), the industry- and size- adjusted ROAs, and the industry- and performance- adjusted ROAs. Our results indicate that post-spinoff firms do not earn significant accounting returns in the long run.

Overall, we present evidence that European firms involved in spinoffs have no superior long-run returns over the three-year period following the spinoff completion dates. There is no evidence that stock markets initially underreact to spinoff announcement news. The evidence documented in this study is different from that reported in earlier US studies on the long-run spinoff performance such as Cusatis, Miles and Woolridge (1993) and Desai and Jain (1999). Based on our results, we argue that the early evidence of superior long-run performance of post-spinoff firms is probably subject to methodological biases. Our evidence lends support to the argument of Fama (1998) that most of significant long-run abnormal returns to corporate events will disappear when more robust return methods are used. Finally, our results pose a challenge to the practitioner view that investing in post-spinoff firms can provide superior portfolio returns.

The rest of the paper is organised as follows. Section 2 outlines the sample selection. Section 3 reports the stock returns to the sample spinoff parent firms during the spinoff announcement period. Section 4 presents the evidence on long-run stock returns to post-spinoff firms compared with different benchmark returns. Section 5 analyses the long-term abnormal accounting returns to post-spinoff firms against several industry-based benchmarks. Section 6 conducts the robustness checks. Section 7 concludes.

2 Spinoff Sample Selection

This study analyzes a sample of European spinoffs. A European spinoff is defined as a spinoff where a European parent firm spins off a subsidiary. This subsidiary can be either from the same or from a different country. All European countries are taken into account initially with the exception of the Eastern European countries because we have limited financial data for these countries. Both parent and offspring firms must be independently managed and separately valued at the stock market after the completion of the spinoff. We also require that the spinoff parent should distribute a majority of its interests in the subsidiary to its existing shareholders since the offspring firm would not be independently managed if the offspring were still subject to the control of its parent firm.

The sample of European spinoffs covers the period from January 1980 to December 2005. The spinoff sample is gathered from SDC M&A Database. The sample countries searched include Austria, Belgium, Denmark, Finland, France, Germany, Ireland, Italy, Luxemburg, Norway, Netherlands, Portugal, Spain, Sweden, Switzerland, and the UK. The initial sample consists of 367 spinoffs, where the transactions were announced during the sample period.

The data selection process in this study uses the following screening criteria and the reduction of observations following the application of a criterion is reported in parentheses:

1) parent firms or offspring firms have no stock price information in Datastream (67);

2) other types of restructuring transactions are mistakenly recorded as spinoffs in SDC, such as divestiture of a join-venture with multi-parents and privatization deals and asset redistribution as part of a merger deal (19) [3];
3) less than 50% of interests of offspring firms are distributed to existing shareholders (9) [4];
4) the same spinoff announcements are double counted in SDC (9)[5];
5) offspring firms are already listed before the spinoff (6);
6) parent firms are not traded in the Europe (6);
7) the shares of offspring firms are sold to either existing shareholders or the market (3); and
8) the announced spinoffs are not completed by the end of year 2005 (78).

We identify the spinoff announcement dates by cross-checking the spinoff transactions with the details in the press reports via the Factiva newspaper database. Specifically, we search the Factiva database at least one year before the SDC-identified spinoff announcement date for the earliest press announcement of the spinoff. When an announcement is reported in the news, we search back another year from that date to confirm that there are no earlier announcements.

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3 The SDC often includes other types of restructurings in the spinoff sample. For example, SDC records the spinoff of Adam and Harvey unit of Stocklake Holdings to its shareholders in July 1991. However, the deal was actually part of liquidation plan of Stocklake Holdings. Stocklake Holdings' shares were delisted in September 1991. Another example is the spinoff of non-automotive business to shareholders by Sommer Allibert SA in 2001 as recorded in SDC. The spinoff was actually undertaken to facilitate the acquisition of Sommer Allibert SA by Peugeot Citroen. We remove non-spinoff transactions from the spinoff sample when they are either part of a complex restructuring plan or part of a predefined merger plan since those transactions are not spinoff and such transaction announcement news often contains confounding information.

4 This sample selection criterion is chosen for two reasons. First, we hope that our results are comparable with earlier US studies on corporate spinoffs. Prior US studies typically define a spinoff as a divestiture where the majority of shares of the subsidiary are distributed to the parent's existing shareholders. Second, we want to avoid the cases where parent firms retain the control over offspring firms in the post-spinoff period, where the performance of either parent of offspring firm might be substantially affected by the related transactions. A more than 50% interest of subsidiary held by parent in the post-spinoff period could allow parent managers to do such transactions. Thus it is difficult to assess the real long-term value creation from a spinoff under such circumstances.

5 When a parent firm is split into two or three independent firms via a spinoff, SDC sometimes records the number of spinoffs as the number of independent post-spinoff firms rather than the number of offspring firms. We remove the spinoff announcement about the post-spinoff parent firm from the sample for such cases.

The cross-checking of announcement dates is undertaken because we are primarily interested in the initial market reaction to the spinoff announcement. We find that, for our sample, 157 out of 170 completed spinoffs have earlier announcement dates in the news reports than the SDC-identified announcement dates. In addition, the calculation of cumulative abnormal returns (CARs) based on SDC-identified announcement dates will be much different from that based on the earliest announcement dates in the news reports. For example, SDC reports that Culver Holdings announced the spinoff of World Travel Holdings on May 22nd, 2000. The two-day announcement period (-1, 0) CARs based on an estimated market model is -0.66%. However, the actual earliest announcement date is December 23rd, 1999 (see 'Culver Holdings PLC Prop. Offer for Shr Subscriptn', Regulatory News Service, December 23rd, 1999). The two-day announcement period (-1, 0) CARs based on the earliest announcement date with the same method is 10.54%.

A further check of the SDC-identified spinoff completion dates is conducted with the details of a spinoff transaction in the news reports via Factiva and the stock price data in *Datastream*. This cross-checking is undertaken to confirm the completion status of a spinoff and to obtain an accurate completion date. We find that SDC sometimes mistakenly classifies one spinoff as uncompleted when the spinoff was actually completed.[6] When there are mistakes in the SDC-reported completion details identified with crosschecking, we amend the sample data based on the verified information.

The final sample includes 170 completed European spinoff deals during the sample period, including 144 spinoff parent and 170 offspring firms, where 10 parent s spin off two or more subsidiaries at the same time and a further 13 parents conducted spinoffs at different times during the sample period. The number of European spinoffs will be 157 if we consider the firm announcing spinoffs at different times as different observations. For the completed spinoff sample, parents operate in 46 different industries and offspring

[6] For example, SDC reports that the spinoff of three units (EQ Holdings, Evox Rifa Holdings, and Vestcap) by Finvest Oy in March 2000 is pending (at the data collection date, February 2006). Actually, the spinoff was completed on November 1st, 2000 (See 'Finvest Details Demerger Listing Plan', Reuters News, October 26th, 2000).

operate in 50 different industries (defined as the two-digit SIC level). In total, both parent and offspring firms operate in 59 different industries.

The final spinoff sample covers 13 European countries. The earliest year with spinoff data available in our sample is the year 1987. Table 1 shows the distribution of 170 completed spinoff deals by parent's listing country and announcement year.

[Insert Table 1 about here]

3 Spinoff Announcement-period Stock Returns

Existing studies suggest alternative methodologies to estimate the announcement period abnormal returns to corporate events, such as market adjusted returns, abnormal returns based on Fama and French (1993) three-factor model, abnormal returns relative to reference portfolios. Kothari and Warner (2006) argue that different methodologies will yield qualitatively similar results for estimating short-run abnormal returns to events because the statistical problems are trivial within a short event window such as the three-day announcement period. Fama (1991; 1998) also contend that event studies provide strongest support to the efficient market hypothesis because the stock markets respond to corporate announcements quickly and completely within several days.

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Therefore, we employ a standard event-study methodology, the market model, as described in Campbell, Lo and MacKinlay (1997: Chapter 4) and Kothari and Warner

(2006)[7]. The formula for expected return for firm i in time t based on a market model is given by:

$$R_{it} = \alpha_i + \beta_i R_{Mt} \quad (1)$$

Where the parameters α_i and β_i are estimated by regressing the security return, R_{it}, on the market return, R_{Mt}, for the estimation period.

The abnormal returns are defined as the difference between actual stock returns and expected stock returns:

$$AR_{it} = R_{it} - E(R_{it}) \quad (2)$$

Where AR_{it} is the abnormal return, R_{it} is the realised return and $E(R_{it})$ is the expected return on firm i for period t. The expected return is calculated with the estimated market model with the early-mentioned formula.

Cumulative abnormal returns (CARs) are then computed as the sum of daily abnormal returns over the horizon of the study. CAR for firm i during the period T is given by:

$$CAR_{iT} = \sum_{t=1}^{T} AR_{it} \quad (3)$$

In this study, the estimation period for the parameters of the market model comprise trading days [-220, -20] relative to the spinoff announcement day, which is day 0. The market return is estimated based on the total market return index for each country given in *Datastream*. The total market return index is calculated by *Datastream* with value-weighted average returns to representative companies comprised in the index for each country it covers. The calculation of total market return index by *Datastream* includes both the capital gains and the dividend yields. The selection of total market return index for each country is to ensure the consistency of stock return results across different countries. We then calculate the three-day CARs in the window (-1, +1) for each spinoff announcement. We also compute CARs during different event windows, (-10, +1), (-1,

[7] The same event methodology is initially proposed in Dodd and Warner (1983) and has been used in prior empirical studies on corporate spinoffs, such as Krishnaswami and Subramaniam (1999) and Veld and Veld-Merkoulova (2004).

0), 0, and (+1, +10). The same approach for abnormal returns to spinoff announcements has been used in Veld and Veld-Merkoulova (2004).

Abnormal returns to all spinoff announcements between January 1987 and December 2005 are reported in Table 2. For the full sample, the average CARs over the three-day event window (-1, +1) are 4.82%, which are somewhat higher than the announcement returns documented in earlier US studies (3.84% in Desai and Jain, 1999; 3.28% in Krishnaswami and Subramaniam, 1999). The announcement returns over one-day, two-day, and three-day event windows are all significant at the 1% level, indicating that the market strongly reacts to spinoff announcement news.

