

The performance of European equity carve-outs

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Abstract

In this paper we examine the valuation effects of equity carve-outs in Europe. We demonstrate that equity carve-out announcements yield significant abnormal returns for the shareholders of parent firms. This positive market reaction is stronger in countries that better protect minority shareholder rights. However, a remarkable price reversal is detected in the aftermath of a carve-out transaction that lasts up to two years. In contrast, parent-firm operating performance improves as long as the disposal of subsidiary assets is proven to be an optimal corporate decision. Subsidiaries stemming from the restructuring transaction also experience an initial positive market reaction which then reverses to severe price losses within a few months of the first day of listing.

Keywords: Equity carve-outs, divestiture, IPOs, BHARs, operating performance.

JEL classification: G34; G14

1. Introduction

Restructuring a company's operations is often a necessity when the company has expanded to the point that its current structure can no longer efficiently manage the general objectives of the company¹. For instance, a corporate restructuring may call for the disposal of some departments into subsidiaries as a means of creating a more effective management model by: focusing on core business, eliminating negative synergies between unrelated business segments, creating pure-play companies which are easier for investors to evaluate and reducing debt (Gaughan, 2002). In these cases, corporate restructuring is seen as a positive sign of growth for the company and is often welcomed favorably by the market and shareholders who wish to see the corporation gain a larger market share and further its profit growth.

Equity carve-outs (ECOs) are transactions where publicly-traded parent companies "carve out" a part of their subsidiaries' outstanding shares through an initial public offering (IPO), thus combining elements from both IPOs and spin-offs. Specifically, in ECOs a subsidiary goes public and raises money, directly affecting the liquidity level of the parent firm. The unique feature of ECOs is that the parent firm continues to hold a controlling interest in the subsidiary after the IPO (Ghosh et al., 2012). The main difference between spin-offs and ECOs is that the latter entail the sale of the subsidiary's shares, therefore raising new capital, while the former do not involve a cash exchange. Thus, a spin-off is not motivated by the company's desire to generate immediate cash, while ECOs often become a source of liquidity.

The vast majority of studies that examine the valuation effects of ECOs concentrate on the US. This unique corporate finance environment is characterized by liquid markets, an entrepreneurial social culture and strong investor protections; in this way, it significantly differs

¹ Indicatively, a recent corporate restructuring that attracted much media coverage occurred in the Netherlands, where the ING Group reduced its holdings in the Nationale Nederlanden Group (NN) to 71.4%. "On 2 July, 2014, the NN Group shares started trading on Euronext Amsterdam. Interestingly, the ING Group sold 77 million ordinary shares in the IPO of the NN Group at an offer price of 20 euros per share, resulting in approximately 1.5 billion euros in gross proceeds for ING. Including the exchange into NN Group shares of 450 million euros of mandatorily subordinated notes and excluding the exercise of the over-allotment option, the gross proceeds for ING at settlement of the IPO amount to approximately 2 billion euros" (www.ing.com).

from many European institutional settings, which might imply that current understandings are geographically fragmented. Indeed, prior finance and law literature has demonstrated that a country's legal system affects a company's decision to go public (Shleifer and Wolfenzon, 2002). Specifically, a higher level of minority shareholder and investor protection amplifies the effectiveness of contracts, reduces the cost of external financing and improves company performance (Berkowitz et al., 2003; Espenlaub et al., 2016; LaPorta et al., 2006). Since ECOs entail the transfer of ownership from the parent firm to shareholders, we presume that countries with stronger protection for all shareholders, and especially minority ones, will favor the occurrence of ECOs. Therefore, the heterogeneity in shareholder protection between European countries and the recent resurgence of demerger activity provide an ideal setting for a deeper investigation of ECOs.

Our main objective is to unveil the key rationales and drivers for the value creation of carve-outs occurring between 1997 and 2011, thereby enabling analysts and academics to better assess the stock market reaction and understand the operating consequences of carve-outs. In particular, we aim to answer the following research questions: Do ECOs enhance corporate value when firms carve out subsidiaries? How do subsidiaries perform subsequently to ECOs? Does the operating performance of parent firms improve after the ECO transaction? Do European ECOs bring similar benefits to their shareholders as their US counterparts? How do strong governance standards (such as the protection of minority shareholder interests) alter the market reaction to ECOs?