[Insert Table 2 about here]

The full sample of spinoff announcements is further split into two sub-groups, UK spinoffs and non-UK spinoff). Examination of announcement returns for these two sub-samples yields the following conclusions. UK spinoffs are slightly better perceived in the market than non-UK spinoffs as the former have an average of 5.48% CARs over the three-day event window while non-UK spinoffs have an average of 4.27%. The median three-day cumulative abnormal return to UK spinoffs is 3.03%, which is similar to the median three-day CARs to non-UK spinoffs of 3.33%. The announcement abnormal return pattern remains unchanged if the comparison of announcement period returns is based on alternative announcement windows such as the two-day window or the one-day window.

As indicated in Panel D of Table 2, the difference in CARs between UK and non-UK spinoffs is generally insignificant. The only significant difference is the mean difference of CARs between UK and non-UK spinoffs for the announcement date, which is significant at the 5% level (t-statistic = 2.20). The difference in CARs between UK and non-UK spinoffs is statistically insignificant for other event windows. For example, the mean (median) difference in CARs between UK and non-UK spinoffs during the three-day announcement period is 1.21% (0.87%), which has a t-statistic of 0.75 (z-statistic of 0.52).

Park (2004) argues that event studies in a multi-country setting should use a world market model in estimating abnormal announcement returns to events rather than a market model with a local market index. Park shows that a world market model incorporating the impacts of local market index, world market index and foreign exchange rate has more power in explaining announcement returns to events across different countries. The formula for expected return for firm i in time t based on a world market model is given by:

$$R_{it} = \alpha_i + \beta_{1i} R_{LMt} + \beta_{2i} R_{WMt} + \beta_{3i} ER_t \qquad (4)$$

Where the parameters α_i, β_{1i}, β_{2i}, and β_{3i} are estimated by regressing the security returns on the market return for the estimation period, R_{LMt} is the return of local stock market index, R_{WMt} is the return of world stock market index orthogonal to the return of local market index, and ER_t is the relative change of foreign exchange rates of the local currency.

We follow Park's approach to re-estimate announcement abnormal returns by using Datastream total market return index as the local market index, S&P 500 index as the world market index, and US dollar to local currency rate in the world market model. The use of different world market index such as Morgan Stanley EFMA index does not change the estimated results. To save space, we only report the abnormal announcement returns using the S&P 500 as the world market index.

Table 3 reports the abnormal announcement returns to sample spinoff parent firms against the world market model. The estimation results of Table 3 are very similar to those of Table 2. For the full sample, the cumulative average abnormal returns over the three-day event window (-1, +1) are 4.83%. Announcement returns to UK spinoffs are comparable to those to non-UK spinoffs since the former have an average of 4.76% cumulative abnormal returns over the three-day event window while non-UK spinoffs have an average of 4.24%. Thus, the world market model does not offer much from the market model in estimating abnormal announcement returns to spinoffs. This evidence is consistent with the argument of Kothari and Warner (2006) that different return methodologies would produce qualitatively similar abnormal returns for a short event window.

[Insert Table 3 about here]

Overall, our results show that stock returns to European spinoff announcements are significantly positive. In addition, the positive abnormal returns to European spinoff announcements are similar to those reported in prior empirical studies, such as Desai and Jain (1999), Krishnaswami and Subramaniam (1999), and Veld and Veld-Merkoulova (2004). This evidence supports the first hypothesis H1 that spinoff parent firms earn significant and positive announcement returns.

4 Long-run Stock Returns to Post-spinoff Firms

This section reports the long-run abnormal stock returns to post-spinoff firms against different benchmarks. Subsection 4.1 analyses the buy-and-hold abnormal returns to post-spinoff firms, where the benchmarks are returns to size- and book-to-market control portfolios and returns to industry- and size- matching firms. Subsection 4.2 presents the results for calendar-time regression models, where the benchmarks are Fama-French (1993) three-factor models and Carhart (1997) four-factor models. Subsection 4.3 shows the calendar-time portfolio abnormal returns, where the benchmarks are returns to size- and book-to-market portfolios and returns to industry- and size- matching firms. Subsection 4.4 reports further tests on the market efficiency in reacting to spinoff announcements.

4.1 The Buy-and-hold Abnormal Return Approach

The buy-and-hold abnormal returns, or BHAR, approach measures the average multiyear return from a strategy of buying in all firms involved with an event and selling at the end of a pre-specified holding period versus a comparable strategy investing otherwise similar non-event firms. The BHAR approach is favoured by some researchers because buy-and-hold abnormal returns are more consistent with the true investor experience than the cumulative abnormal returns (Barber and Lyon, 1997; Lyon, Barber and Tsai, 1999)[8].

For post-spinoff firms, raw buy-and-hold returns are calculated as follows:

$$R_{i,T} = \left[\prod_{t=1}^{T} (1 + r_{i,t}) \right] - 1 \tag{5}$$

where $r_{i,t}$ is the return on stock i in month t relative to the spinoff completion date, 0. The return over the first partial calendar month is considered as the return in the spinoff completion month. The first one-year return includes the first partial calendar month's return and the returns over the next 11 months. The average of the N individual buy-and-hold returns for the T months subsequent to the completion month is computed as below:

$$\overline{R_T} = \frac{\sum_{i=1}^{N} R_{i,T}}{N} \tag{6}$$

Buy-and-hold returns are calculated for the matching stock ($R_{i,T}^{bm}$) with the above procedure. The buy-and-hold abnormal returns are then given below:

$$AR_{i,T} = R_{i,T} - R_{i,T}^{bm} \tag{7}$$

Then control-portfolio (or matching-firm) adjusted returns, AR, are calculated as the average of the differences in the buy-and-hold returns over the T months following the completion date as

8 Fama (1998) is against the BHAR approach to measure long-run abnormal returns because the BHAR approach can bias upwards the abnormal returns over a long horizon.

$$\overline{AR_T} = \frac{\sum_{i=1}^{N} (R_{i,T} - R_{i,T}^{bm})}{N} \tag{8}$$

The t statistic to estimate the statistical significance of the ARs is given below:

$$t = \frac{\overline{AR_T}}{s / \sqrt{N}} \tag{9}$$

where s is the cross-sectional standard deviation of AR_T for the N firms in the sample. Fama (1998) has argued that the calculation of t-statistic for the ARs inappropriately assumes that event-firm returns are independent. Following Mitchell and Stafford (2000), we estimate the correlation of complete overlapping monthly returns of spinoff firms and calculate an adjusted t-statistic for the AR to mitigate the cross-sectional return dependence problem (see Appendix 1 for details of the computation procedure).

The selection of benchmarks for the calculation of long-run excess returns is not straightforward because most of previously suggested return methods suffer from statistical problems[9]. Recent empirical studies have argued that matching sample firms with control firms based on similar company-specific characteristics provides an appropriate benchmark to detect abnormal returns (Daniel and Titman, 1997; Daniel, Titman and Wei, 2001; Jegadeesh, 2000).

Following their arguments, we use two different characteristics-based benchmarks in measuring the long-run abnormal returns to post-spinoff firms. One benchmark is returns to size- and book-to-market control portfolios. The other is returns to industry- and size-matching firms.

The first benchmark is used to capture the power of size and book-to-market ratio in explaining cross-sectional returns (Fama and French, 1992 and 1995). To implement the size and book-to-market matching portfolio procedure, all stocks in each sample country

[9] See e.g. Ang and Zhang (2004), Barber and Lyon (1997), Fama (1998), Kothari and Warner (2006), Lyon, Barber and Tsai (1999) for related discussion on the various methods to calculate long-run stock returns.

are grouped into five portfolios based on their market capitalization at the end of June for each sample year[10]. Each portfolio contains an equal number of stocks. Stocks with the smallest market values are placed into portfolio 1, and those with the largest market values are placed into portfolio 5. For each stock, we also calculate the book-to-market ratio using the most recently reported book value of equity prior to the portfolio construction date. We then divide stocks within each size quintile into five equal-sized subgroups based on their book-to-market ratio. Stocks with the smallest book-to-market ratios are placed into sub-group 1, and those with the largest book-to-market ratios are placed into sub-group 5.

After constructing 25 size and book-to-market control portfolios, post-spinoff parent and offspring stocks are matched with a portfolio based on the post-spinoff firm's market value and the book-to-market ratio at the spinoff completion date for the sample country.[11] Then we calculate market-value-weighted average stock returns to the control portfolio. If stock returns for a firm in the control portfolio are missing in the computation period, we assume that the investment proceeds are reinvested in the remaining stocks of the control portfolio on a pro-rata basis. Specifically, the investment proceeds will be reallocated to the remaining stocks of the control portfolio proportionally, where the reallocation weight is the stocks' market values. When no matched firm is available in the size- and book-to-market control portfolio for the sample country[12], returns on the total market return index for each country given in *Datastream* is then used[13].

[10] Similar to Fama and French (1992), we use a firm's market capitalisation in June to construct control portfolios. Our results remain qualitatively similar when portfolio construction relies on a firm's market capitalisation in other calendar months.

[11] In some cases, *Datastream* does not have the data of the book value of equity for the sample firms. We then calculate the ratio based on the book value of equity given in the annual reports of sample firms, which are downloaded from Thomson Research.

[12] Such cases sometimes occur for some European countries which have a small stock market. For example, Ireland has an average of only 73 stocks during the 1990s as indicated by the stock data in *Datastream*.

[13] Results for long-run post-spinoff performance do not materially change when we use the value-weighted stock returns to all listed firms in the sample country as the benchmark returns rather than the total market return index for the sample country given in Datastream.

We compute these abnormal stock return measures during the post-spinoff period for each parent/offspring portfolio. Combining performance data from post-spinoff parent and offspring into a single portfolio is to gauge the overall performance gains from a spinoff. Specifically, we create a pro-forma combined firm following the spinoff by calculating value-weighted abnormal returns of parent and offspring. The value weight is based on market values of spinoff parent and offspring on the spinoff completion date. The same approach to measure the long-run performance of combined firms is used in Desai and Jain (1999), McConnell, Ozbilgin and Wahal (2001) and Veld and Veld-Merkoulova (2004).

The second benchmark is employed to control industry-specific risks. Fama and French (1997) show that current asset pricing models have not been able to explain industry-specific risks. My industry- and size- matching firm approach is based on the two-digit SIC industry, which is similar to that used in Veld and Veld-Merkoulova (2004) except for the following changes. First, we select matching firms which do not undertake a spinoff within the five-year period centring on the spinoff completion date of a sample firm involved with the spinoff. Second, we require that the industry matching firm's size is within the scope of (50%, 150%) of the market capitalisation of the sample firm. The additional size constraint is used to avoid selecting control firms that are too small relative to sample firms. For our spinoff sample, many spinoff parent firms are very large firms in local stock markets, where sometimes few industry peers can match the size of parents.

There are statistical problems associated with the use of the BHAR approach to measure the long-run abnormal returns. In particular, the BHAR approach inappropriately assumes that the event-firm returns are cross-sectional independent. Mitchell and Stafford (2000) argue that the BHAR approach using a bootstrap method does not resolve the cross-sectional dependence problem. They recommend an adjusted t-statistics approach to account for the event-firm-return dependence issue (the details of this adjusted t-statistics approach is given in Appendix 1). Mitchell and Stafford (2000) show that the long-run abnormal returns to event firms such as firms issuing shares will become insignificant when a reasonable change is made to the traditional t-statistic. We follow their approach to calculate the adjusted t-statistics for the long-run BHARs to post-spinoff firms in our sample.

The long-term size- and book-to-market adjusted abnormal returns of the parent, offspring, and the pro-forma combined firms in the three-year post-spinoff period are reported in Panels A-C of Table 4. The abnormal returns are calculated as the difference between the sample firm returns and the returns on the control portfolio, as per the matching process introduced earlier. We examine the long-run performance of post-spinoff firms over the three-year post-spinoff period. Therefore, we focus on the post-spinoff firms following spinoffs completed between January 1987 and December 2002 in order to have three-year post-spinoff data to calculate the long-run performance.

[Insert Table 4 about here]

Panel A in Table 4 demonstrates no significant stock returns to post-spinoff parent/offspring combined firms. For instance, the mean and median three-year size- and book-to-market-adjusted BHARs to post-spinoff combined firms are 0.06 and -0.03, respectively. Both the mean and the median are insignificant at conventional significance levels (t-statistic = 0.59 and z-statistic = -0.19). The results documented in this study differ from earlier US findings on corporate spinoff value effects. For example, Cusatis, Miles and Woolridge (1993) and Desai and Jain (1999) observe that post-spinoff firms perform significantly better than matching firms in the three-year post-spinoff period. However, our evidence is consistent with Veld and Veld-Merkoulova (2004) who observe no long-run abnormal returns to European spinoffs as well.

Panel B presents the summary statistics of long-term size- and book-to-market- adjusted BHARs to post-spinoff parents. As shown in Panel B, abnormal returns to post-spinoff parent firms are not statistically different from zero. Since the sample size is not big, we focus on the analysis of the median returns to post-spinoff parents to avoid biased statistical inferences. The median BHARs to post-spinoff parents are -0.06, -0.08 and -0.09 for one-year, two-year, and three-year holding periods, respectively. None of those returns is significant at conventional levels. Again, this evidence is different from the US findings that post-spinoff parent firms earn superior long-run stock returns (e.g. see Desai and Jain, 1999).

Panel C of Table 4 further demonstrates that long-run abnormal returns to post-spinoff offspring are insignificant across different holding periods. The mean two-year (and three-year) BHARs to post-spinoff offspring is 0.23 (0.26). Both returns would be significant at the 1% level if the traditional t-statistics are used. We use the adjusted statistics following the approach of Mitchell and Stafford (2000) to account for the cross-sectional return dependence, i.e. cross-sectional correlation due to clustered events. Adjusted t-statistics show that the mean BHARs to post-spinoff offspring are only significant at the 10% level. The median BHARs to post-spinoff offspring are insignificantly different from zero for different holding periods. Therefore, our evidence indicates that European stock markets generally react efficiently to spinoff announcements and post-spinoff offspring does not earn superior long-run stock returns.

Panels D-F of Table 5 reports the long-run industry- and size- adjusted abnormal returns to post-spinoff firms. Panel D in Table 5 shows that there are insignificant stock returns to post-spinoff parent/subsidiary combined firms. The mean and median three-year industry- and size- adjusted BHARs to post-spinoff combined firms are 0.02 and -0.07, respectively. Both the mean and the median are not significant at conventional levels (t-statistic = 0.57 and z-statistic = -0.27). Returns in different holding periods such as one-year and two-year periods are also insignificant at conventional levels. The binomial tests also show that half of sample firms have positive abnormal returns while half experience negative abnormal returns. The results documented in Panel D are very similar to those reported in Panel A.

[Insert Table 5 about here]

Panel E of Table 4 presents the results of long-term industry- and size- adjusted BHARs to post-spinoff parents. The abnormal returns to post-spinoff parents are also not statistically different from zero. The mean BHARs to post-spinoff parents are 0.01, 0.13 and 0.07 for one-year, two-year, and three-year holding periods, respectively. The median BHARs to post-spinoff parent firms are -0.01, 0.0003 and -0.01 for one-year, two-year, and three-year holding periods, respectively. None of those returns is significant at conventional levels.

Panel F of Table 4 demonstrates that the long-run industry- and size-adjusted abnormal returns to post-spinoff offspring firms are also insignificant across different holding periods. The mean two-year (and three-year) BHARs to post-spinoff offspring firms is 0.16 (0.22). Both returns would be significant at the 1% level if the traditional t-statistics are used. However, adjusted t-statistics to account for the event dependence problems show that the mean BHARs to post-spinoff offspring firms are no longer significant at the 5% level. As my sample size is small, the z-statistics for the median long-run abnormal returns have more reliable statistical inferences than the t-statistics for the mean long-run abnormal returns. As shown in the table, the median BAHRs to post-spinoff offspring firms are also insignificantly different from zero for different holding periods.

Overall, our evidence suggests that initial stock market reaction to spinoff announcements is generally efficient and neither post-spinoff parents nor their offspring earn superior long-run stock returns. This evidence differs from earlier US findings on corporate spinoff value effects. For example, Cusatis, Miles and Woolridge (1993) and Desai and Jain (1999) observe that post-spinoff firms outperform industry matching firms in the three-year post-spinoff period. However, our evidence is consistent with results from McConnell, Ozbilgin and Wahal (2001) and Veld and Veld-Merkoulova (2004), which show no long-run abnormal stock returns to American and European spinoffs.

4.2 The Calendar Time Regression Approach

The adjusted t-statistics in calculating BHARs do not fully resolve the event-firm-return dependence problems in measuring the long-run abnormal returns. An alternative approach to measuring long-term stock returns is to track the performance of a portfolio of firms involved in an event in calendar time relative to an explicit asset pricing model. The calendar-time portfolio approach is recommended in Fama (1998) and Mitchell and Stafford (2000). The event portfolio is formed each period to include all firms that experience a similar event within the prior n periods, where the n periods refer to a specific investment holding period of event firms, such as 12 and 24 months. With these event portfolios, the cross-sectional correlations of the individual event firm returns are automatically accounted for in the portfolio variance over the calendar time. When assessing the abnormal returns, the returns to event portfolios are regressed on the pre-specified asset pricing models and the statistical significance of the intercept will indicate the level of long-run abnormal returns.

Currently, two different multi-factor asset pricing models are popular for empirical long-run event studies. The first one is the Fama and French (1993) three-factor models, which captures the power of size and book-to-market in explaining the stock returns. Specifically, the multi-factor model is given below:

$$(R_i - R_f)_t = \alpha + \beta_1 (R_M - R_f)_t + \beta_2 SMB_t + \beta_3 HML_t \qquad (10)$$

SMB is the return on a portfolio long in small market capitalization stocks and short in big market capitalization stock. HML is the return on a portfolio long in high book-to-market stocks and short in low book-to-market stocks.

Recent empirical studies suggest another factor of explaining stock returns: momentum. Jegadeesh and Titman (1993, 2001) show that returns to portfolios formed on past returns cannot be explained by the returns to stocks of different size and book-to-market characteristics. Carhart (1997) augments the Fama and French (1993) model with the momentum factor:

$$(R_i - R_f)_t = \alpha + \beta_1 (R_M - R_f)_t + \beta_2 SMB_t + \beta_3 HML_t + \beta_4 UMD \qquad (11)$$

Where UMD is the return on a portfolio long in stocks with high past returns and short in stocks with low past returns.

The risk-free rate used in this study is the monthly rate derived from the redemption rate for one-year government benchmark bonds for each local country given in Datastream. The local market index is the Datastream total return index for each local country. The measurement of factors for Fama and French (1993) three-factor models is to form 5×5 size and book-to-market portfolios based first on the size rank and then on the book-to-market rank. The measurement of factors for Carhart (1997) four-factor models is to form $3 \times 3 \times 3$ size and book-to-market portfolios based first on the size rank and then on the book-to-market rank and finally on the past-year return rank. The details to compute factor loadings of Fama and French (1993) and Carhart (1997) models are reported in Appendix 2. The average monthly return on the portfolio of parent (subsidiary) stocks less the contemporaneous return on the risk free rate is then regressed against the contemporaneous returns of the three factors of the Fama and French (1993) model or against the contemporaneous returns of the four factors of the Carhart (1997) model.

Loughran and Ritter (2000) question the robustness of calendar-time regression approach because simply averaging monthly returns in each calendar month fails to detect long-run abnormal returns and ignores the existence of the “hot” period in which more corporate events are completed. To address this concern, we use the monthly-observation-number weighted monthly return rather than the simple average monthly return in the regression models. This approach assigns a more weight to the hot period when more corporate events are undertaken than that to the cold period.

Another problem associated with the calendar-time regression approach is that a small number of event firms in the monthly rebalanced portfolio may cause heteroskedasticity problem. Mitchell and Stafford (2000) require at least 10 firms in the event portfolio at each point in time. However, because of the small sample size, I require at least five firms in the event portfolio for each calendar month considered. Even for this data requirement, we can only use the calendar time regression approach to measure the long-run abnormal returns to post-spinoff UK firms since there are insufficient monthly observations for other European countries.

Table 5 reports the time-series regressions of post-spinoff UK firm portfolios. In general, the R-squared for time-series regression models are very small. This is due to the small sample size problem. The consistent message from different regression models is that none of the regression intercepts is significantly positive.

[Insert Table 5 about here]

Panel A of Table 5 reports the Fama-French (1993) model regression results for post-spinoff parents in the UK. When holding event firms for one year following the spinoff completion date, the model intercept (-0.02) is significantly negative (the t-statistic = -1.75). However, the whole model is insignificant since the F-statistic is just 1.58. When holding event firms for two years, the model intercept is positive (0.01) but it is insignificant at conventional levels (t-statistic = 0.72). Similar results obtain when holding event firms for three years. Panel B of Table 5 presents the Fama-French (1993) model regression results for post-spinoff offspring in the UK. Likewise, the model intercept is never significant at conventional levels for different holding periods.