Using the classical event study methodology, our results indicate an initially positive market reaction to the announcement of ECOs that exceeds 1%. However, this reaction lasts just a few days before we witness significant stock price losses from 6 months to 24 months after the ECO transaction. The degree of minority shareholder protection seems to drive the market's reaction to ECOs by favoring shareholder-friendly environments. Looking at the long-term operating performance of parent firms, we observe a remarkable improvement in profitability that persists

up to two years following ECOs. Finally, we find evidence that carve-out IPOs elicit positive abnormal returns on the first trading day that last up to one month. Thereafter, a strong price underperformance prevails in the market, offsetting the initial price reaction.

This study offers several important contributions. First, we demonstrate that European ECOs provoke significant abnormal returns, though these are weaker when compared to the US; this suggests that an important strategic decision of corporate restructuring is greeted with less enthusiasm by investors in the European context. We also report that any tangible capital gains obtained vanish during periods of financial turmoil. Second, we contribute by showing the significantly positive long-term operating performance of ECOs, providing empirical support for Nanda's (1991) asymmetric information model. Third, we demonstrate for the first time the relative importance of nationally-imposed and enforced corporate governance mechanisms which aim to protect minority shareholding in a successful corporate-restructuring operation. We raise the possibility that other corporate-restructuring decisions might also be affected by the dominant role of nationally-enforced devices to protect minority or other shareholders.

Our results have important implications for shareholders, investors and regulators alike. Our findings imply that shareholders and investors who trade around European ECO announcements can reap significant capital gains. However, they should be aware that these gains are reversed to significant price losses within 6 months. Strategic investors should be aware that these managerial decisions for parent firms are optimal, since we demonstrate a remarkable operating improvement within the two years following the ECOs. Finally, international policy makers can benefit from our findings, as we suggest that countries where regulators adopt more stringent protection of minority shareholders are associated with more successful corporate restructurings.

The rest of the paper is structured as follows: Section 2 presents the prior research on ECOs. Section 3 reports on the sample selection and the methodology employed. Section 4 presents the main empirical findings. Finally, section 5 concludes and offers avenues for future research.

2. Prior Research

2.1 Short-term reaction to ECO announcements

The investigation of the valuation effects of ECOs has attracted academic interest since the 1980s. The majority of prior studies have focused on the stock price reaction of parent firms to announcement dates. Two main hypotheses have been proposed to predict the impact of the announcement of ECOs on the parent company's stock price: the divestiture gains hypothesis and the asymmetric information hypothesis (Hogan and Olson, 2004). The former was developed by Schipper and Smith (1986) who, using a sample of 76 carve-out announcements, found that parent firm shareholders earn an average five-day excess return of 1.83%. The market reaction to this kind of stock sale is in stark contrast with the commonly-acknowledged negative reaction for seasoned equity offerings. Schipper and Smith (1986) attribute this positive market reaction to several reasons. First, a carve-out facilitates parental focus and enables the market to value a new entity that now has its own identity, which uncovers hidden value (Madura and Nixon, 2002). Second, carve-out transactions provide an opportunity for parent firms to raise money and invest in value-enhancing projects for the subsidiary. Third, the carve-out subsidiary is obliged to comply with stock exchange listing requirements; this results in more analyst coverage, more scrutiny and more information available to the public. Fourth, new market-based compensation contracts may require management to exert more effort to act in the best interests of shareholders to increase firm value (Prezas et al., 2000). In short, the divestiture gains hypothesis posits that parent firms sell the stock of their subsidiaries for three reasons: to raise funds for debt reduction, to finance investment activities and to distribute a dividend (Gleason et al., 2006).