Panel C of Table 5 reports the Carhart (1997) model regression results for post-spinoff parents in the UK. When holding event firms for one year following the spinoff completion date, the model intercept is negative (-0.01) but is insignificant (t-statistic = -0.68). When holding event firms for two years, the model intercept is positive (0.02) but it is not significant at conventional levels (t-statistic = 1.45). When holding event firms for three years, the model intercept is again positive (0.01) while not significant at conventional levels (t-statistic = 1.46). Panel D of Table 5 presents the Carhart (1997) model regression results for post-spinoff offspring firms in the UK. The regression results for post-spinoff offspring firms in Panel D are very similar to those for post-spinoff parent firms in Panel C. None of the model intercepts in Panel D is significant at conventional significance levels.

4.3 The Calendar Time Portfolio Abnormal Return Approach

There are some problems using the CTRG approach in measuring long-run abnormal returns. A most important one is that the regressions wrongly assume that the factor loadings are constant over a relative long period (e.g. up to 190 months in this study). This is unlikely since the composition of the event portfolio changes over time. Fama and French (1997) have shown that different industries have different factor loadings and Mitchell and Mulherin (1996) observe that corporate events tend to cluster through time by industry. The portfolio composition of events firms is likely heavily concentrated in a few industries at each point in time but in different industries over a long period. Therefore, the CTRG approach assuming constant factor loadings can lead to biased estimation results.

We therefore use the calendar time abnormal returns (CTAR) approach to account for this problem. The CTAR approach is the average abnormal return of each calendar month for all event firms within the prior pre-specified investment periods (such as one year, two years and three years). I also require that at least five firms exist in the event portfolio for each time point in calendar months. The expected return on the event portfolio is estimated by both the 25 size- and book-to-market- control portfolios and the industry- and size- matching firms. The benchmarks used in this subsection are actually those used in the BHAR approach. Similar to Mitchell and Stafford (2000), we standardise the monthly CTARs by estimates of the portfolio standard deviation in order to control for heteroskedasticity. The measurement of long-run abnormal returns to event firms is thus based on the time-series mean of the monthly standardised CTARs and standard error of the mean.

The results from the CTAR analysis are presented in Table 6. The CTARs to post-spinoff parent firms are insignificant for different holding periods and for different benchmarks. For instance, holding post-spinoff parent firms for three years on average earn a negative but insignificant average monthly returns (-0.01) against the size- and book-to-market control portfolio (t-statistic = -0.01). Similarly, holding post-spinoff parent firms for three years on average earn a positive but insignificant average monthly returns (0.07) against the industry- and size- matching firm (t-statistic = 0.94).

[Insert Table 6 about here]

The CTARs to post-spinoff offspring firms are also generally insignificant for different holding periods and for different benchmarks. The only exception is that the CTARs to post-spinoff offspring firms when the holding period is the two-year period and the benchmark is the size- and book-to-market control portfolio. The average monthly return for this case is 0.15, which is statistically significant at the 10% level (t-statistic = 1.87). However, none of other CTARs is significant at conventional levels. Therefore, the significant CTAR result for a particular return benchmark is likely to be a product of luck (Fama, 1998).

Therefore, the CTAR approach reports evidence that is consistent with the results of previous approaches. We conclude that post-spinoff firms do not earn superior abnormal returns in the long run against different benchmarks. The results documented here differ from earlier US findings on the long-run performance of firms involved in spinoffs such as Cusatis, Miles and Woolridge (1993) and Desai and Jain (1999). The difference may be due to different return methodologies used. Since prior studies have not used very robust return methodologies as this study, we contend that the long-run abnormal returns to post-spinoff firms reported in Cusatis, Miles and Woolridge (1993) and Desai and Jain (1999) may be due to biased return methodologies used.

4.4 Further Regression Tests

If markets are inefficient in reacting to spinoff announcements, there should be an association between the announcement period returns to spinoff announcements and the long-run abnormal returns to firms involved in spinoffs. We test this possibility by regressing the long-run BHARs to post-spinoff parent/offspring combined firms on the three-day cumulative abnormal returns to parents during the announcement period. The regression results are reported in Table 7.

[Insert Table 7 about here]

Results in Table 7 show that there is no significant association between long-run stock returns to post-spinoff firms and short-run market reaction to spinoff announcements. The coefficients for the three-day announcement returns are not significant for different regression models. In addition, the explanatory power of all regressions is extremely small. The adjusted R-square ranges from -0.008 to 0.005. Therefore, there is no evidence that stock markets initially underreact to spinoff announcement news.

5 Accounting Returns to Post-spinoff Firms

We use the benchmark-adjusted performance approach suggested in Barber and Lyon (1996) to obtain the abnormal accounting returns to post-spinoff firms. We examine the accounting performance for pre-spinoff firms for the two-year period prior to the spinoff announcement date and the accounting performance for post-spinoff firms for the three-year period following the spinoff completion date. The performance measures is the cash flow return on assets (ROA), measured as the ratio of income before interest, tax, depreciation and amortization (*EBITDA*) to book value of assets. The cash-flow based accounting measure is adopted to minimise the impact of managerial manipulation of accounting numbers.

The first approach to calculate industry-adjusted ROAs as abnormal accounting returns, used in Daley, Mehrotra and Sivakumar (1997) for post-spinoff firms, is subject to measurement errors because firms undertaking spinoffs are usually large and diversified firms in their industry and industry median firms tend to be substantially smaller than the spinoff firms. As shown in Berger and Ofek (1995) and others, large and diversified firms differ significantly from their small and focused industry counterparts in both operating performance and market valuation. Ghosh (2001) argues that a research design accounting for pre-event performance and size for firms experiencing corporate events is superior to the industry-median-adjusted approach. Following Loughran and Ritter (1997) and Ghosh (2001), we control for size and pre-event performance in measuring abnormal accounting returns. The procedure to estimate different benchmark-adjusted accounting returns is illustrated through the following example of ROA computation.

The first measure is industry-adjusted ROA. This proxy is computed as the return on assets of the event firm subtracted by the median return on assets for all firms, except the event firm, that operate in the same two-digit SIC code industry as the pre-spinoff parent.

The second measure is industry- and size-adjusted ROA. This proxy is calculated as the median ROA for all firms, except for the event firm, that share the same two-digit SIC code industry as the event firm and have asset values within 50% of the asset value of the pre-spinoff parent in the same fiscal year.[14]

The third measure is industry-, and performance-adjusted ROA. First, we calculate as ROA for all firms, except for the event firm , that are in the same two digit SIC industry as the event firm and whose ROA is within the range between 50% and 150% of the asset values of the event firm in the same fiscal year. From those firms a firm that is closest to the sample firm in terms of ROA in the preceding fiscal year is then selected. The industry-and performance-adjusted ROA is computed as the ROA of event firm subtracted by the ROA of the matching firm in the same 2-digit SIC industry.

Results of the accounting performance of firms involved in spinoffs are reported in Table 8. Panel A of Table 8 reports the accounting performance for pre-spinoff parents over the two-year period preceding the spinoff announcement date. In general, the accounting performance of pre-spinoff parents is in line with that of their industry peers. For three industry-based benchmarks, the abnormal accounting returns to pre-spinoff parents are insignificantly different from zero.

[14] The size matching on a smaller scope such as between 70% and 130% often gives no matching industry firms. Using a broader industry definition (one-digit SIC code industry) does not solve the data limitation problem because most of mainland European stock markets contain less than 500 public firms. To make industry- and size- matching feasible and meaningful, we use 50% instead of 30% as in Daley et al (1997).

[Insert Table 9 about here]

Panel B of Table 8 presents the accounting performance of post-spinoff parents. The results show that post-spinoff parents are not performing better than their industry peers in terms of accounting returns. None of the abnormal accounting returns is significant at conventional levels. For example, the mean (median) of average three-year industry- and size- adjusted ROAs is -0.5% (-0.7%), which is statistically insignificant at 10% level (t-statistic = -0.45 and z-statistic = -0.68).

Panel C of Table 8 shows the accounting performance of post-spinoff offspring firms. There is some evidence that post-spinoff offspring firms earn positive abnormal accounting returns. For the industry- and size- adjusted ROAs, the mean (median) of abnormal ROAs for post-spinoff offspring is 4.5% (2.3%), which is significant at 5% level (t-statistic = 2.17 and z-statistic = 2.15). However, the industry- adjusted ROAs are not significant. In addition, the abnormal accounting returns to post-spinoff offspring are insignificant for other holding periods. We do not examine the industry- and performance- adjusted ROAs for offspring because there are no prior performance data available for such firms.

Overall, results for the accounting returns show that post-spinoff firms do not earn superior accounting returns in the long term. This evidence is consistent with the stock performance of post-spinoff firms documented in section 4.

6 Robustness Checks

Desai and Jain (1999) present evidence that US stock markets may only underreact to focus-increasing spinoffs, where parent and offspring operate in different two-digit SIC industries. Specifically, Desai and Jain document observe the superior long-run stock returns to post-spinoff firms from focus-increasing spinoffs. In contrast, their sample firms following non-focus-increasing spinoffs do not have significant long-run abnormal returns. We examine the long-run abnormal returns to post-spinoff firms from focus-increasing spinoffs to assess whether this focus-related performance obtains for our European sample.

As in Desai and Jain (1999), we define focus-increasing spinoffs as those in which the parent and the offspring firms do not share the same two-digit SIC industry and non-focus-increasing spinoffs as those in which the parent and offspring operate in the same two-digit SIC industry.

In Panels A-C of Table 9, we report the size- and book-to-market- adjusted BHARs to post-spinoff firms following focus-increasing spinoffs and those to post-spinoff firms following non-focus-increasing spinoffs. The data in Panel A of Table 9 show that post-spinoff firms following focus-increasing spinoffs do not have long-run abnormal returns. For the post-spinoff parent/offspring combined firms, the mean (median) of the three-year size- and book-to-market- adjusted BHARs is 0.06 (-0.03), which has a t-statistic of 0.59 (z-statistic of -0.30). The mean and median returns for the one-year (and the two-year) holding period are also insignificant at conventional levels.

[Insert Table 9 about here]

We also examine whether post-spinoff parents following focus-increasing spinoffs earn superior long-run returns in Panel B of Table 9. Contrary to the findings of Desai and Jain (1999), post-spinoff parents following focus-increasing spinoffs have insignificant long-run abnormal returns. For instance, the mean (median) of the three-year size- and book-to-market- adjusted BHARs to post-spinoff parents following focus-increasing spinoffs is 0.05 (-0.08), which has a t-statistic of 0.37 (z-statistic of -0.93).

Results in Panel C of Table 9 demonstrate that the offspring following focus-increasing spinoffs have no superior long-run stock returns. The mean (median) of the three-year size- and book-to-market- adjusted BHARs to post-spinoff offspring firms from focus-increasing spinoffs is 0.12 (-0.001), which has a t-statistic of 0.93 (z-statistic of 0.46).

Again, our results are against the evidence reported in Desai and Jain (1999) that focus-increasing spinoffs earn significant long-run abnormal returns.

For the purpose of robustness check, we also analyse the long-run industry- and size-adjusted BHARs to post-spinoff firms from focus-increasing spinoffs in Panels D-F of Table 9. Results in Table 9 indicate that post-spinoff firms from focus-increasing spinoffs generally have insignificant long-run abnormal returns. The only exception is that the two-year BHARs to offspring have a mean of 0.16, which is significant at the 10% level (t-statistic = 1.72). However, the median (0.10) of two-year BHARs to post-spinoff offspring firms is insignificant at the 10% level (z-statistic = 1.01). In addition, the long-run BHARs to offspring for other holding periods are insignificant. Therefore, results in Panels D-F are generally consistent with those presented in Panels A-C.

Finally, we use the calendar time abnormal portfolio approach to examine whether focus-increasing spinoffs earn superior long-run returns[15]. The results are reported in Table 10. As shown in Table 10, investing in post-spinoff firms from focus-increasing spinoffs do not have superior portfolio returns. For example, the monthly abnormal returns for buying parent firms for three years upon the spinoff completion dates have an average of 0.01, which is insignificant at the 10% level (t-statistic = 0.36).

[Insert Table 10 about here]

The further analysis of long-run abnormal returns to focus-increasing spinoffs lends support to the efficient markets hypothesis. There is no evidence that stock markets underreact to focus-increasing spinoffs.

7 Summary

This study examines the efficiency of stock markets in valuing corporate spinoffs. There are mixed views on whether stock markets underreact to spinoff announcements. On the

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[15] We do not use the calendar time regression approach because the reduction of monthly observations for focus-increasing spinoffs makes statistic inference from the regressions less informative and reliable.

one hand, the efficient markets hypothesis contends that there is no superior long-run performance for firms involved in spinoffs. On the other hand, some practitioners have argued that investing in post-spinoff firms can earn superior portfolio returns. We address this issue by examining both short-run and long-run returns to firms involved in spinoffs with different return methodologies in order to avoid biased results. We test two hypotheses based on the market efficiency view. The first is that spinoff parent firms earn superior announcement returns. The second is that post-spinoff firms do not earn superior stock returns in the long run. Our empirical results support these two hypotheses.

First, we find that spinoff announcement returns are significantly positive for both UK and non-UK countries. The spinoff announcement effects hold for different methods to estimate abnormal announcement returns to spinoff parent firms. As contended in Fama (1991 and 1998), the initial market reaction to spinoff announcements should be quick and completed. The results support the first hypothesis.

Second, we use three different approaches to examine the long-run stock returns to post-spinoff firms. The BHAR approach is used as prior empirical studies but with the adjusted t-statistics to account for the event dependence problems. We also use two different benchmarks, size- and book-to-market control portfolios and industry- and size-matching firms. For both benchmarks, we find none of the BHARs to post-spinoff firms is statistically significant across different holding periods.

The calendar time regression approach is used against two popular asset pricing models, including Fama and French (1993) three-factor model and Carhart (1997) four-factor model. In addition, we use the observation-number weighted average monthly returns to increase the statistical power to detect the long-run abnormal returns. However, we find that none of the model intercepts is significantly positive.

We also employ the calendar time abnormal portfolio returns approach to analyse the long-run abnormal returns. The benchmarks are again the size- and book-to-market control portfolios and industry- and size- matching firms. The standardised average monthly abnormal returns are not significant for post-spinoff parent firms across different holding periods. The standardised average monthly abnormal returns against the size- and book-to-market- control portfolios for post-spinoff offspring firms are significant when the holding period is two years. However, it is only significant at the 10% significance level. When the benchmark changes to industry- and size- matching firms or the holding period changes to three-year (one-year), the result is again insignificant.

As a robustness check, we regress the long-run BHARs to post-spinoff combined firms on the spinoff announcement returns. We find no evidence that markets initially underreact to spinoff announcements. Overall, our results show that there are no superior long-run stock returns to post-spinoff firms. The second hypothesis is thus supported.

Third, we examine the long-run accounting performance of firms involved in spinoffs. The results are consistent with the stock return results. Post-spinoff firms do not earn superior accounting returns in the three-year post-spinoff period, either. Therefore, the stock markets do not seem to underreact to spinoff announcements.

Fourth, we conduct a robustness check for long-run stock returns to post-spinoff firms from focus-increasing spinoffs. Extant studies imply that stock markets may only underreact to focus-increasing spinoffs but react efficiently to non-focus-increasing spinoffs. The further analysis results show that European stock markets are efficient in valuing focus-increasing spinoffs as well.

The evidence of this study stresses the importance of using robust return methodologies in estimating the long-run abnormal returns. Further, it questions the validity of an investment strategy of buying post-spinoff firms to beat the market. Further research using more refined methodologies to assess the long-run stock returns to other corporate events will be helpful in examining the efficiency of stock markets in reacting to different corporate news.

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Table 1 Distribution of European spinoffs by announcement year and country of spinoff parent

Distribution of European companies that completed a spinoff in the period from January 1987 to December 2005 by announcement year and listing country of the spinoff parent firm. A total of 367 spinoff announcements are originally identified from the SDC Mergers and Acquisitions Database. Spinoffs are eliminated for the following reasons with data reduction number in parentheses: a) parent firms or offspring firms have no stock price information in Datastream (67); b) other types of restructuring transactions are mistakenly recorded as spinoffs in SDC, such as divestiture of a join-venture with multi-parents and privatization deals and asset redistribution as part of a merger deal (19); c) less than 50% of interests of offspring firms are distributed to existing shareholders (9); d) the same spinoff announcements are double counted in SDC (9); e) offspring firms are already listed before the spinoff (6); f) parent firms are not traded in the Europe (6); g) the shares of offspring firms are sold to either existing shareholders or the market (3); and h) the announced spinoffs are not completed by the end of year 2005 (78). The final sample includes 144 parent firms (157 distinct announcements) and 170 offspring firms. Countries are coded as follows: BD for Germany, BG for Belgium, DK for Denmark, FN for Finland, FR for France, IR for Ireland, IT for Italy, NL for Netherlands, NW for Norway, PT for Portugal, SD for Sweden, SW for Switzerland, and UK for United Kingdom.

Year	BD	BG	DK	FN	FR	IR	IT	NL	NW	PT	SD	SW	UK	Total
1987													1	1
1988									1				3	4
1989									1				6	7
1990											1			1
1991									1				2	3
1992									1		1		1	3
1993													2	2
1994							1				1			2
1995							1		1		2		2	6
1996					1		1		1		5		8	16
1997						1	1	1			4	1	6	14
1998	2					1		1	2		5		8	19
1999	1	1	1	1			4	3	1		2	2	5	21
2000		1		4			1				3		13	22
2001	1				3				1		5		11	21
2002							1	1					1	3
2003	1	1		1			2		2				3	10
2004	1	1		1					1	1	5		3	13
2005											1		1	2
Total	6	4	1	7	4	2	12	6	13	1	35	3	76	170

Table 2 Cumulative abnormal announcement returns to parents based on the market model

This table reports the average cumulative abnormal returns (CARs) for the entire sample of 157 completed spinoffs from January 1987 to December 2005.The spinoff announcements are identified from SDC Merger & Acquisitions Database. Abnormal returns are calculated with the market model, estimated over a 200-day period for each sample firm (from day -220 to day -21 relative to spinoff announcement date). The market model is estimated with the following equation: $R_{it} = \alpha_i + \beta_i R_{Mt}$,

where the parameters α_i and β_i are estimated by regressing the security return, R_{it}, on the market return, R_{Mt}, for the estimation period. The significance of the mean is tested by t-statistic. The significance of the median is tested by the Wilcoxon signed rank test. The binomial test is used to test the significance of the percentage of sample firms with positive abnormal announcement returns, with the null hypothesis that the proportion of positive abnormal announcement-period returns is 50%. [a], [b], [c] indicates the significance level at the 1%, 5% and 10% level, respectively.

Interval	Mean%.	t-statistic	Median%	z-statistic	% (+)
Panel A: CARs based on the market model for All spinoffs (N=157)					
-10 to -1	1.75[b]	2.62	0.79[b]	2.36	56.05
-1 to 0	4.24[a]	6.64	2.64[a]	7.06	70.70[a]
0	3.45[a]	6.25	1.75[a]	6.57	68.15[a]
-1 to +1	4.82[a]	6.14	2.61[a]	6.80	73.25[a]
+1 to +10	-0.06	-0.08	-1.14	-1.55	40.76
Panel B: CARs based on the market model for UK spinoffs (N=72)					
-10 to -1	1.95	1.59	0.72	1.18	52.78
-1 to 0	5.26[a]	4.67	3.02[a]	4.98	75.00[a]
0	4.80[a]	4.70	2.19[a]	5.06	70.83[a]
-1 to +1	5.48[a]	4.12	3.03[a]	4.31	69.44[a]
+1 to +10	0.57	0.43	-1.21	-0.32	45.83
Panel C: CARs based on the market model for Non-UK spinoffs (N=85)					
-10 to -1	1.58[b]	2.38	0.99[b]	2.14	58.82
-1 to 0	3.39[a]	4.91	2.61[a]	4.99	67.06[a]
0	2.29[a]	4.50	1.32[a]	4.20	65.88[a]
-1 to +1	4.27[a]	4.65	3.33[a]	5.29	76.47[a]
+1 to +10	-0.59	-0.72	-1.03[b]	-2.03	36.47
Panel D: Difference in CARs between UK and Non-UK spinoffs					
-10 to -1	0.38	0.27	-0.27	-0.53	
-1 to 0	1.87	1.42	0.41	1.40	
0	2.51[b]	2.20	0.87	1.58	
-1 to +1	1.21	0.75	0.70	0.52	
+1 to +10	1.62	0.74	-0.18	-0.24	

Table 3 Cumulative abnormal announcement returns to spinoff parents based on the world market model

This table reports the average cumulative abnormal returns (CARs) for the entire sample of 157 completed spinoffs by 144 European firms from January 1987 to December 2005.The spinoff announcements are identified from SDC Merger & Acquisitions Database. Abnormal returns are calculated with the world market model, estimated over a 200-day period for each sample firm (from day -220 to day -21 relative to spinoff announcement date). The world market model is estimated with the following equation:

$$R_{it} = \alpha_i + \beta_{1i} R_{LMt} + \beta_{2i} R_{WMt} + \beta_{3i} ER_t$$

where the parameters α_i, β_{1i}, β_{2i}, and β_{3i} are estimated by regressing the security returns on the market return for the estimation period, R_{LMt} is the return of local stock market index, R_{WMt} is the return to the S&P 500 index, and ER_t is the relative change of US dollar rates of the local currency.

The significance of the mean is tested by t-statistic. The significance of the median is tested by the Wilcoxon signed rank test. The binomial test is used to test the significance of the percentage of sample firms with positive abnormal announcement returns, with the null hypothesis that the proportion of positive abnormal announcement-period returns is 50%. [a], [b], [c] indicates the significance level at the 1%, 5% and 10% level, respectively.

Interval	Mean%.	t-statistic	Median%	z-statistic	% (+)
Panel A: CARs based on the world market model for All spinoffs (N=157)					
-10 to -1	1.64[b]	2.46	0.75[b]	2.26	56.05
-1 to 0	4.25[a]	6.62	2.52[a]	7.06	69.43[a]
0	3.47[a]	6.30	1.86[a]	6.66	67.52[a]
-1 to +1	4.83[a]	6.14	2.74[a]	6.86	72.61[a]
+1 to +10	0.04	0.06	-1.17	-1.47	40.13
Panel B: CARs based on the world market model for UK spinoffs (N=72)					
-10 to -1	1.69	1.36	0.65	0.98	54.17
-1 to 0	5.29[a]	4.70	2.97[a]	5.04	75.00[a]
0	4.76[a]	4.76	2.63[a]	5.07	68.06[a]
-1 to +1	5.52[a]	4.15	2.88[a]	4.40	69.44[a]
+1 to +10	0.86	0.64	-0.73	-0.07	45.83
Panel C: CARs based on the world market model for Non-UK spinoffs (N=85)					
-10 to -1	1.60[b]	2.46	0.88[b]	2.22	57.65
-1 to 0	3.36[a]	4.84	2.49[a]	4.89	64.71[a]
0	2.30[a]	4.51	1.66[a]	4.28	67.06[a]
-1 to +1	4.24[a]	4.61	2.36[a]	5.29	75.29[a]
+1 to +10	-0.64	-0.78	-1.28[b]	-2.18	35.29
Panel D: Difference in CARs between UK and Non-UK spinoffs					
-10 to -1	0.08	0.06	-0.23	-0.67	
-1 to 0	1.93	1.46	0.48	-1.53	
0	2.55[b]	2.24	0.97	-1.62	
-1 to +1	1.28	0.79	0.52	-0.61	
+1 to +10	1.50	0.95	0.55	-0.65	

Table 4 Long-run BHARs to post-spinoff parent/offspring combined firms, parents, and offspring

This table reports buy and hold abnormal returns (BHARs) for 129 European post-spinoff parent/offspring combined firms, 129 parents and 142 offspring in the period between January 1987 and December 2002. Panel A reports size- and book-to-market-adjusted BHARs to post-spinoff parent/offspring combined firms. Panel B reports size- and book-to-market-adjusted BHARs to post-spinoff parents. Panel C reports size- and book-to-market-adjusted BHARs to offspring. Panel D reports industry- and size-adjusted BHARs to post-spinoff parent/offspring combined firms. Panel E reports industry- and size-adjusted BHARs to post-spinoff parents. Panel F reports industry- and size-adjusted BHARs to offspring. The reported t statistic is adjusted for cross-sectional dependence (Mitchell and Stafford, 2000). The benchmark for size- and book-to-market- adjusted BHARs is the returns to a group of firms selected based on the closeness of market capitalizations and book-to-market ratios. The benchmark for industry- and size-adjusted BHARs is the returns to a 2-digit SIC industry peer selected based on the closeness of market capitalisation. The significance of the mean (median) is tested by the t-statistic (Wilcoxon test z-statistic). The binomial test is used to test the significance of the percentage of sample firms with positive abnormal announcement returns, with the null hypothesis that the proportion of positive abnormal announcement returns is 50%. [c] indicates the 10% significance level.

Interval	Mean	t-statistic	Median	z-statistic	% (+)
Panel A: Size- and book-to-market- adjusted BHARs for parent/offspring combined firms (N=129)					
(0, +1 year)	-0.01	-0.47	-0.001	-0.58	48.84
(0, +2 year)	0.14	1.31	-0.04	0.76	49.61
(0, +3 year)	0.06	0.59	-0.03	-0.19	48.06
Panel B: Size- and book-to-market- adjusted BHARs for parent firms (N=129)					
(0, +1 year)	-0.03	-0.33	-0.06	-1.33	44.19
(0, +2 year)	0.14	0.36	-0.08	-0.44	44.19
(0, +3 year)	0.01	0.10	-0.09	-1.38	43.41
Panel C: Size- and book-to-market- adjusted BHARs for offspring firms (N=142)					
(0, +1 year)	0.09	0.82	0.005	0.45	50.70
(0, +2 year)	0.25	0.96	0.06	1.57	56.34
(0, +3 year)	0.29	1.74[c]	0.04	1.46	52.11
Panel D: Industry- and size- adjusted BHARs for post-spinoff combined firms (N=129)					
EX+1 to EX+12	-0.02	-0.08	-0.004	-0.48	48.84
EX+1 to EX+24	0.07	1.03	-0.06	-0.16	48.06
EX+1 to EX+36	0.02	0.57	-0.07	-0.27	45.74
Panel E: Industry and size- adjusted BHARs for post-spinoff parent firms (N=129)					
EX+1 to EX+12	0.01	0.13	-0.01	-0.07	48.84
EX+1 to EX+24	0.13	0.65	0.003	-0.07	51.16
EX+1 to EX+36	0.07	0.50	-0.01	-0.10	48.84
Panel F: Industry- and size- adjusted BHARs for post-spinoff offspring firms (N=142)					
EX+1 to EX+12	0.05	0.79	0.04	0.40	52.11
EX+1 to EX+24	0.16	0.96	0.05	0.99	54.23
EX+1 to EX+36	0.22	1.67[c]	0.11	1.39	54.93

Table 5 Time-series regressions of post-spinoff parent and post-spinoff offspring portfolios

This table reports the time series regression results for post-spinoff parent and post-spinoff offspring firms. Panel A (B) shows the coefficients of the following time-series regression for post-spinoff parent (offspring) stocks over the holdings periods EX+1 to EX+12, EX+1 to EX+24, and EX+1 to EX+36, where EX is the spinoff completion date: $(R_P - R_f)_t = \alpha + \beta_1 (R_M - R_f)_t + \beta_2 SMB_t + \beta_3 HML_t + \varepsilon_t$

where $(R_P - R_f)_t$ is the average monthly return on the portfolio of parent (offspring) stocks less the contemporaneous return on the local one-month risk-free rate in calendar month t; $(R_M - R_f)_t$ is the return on the Datastream return index of the country's stocks less the contemporaneous return on the local one-month risk-free rate in calendar month t; SMB_t is the difference between the value-weighted average return on the small-cap portfolios and large-cap portfolios; and HML_t is the difference between the value-weighted average return on the high book-to-market portfolios and low book-to-market portfolios. Panel C (D) shows the coefficients of the following time-series regression for post-spinoff parent (offspring) stocks over the holdings periods EX+1 to EX+12, EX+1 to EX+24, and EX+1 to EX+36, where EX is the spinoff completion date:

$(R_P - R_f)_t = \alpha + \beta_1 (R_M - R_f)_t + \beta_2 SMB_t + \beta_3 HML_t + \beta_4 UMD_t + \varepsilon_t$

where $(R_P - R_f)_t$ is the average monthly return on the portfolio of parent (offspring) stocks less the contemporaneous return on the local one-month risk-free rate in calendar month t; $(R_M - R_f)_t$ is the return on the Datastream return index of the country's stocks less the contemporaneous return on the local one-month risk-free rate in calendar month t; SMB_t is the difference between the value-weighted average return on the small-cap portfolios and large-cap portfolios; HML_t is the difference between the value-weighted average return on the high book-to-market portfolios and low book-to-market portfolios; and UMD_t is the difference between the value-weighted average return on the high past-year stock-return portfolios and low past-year stock-return portfolios. New parent (offspring) stocks are added to the portfolio in the calendar month of the stock's EX date and stock are removed in the calendar month when the holding period ends. The number of observations is the number of calendar months used to estimate the time-series regression. The t-statistics (F-statistics) are in parentheses (brackets). [a], [b], [c] indicates the significance level at 1%, 5% and 10% level, respectively.

Holding Period	α	β_1	β_2	β_3	β_4	R^2
Panel A: Regression of Fama-French (1993) three-factor model for post-spinoff parent firms						
EX+ 1 to EX+12	-0.02[c]	0.53[c]	-0.10	0.50		0.03
No. of obs. = 63	(-1.75)	(1.74)	(-0.24)	(0.87)		[1.58]
EX+ 1 to EX+24	0.01	0.33	-0.05	-0.84		0.04[c]
No. of obs. = 116	(0.72)	(1.17)	(-0.14)	(-1.60)		[2.37]
EX+ 1 to EX+36	0.01	0.31	-0.18	-0.65		0.03[c]
No. of obs. = 147	(0.71)	(1.49)	(-0.68)	(-1.62)		[2.59]
Panel B: Regression of Fama-French (1993) three-factor model for post-spinoff offspring firms						
EX+ 1 to EX+12	-0.02	0.31	-0.26	0.16		0.01
No. of obs. =72	(-1.43)	(1.15)	(-0.68)	(0.30)		[1.13]
EX+ 1 to EX+24	0.001	0.27	0.01	-0.34		0.02
No. of obs. =117	(0.13)	(1.47)	(0.04)	(-0.99)		[1.80]
EX+ 1 to EX+36	0.002	0.29[c]	-0.05	-0.39		0.03[b]
No. of obs. =150	(0.28)	(1.93)	(-0.27)	(-1.32)		[2.78]

Table 5 (Continued)

Holding Period	α	β_1	β_2	β_3	β_4	R^2
Panel C: Regression of Carhart (1997) four-factor model for post-spinoff parent firms						
EX+ 1 to EX+12	-0.01	0.25	-0.18	-0.44	-0.74	0.02
No. of obs. = 63	(-0.68)	(0.66)	(-0.38)	(-0.76)	(-1.36)	[1.34]
EX+ 1 to EX+24	0.02	-0.02	-0.39	-1.55[a]	-0.95[c]	0.07[b]
No. of obs. = 116	(1.45)	(-0.07)	(-1.04)	(-2.76)	(-1.77)	[3.19]
EX+ 1 to EX+36	0.01	0.06	-0.43	-1.21	-0.70	0.06[b]
No. of obs. = 147	(1.46)	(0.23)	(-1.56)	(-2.85)	(-1.67)	[3.39]
Panel D: Regression of Carhart (1997) four-factor model for post-spinoff offspring firms						
EX+ 1 to EX+12	-0.01	0.13	-0.32	-0.68	-0.08	0.01
No. of obs. =72	(-0.45)	(0.38)	(-0.74)	(-1.26)	(-0.15)	[1.14]
EX+ 1 to EX+24	0.01	-0.09	-0.39	-1.26[a]	-0.73[b]	0.11[a]
No. of obs. = 117	(1.30)	(-0.42)	(-1.65)	(-3.59)	(-2.16)	[4.63]
EX+ 1 to EX+36	0.01	0.11	-0.26	-0.90[a]	-0.45	0.07[a]
No. of obs. = 150	(1.09)	(0.61)	(-1.36)	(-2.98)	(-1.49)	[3.96]

Table 6 Mean calendar-time portfolio abnormal returns (CTARs) to post-spinoff firms

This table reports the mean calendar-time portfolio abnormal returns for post-spinoff parent and post-spinoff offspring firms. The CTARs are calculated each month as the difference between the event-portfolio return and the expected return on the portfolio, standardised by the portfolio residual standard deviation. Each month, equal-weight event portfolios contain all post-spinoff parent or offspring stocks. The event portfolio is rebalanced monthly to drop all stocks that reached the end of their respective holding period and add all stocks that have just emerged from the spinoff transaction. The portfolio expected returns are proxied by value-weighted returns on size- and book-to-market control portfolios and value-weighted returns on industry- and size- matching firms. Abnormal returns are calculated as monthly differences of event portfolio returns and portfolio expected returns. Mean CTARs and standard errors are calculated from the time-series of monthly CTARs. The t-statistic is in parentheses and the number of observations is in square brackets. The number of observations is the number of calendar months used to calculate the mean calendar-time portfolio abnormal returns. [c] indicates the significance level at the 10% level.

	Size- and book-to-market- adjusted calendar-time abnormal returns		**Industry- and size- adjusted calendar-time abnormal returns**	
Holding Period	**Parent**	**Offspring**	**Parent**	**Offspring**
(0, +1 year)	-0.09	0.04	0.03	-0.03
	(-0.87)	(0.36)	(0.25)	(-0.27)
	[92]	[94]	[92]	[94]
(0, +2 years)	0.01	0.15[c]	0.11	0.11
	(0.17)	(1.87)	(1.43)	(1.42)
	[156]	[158]	[156]	[158]
(0, +3 years)	-0.01	0.06	0.07	0.09
	(-0.11)	(0.87)	(0.94)	(1.19)
	[190]	[190]	[190]	[190]

Table 7 Regression of long-run BHARs to post-spinoff combined firms on the three-day cumulative announcement abnormal returns to spinoff parent firms

Regression coefficients for long-run BHARs for 129 post-spinoff parent/offspring combined firms from the 142 spinoffs completed from January 1987 to December 2002. Panel A reports the regression results when the dependent variable is size- and book-to-market- adjusted BHAR. Panel B reports the regression results when the dependent variable is industry- and size- adjusted BHARs. CAR (-1, +1) is the three-day (-1, +1) cumulative abnormal returns to spinoff parents based on the market model, estimated over a 200-day period for each sample firm. White heteroscedasticity-adjusted t statistics arein parentheses. [a], [b], [c] indicates the significance at the 1%, 5%, and 10% level, respectively.

Variable	**One-year BHAR**		**Two-year BHAR**		**Three-year BHAR**	
Panel A: Dependent variable is size- and book-to-market adjusted BHAR						
Intercept	0.01	(0.28)	0.17[c]	(1.82)	0.12	(1.39)
CAR (-1, +1)	-0.004	(-1.61)	-0.006	(-1.22)	-0.01[b]	(-2.50)
No. of Obs.	129		129		129	
Adjusted R^2	0.001		-0.005		0.005	
F statistic	1.15		0.39		1.61	
Sig. level	0.29		0.53		0.21	
Panel B: Dependent variable is industry- and size- adjusted BHAR						
Intercept	-0.01	(-0.30)	0.07	(0.59)	0.04	(0.37)
CAR (-1, +1)	-0.0003	(-0.08)	-0.00007	(-0.01)	-0.003	(-0.54)
No. of Obs.	129		129		129	
Adjusted R^2	-0.008		-0.008		-0.007	
F statistic	0.01		0.00		0.09	
Sig. level	0.95		1.00		0.77	

Table 8 Changes in return on assets (ROA) ratio for post-spinoff firms

This table reports the mean and median changes in the return on assets (ROA) ratio for parent and offspirng firms. The return on assets ratio is the fiscal year's operating cash flows divided by the beginning-of-fiscal year asset value. Industry-adjusted ROAs are computed by subtracting the median value for all firms in the same two-digit SIC code from the corresponding spinoff firm variable. Size-adjusted ROAs are computed by subtracting the median value for all firms in the same two-digit SIC code, whose asset value is within 50% of the asset value of the parent, from the corresponding spinoff firm variable. Performance-adjusted ROAs are computed by subtracting the median value for all firms in the same two-digit SIC code, whose ROA value is within 50% of the ROA value of the parent, from the corresponding spinoff firm variable. Mean (median) changes are tested against zero using the t-statistic (the Wilcoxon sign rank test statistic). [a], [b], [c] indicates the significance level at the 1%, 5% and 10% level, respectively.

Holding period (from, to)	No. of obs.	Unadjusted ROA		Industry-adjusted ROA		Industry- and size-adjusted ROA		Industry- and performance-adjusted ROA	
(years)		Mean	Median	Mean	Median	Mean	Median	Mean	Median
Panel A: Pre-spinoff parents									
(-2, -1)	145	0.143	0.124	0.008	0.001	0.011	-0.008	-0.011	0.001
				(0.75)	(0.29)	(0.73)	(-0.29)	(-0.82)	(0.39)
(-1, 0)	156	0.116	0.105	-0.009	0.001	-0.022	-0.005	0.006	0.002
				(-0.59)	(0.07)	(-1.28)	(-0.83)	(0.37)	(0.68)
Panel B: Post-spinoff parents									
(0, +1)	157	0.101	0.105	-0.003	-0.005	-0.002	-0.003	0.001	0.005
				(-0.23)	(-0.38)	(-0.11)	(-0.22)	(0.06)	(0.85)
(+1, +2)	120	0.109	0.103	0.008	0.001	0.011	-0.008	-0.011	0.001
				(0.75)	(0.29)	(0.73)	(-0.28)	(-0.81)	(0.39)
(+2, +3)	100	0.090	0.100	-0.009	0.001	-0.022	-0.005	0.006	0.002
				(-0.59)	(0.07)	(-1.28)	(-0.82)	(0.37)	(0.65)
Average of (0,+3)	157	0.097	0.102	-0.003	-0.008	-0.005	-0.007	-0.016	-0.001
				(-0.28)	(-0.51)	(-0.45)	(-0.68)	(-1.20)	(-0.05)
Panel C: Post-spinoff offspring									
(0, +1)	160	0.084	0.100	-0.026	-0.004	-0.029	-0.010		
				(-1.33)	(-0.92)	(-1.41)	(-1.33)		
(+1, +2)	117	0.105	0.110	0.005	-0.002	0.045[b]	0.023[b]		
				(0.23)	(-0.91)	(2.17)	(2.15)		
(+2, +3)	101	0.081	0.120	-0.027	-0.014	-0.029	-0.006		
				(-0.67)	(-0.30)	(-0.65)	(-0.22)		
Average of (0,+3)	160	0.088	0.105	-0.025	-0.010	-0.014	0.000		
				(-1.23)	(-0.73)	(-0.56)	(-0.18)		

Table 9 Long-run BHARs to post-spinoff combined firms, parents, and offspring following focus-increasing spinoffs

This table reports long-run BAHRs for 99 European post-spinoff combined firms, 99 parent firms and 107 offspring firms from focus-increasing spinoffs in the period between January 1987 and December 2002. Panel A reports size- and book-to-market-adjusted BHARs to post-spinoff parent/offspring combined firms. Panel B reports size- and book-to-market-adjusted BHARs to post-spinoff parents. Panel C reports size- and book-to-market-adjusted BHARs to offspring. Panel D reports industry- and size-adjusted BHARs to post-spinoff parent/offspring combined firms. Panel E reports industry- and size-adjusted BHARs to post-spinoff parents. Panel F reports industry- and size-adjusted BHARs to offspring. The reported t statistic is adjusted for cross-sectional dependence (Mitchell and Stafford, 2000). The benchmark for size- and book-to-market- adjusted BHARs is the returns to a group of firms selected based on the closeness of market capitalizations and book-to-market ratios. The benchmark for industry- and size-adjusted BHARs is the returns to a 2-digit SIC industry peer selected based on the closeness of market capitalisation. EX is the month of completion date of spinoff. The significance of the mean (median) is tested by the t-statistic (Wilcoxon test z-statistic). The binomial test is used to test the significance of the percentage of sample firms with positive abnormal announcement returns, with the null hypothesis that the proportion of positive abnormal announcement returns is 50%. None of the BHARs is significant at the 10% level.

Interval	Mean%.	t-statistic	Median%	z-statistic	% (+)
Panel A: Size- and book-to-market adjusted BHARs for post-spinoff combined firms (N=99)					
(0, +1 years)	-0.02	-0.47	0.00	-0.47	49.49
(0, +2 years)	0.16	1.31	0.03	0.90	50.51
(0, +3 years)	0.06	0.59	-0.03	-0.30	48.48
Panel B: Size- and book-to-market- adjusted BHARs for post-spinoff parents (N=99)					
(0, +1 years)	-0.03	-0.83	-0.05	-0.67	47.47
(0, +2 years)	0.20	1.01	-0.07	-0.08	45.45
(0, +3 years)	0.05	0.37	-0.08	-0.93	46.46
Panel C: Size- and book-to-market- adjusted BHARs for post-spinoff offspring (N=107)					
(0, +1 years)	0.06	0.93	-0.03	0.04	49.53
(0, +2 years)	0.14	1.50	0.06	1.16	56.07
(0, +3 years)	0.12	0.93	-0.001	0.46	49.53
Panel D: Industry- and size- adjusted BHARs for post-spinoff combined firms (N=99)					
(0, +1 years)	0.003	0.08	0.03	0.21	52.53
(0, +2 years)	0.13	1.03	0.01	0.42	50.51
(0, +3 years)	0.07	0.57	0.007	0.39	50.51
Panel E: Industry and size- adjusted BHARs for post-spinoff parents (N=99)					
(0, +1 years)	0.03	0.72	0.04	0.99	53.54
(0, +2 years)	0.22	1.09	0.08	0.69	55.56
(0, +3 years)	0.16	1.01	0.02	0.73	52.53
Panel F: Industry- and size- adjusted BHARs for post-spinoff offspring (N=107)					
(0, +1 years)	0.05	0.76	0.002	0.15	50.47
(0, +2 years)	0.16[c]	1.72	0.10	1.01	55.14
(0, +3 years)	0.14	0.99	0.08	0.76	54.21

Table 10 Mean calendar-time portfolio abnormal returns (CTARs) to post-spinoff firms following focus-increasing spinoffs

This table reports the mean calendar-time portfolio abnormal returns for post-spinoff parent and post-spinoff offspring firms. The CTARs are calculated each month as the difference between the event-portfolio return and the expected return on the portfolio, standardised by the portfolio residual standard deviation. Each month, equal-weight event portfolios contain all post-spinoff parent or offspring stocks. The event portfolio is rebalanced monthly to drop all stocks that reached the end of their respective holding period and add all stocks that have just emerged from the spinoff transaction. The portfolio expected returns are proxied by value-weighted returns on size- and book-to-market control portfolios and value-weighted returns on industry- and size- matching firms. Abnormal returns are calculated as monthly differences of event portfolio returns and portfolio expected returns. Mean CTARs and standard errors are calculated from the time-series of monthly CTARs. The t-statistic is in parentheses and the number of observations is in square brackets. The number of observations is the number of calendar months used to calculate the mean calendar-time portfolio abnormal returns. None of the portfolio returns is significant at conventional levels.

	Size- and book-to-market- adjusted calendar-time abnormal returns		**Industry- and size- adjusted Calendar-time abnormal returns**	
Holding Period	**Parent**	**Offspring**	**Parent**	**Offspring**
(0, +1 years)	-0.001	0.10	0.08	-0.02
	(-0.03)	(0.94)	(0.74)	(-0.32)
	[91]	[93]	[91]	[93]
(0, +2 years)	0.01	0.10	0.07	0.03
	(0.23)	(1.19)	(0.81)	(0.62)
	[127]	[128]	[127]	[128]
(0, +3 years)	0.01	0.06	0.02	0.05
	(0.36)	(0.33)	(0.81)	(1.19)
	[176]	[176]	[176]	[176]

Appendix 1 Calculation of Adjusted t-statistics

Our calculation of adjusted t statistics follows the approach of Mitchell and Stafford (2000) to mitigate the event firm dependence problem. We first estimate the average correlation of 3-year BHARs for sample firms with complete (36 months) calendar-time overlap. Then we calculate the estimated correlation between sample firms with less than 36-month overlap by assuming the correlation is decreasing linearly as the amount of overlap falls from complete calendar-time overlap of 36 months to no overlap between observations (see Table A1 for details). The calculated average correlation of BHARs with complete overlap for our sample is p=0.0622. Then the estimated correlation of 3-year BHARs with 35-month overlap is calculated as 35/36 * p=0.0604, and so on. The estimated correlation for non-overlapping observations is zero. Then the grand average correlation for the BHARs is 0.0174.

The t-statistic without assuming independence for our sample firms (N= 129) is then calculated by using the following formula:

$$\frac{\sigma_{BHAR(independence)}}{\sigma_{BHAR(dependence)}} \approx \frac{1}{\sqrt{1+(N-1)\overline{\rho_{i,j}}}} = \frac{1}{\sqrt{1+(129-1)*0.0115}} = 0.6365$$

This adjustment of t-statistics is moderate compared with the adjustment of 0.2463 in Mitchell and Stafford (2000) for their seasoned equity offerings sample.

Table A1 Correlation structure of three-year BHARs for the European spinoff parent firms

Number of Months of Overlap	Number of Unique Correlations n(n-1)/2	Assumed Correlation Structure	Estimated Correlation
36	92	p	0.0409
35	168	35/36*p	0.0397
34	127	34/36*p	0.0386
33	168	33/36*p	0.0375
32	124	32/36*p	0.0363
31	108	31/36*p	0.0352
30	138	30/36*p	0.0341
29	127	29/36*p	0.0329
28	126	28/36*p	0.0318
27	139	27/36*p	0.0307
26	128	26/36*p	0.0295
25	117	25/36*p	0.0284
24	145	24/36*p	0.0272
23	158	23/36*p	0.0261
22	115	22/36*p	0.0250
21	125	21/36*p	0.0238
20	149	20/36*p	0.0227
19	100	19/36*p	0.0216
18	90	18/36*p	0.0204
17	138	17/36*p	0.0193
16	110	16/36*p	0.0182
15	102	15/36*p	0.0170
14	132	14/36*p	0.0159
13	116	13/36*p	0.0148
12	111	12/36*p	0.0136
11	130	11/36*p	0.0125
10	94	10/36*p	0.0114
9	81	9/36*p	0.0102
8	113	8/36*p	0.0091
7	116	7/36*p	0.0079
6	83	6/36*p	0.0068
5	80	5/36*p	0.0057
4	103	4/36*p	0.0045
3	74	3/36*p	0.0034
2	74	2/36*p	0.0023
1	97	1/36*p	0.0011
0	4058	0/36*p	0.0000
No. of firms=129	Total=8256		Average=0.0115

Appendix 2 Portfolio construction for the calendar time regression approach

For the estimation of Fama and French (1993) three-factor model, the SMB, and HML portfolios are constructed following the approach of Daniel, Titman and Wei (2001). For a given country and at each calendar month, we use only stocks for which we have the market capitalization (MV) and a book-to-market ratio (*B*/*M*).

To construct the portfolios, we sort all stocks that pass the above requirements by MV and create tritile portfolios. We then take the portfolio of stocks with the highest MV and re-sort all stocks by *B/M*, thereby creating three *B/M* portfolios within the high MV group. We repeat the same procedure for the low MV groups. After sorting for MV and *B*/*M*, we have six portfolios. Table A2 depicts the portfolio construction procedure. The two trading strategies are constructed as follows:

$$\text{SMB} = 1/3 * ((\text{SL} - \text{BL}) + (\text{SM} - \text{BM}) + (\text{SH} - \text{BH}))$$

$$\text{HML} = 1/2 * ((\text{SH} - \text{SL}) + (\text{BH} - \text{BL}))$$

Table A2 Portfolio construction procedure for Fama and French (1993) three-factor model

Market Capitalisation (MV)	**Book-to-market (B/M)**	**Portfolio**
Small	High	SH
	Medium	SM
	Low	SL
Big	High	BH
	Medium	BM
	Low	BL

For the estimation of Carhart (1997) four-factor model, the SMB, HML, and UMD portfolios are constructed following the approach of Liew and Vassalou (2000). For a given country and at each calendar month, we use only stocks for which we have the market capitalization (MV), a book-to-market ratio (*B*/*M*), and at least twelve monthly observations so as to be able to calculate the momentum (MOM). We consider only the 12-month momentum strategy, and we implement it by calculating the average of past year's returns, excluding the most recent month.

To construct the portfolios, we sort all stocks that pass the above requirements by MV and create tritile portfolios. We then take the portfolio of stocks with the highest MV and re-sort all stocks by *B/M*, thereby creating three *B/M* portfolios within the high MV group. We repeat the same procedure for the medium MV and low MV groups. After sorting for MV and *B*/*M*, we have nine portfolios. We then sort the securities in each of these nine portfolios according to MOM and create tritile portfolios within the nine portfolios. We obtain, in this manner, 27 portfolios.

Table A3 depicts the portfolio construction procedure. “Down” are the bottom third of the total stocks with the lowest last year's average return, excluding the most recent month. “Up” are the top third of the total stocks with the highest last year's average return, excluding the most recent month. “Medium” are the remaining third of the stocks. The three trading strategies are constructed as follows:

$$\begin{aligned} SMB = 1/9 * ((P1 - P19) + (P2 - P20) + (P3 - P21) + (P4 - P22) + (P5 - P23) + (P6 - P24) \\ + (P7 - P25) + (P8 - P26) + (P9 - P27)) \end{aligned}$$

$$\begin{aligned} HML = 1/9 * ((P1 - P7) + (P2 - P8) + (P3 - P9) + (P10 - P16) + (P11 - P17) + (P12 - P18) \\ + (P19 - P25) + (P20 - P26) + (P21 - P27)) \end{aligned}$$

$$\begin{aligned} UMD = 1/9 * ((P1 - P3) + (P4 - P6) + (P7 - P9) + (P10 - P12) + (P13 - P15) + (P16 - P18) \\ + (P21 - P19) + (P22 - P24) + (P25 - P27)) \end{aligned}$$

SMB represents the return to a portfolio that is long on small MV stocks and short on big MV stocks, controlling for the size and momentum effects. In other words, HML is a zero investment strategy that is both size and momentum neutral. Similar interpretations can be given for SMB and UMD. The 27 portfolios are value-weighted at construction. In the presence of small capitalization stocks, value-weighted portfolios result in more realistic returns.

Table A3 Portfolio construction procedure for Carhart (1997) four-factor model

Market Capitalisation (MV)	Book-to-market (B/M)	Past year's returns (MOM)	Portfolio
Small	High	Down	P1
		Medium	P2
		Up	P3
	Medium	Down	P4
		Medium	P5
		Up	P6
	Low	Down	P7
		Medium	P8
		Up	P9
Medium	High	Down	P10
		Medium	P11
		Up	P12
	Medium	Down	P13
		Medium	P14
		Up	P15
	Low	Down	P16
		Medium	P17
		Up	P18
Big	High	Down	P19
		Medium	P20
		Up	P21
	Medium	Down	P22
		Medium	P23
		Up	P24
	Low	Down	P25
		Medium	P26
		Up	P27

The factor returns are calculated for annual rebalancing frequencies. Annually rebalanced portfolios use December-end B/M values, June-end market capitalization, and past 12 months of returns prior to July. If a stock does not have returns for any month through the duration of the holding period, we invest that portion of the portfolio into the market portfolio of the corresponding country, as measured by the country's total return index given in *Datastream*. Our portfolio construction procedure differs from the one used in Fama and French (1993), in which two independent sorts created the HML and SMB. We cannot use independent sorts because of the small number of securities we have in some countries.