The divestiture gains hypothesis has found empirical support from various studies such as Allen and McConnell (1998), who assert that an ECO is a way to raise funds by divesting subsidiary assets rather than selling the parent firm's securities. Since ECOs reduce the asset base under the parent managers' control, the positive market reaction of the parent firm is attributable to lower agency costs (Ghosh et al., 2012). However, if the funds raised in the IPO are kept

within the business rather than used to reduce debt, the potential restructuring benefits are largely cancelled out. Indeed, Allen and McConnell (1998) find that ECOs used to reduce debt induce significantly higher abnormal returns for parents than ECOs used for investment purposes. Lang et al. (1995) reach similar conclusions, as well as Frank and Harden (2001) who also lend support to the divestiture gains hypothesis as the main motive for conducting carve-outs.

Nanda (1991) explores how asymmetric information about the parent and the subsidiary's assets affects the choice between selling a part of the subsidiary's shares to the public (carve-outs) or issuing new equity (seasoned equity offerings). Deploying Myers and Majluf's (1984) framework to consider ECOs, Nanda (1991) contends that managers who believe that the parent firm is undervalued and the subsidiary overvalued will find it optimal to issue unseasoned equity in the subsidiary instead of issuing equity in the parent firm. Therefore, Nanda's asymmetric information hypothesis predicts a positive stock price reaction for parent firms on ECO announcements, while their subsidiaries suffer negative announcement-period returns (Hogan and Olson, 2004; Hulburt et al., 2002). In line with Nanda (1991), Slovin et al. (1995) also report that firms involved in ECOs experience significant positive abnormal returns on the announcement dates.

Powers (2003) presumes that some parents carve out subsidiaries to create a more efficient organization, a motive attributed to the efficiency rationale. This increased efficiency comes from many sources such as the access to capital markets, the unlocking of hidden value in parent firms or the improvement of managerial incentive contracts (Schipper and Smith, 1986). Powers (2003) also refers to the financing rationale as an alternative motive for carve-out transactions; that is, carve-outs are a way of generating cash through the sale of subsidiary shares to the public when subsidiaries are overvalued, which is consistent with the predictions of Nanda's (1991) asymmetric information model.

Benveniste et al. (2008) examine IPO market efficiency using a sample of ECOs offered during the period 1985-2005. They find that the average initial return of ECOs is 14% and is

significantly related to the parent's return over the book-building period, though not related to the parent's contemporaneous return. Finally, the authors claim that the pre-IPO price revision of ECOs cannot be predicted by the market-wide and firm-specific public information available at the time the initial filing range is set.

The focus of Otsubo's (2009) study is the gains associated with the combinations of carve-outs and each of the four subsequent events: M&A activity, secondary offerings, spin-offs, and reacquisitions. The study finds that these secondary events play a vital role in construing the potential market reactions to carve-out announcements. Using a sample of 201 carve-outs conducted by non-financial firms in the US, Otsubo (ibid) finds that the stock market reaction is favorable when the parent-subsidary relationship is preserved after a carve-out. However, the stock market reacts differently to parent companies and subsidiaries when secondary events are announced. Specifically, there is a stock price uptrend for the parent company if the secondary event is an M&A. This result indicates that the stock market reacts to the potential gains from the combination of carve-outs and M&A when the carve-outs are announced.

Using a sample of 222 ECOs from the US for the period 1986-2004, Desai et al. (2011) investigate the role played by the parent's motive in conducting a carve-out. They find that the probability and hazard of a carve-out acquisition increase when the parent's objective is to unlock the value of a subsidiary, and when the parent and the subsidiary are tied with a product-market relationship. Moreover, the authors find evidence that when the ECO operates in a hi-tech industry the likelihood of acquisition increases. In contrast, the likelihood of acquisition decreases when the parent ownership of the ECO is above 50% prior to the acquisition. Finally, their results reveal that the probability of reacquisition increases when the parent's motive is to unlock value, when the parent retains majority ownership in the post-IPO carve-out and when the parent and the subsidiary have established an ongoing product-market relationship.

Otsubo (2013) explores whether and how Japanese carve-outs enhance the wealth of their parent company shareholders by focusing on financing opportunities in carve-outs and testing the

parent financing hypothesis and the subsidiary financing hypothesis. The author finds that the stock price response of a parent company is positive to a carve-out and it is stronger when the parent company is highly leveraged. In addition, parent companies apparently use proceeds from carve-outs to lower their leverage and continue to do so for several years subsequently. This finding is consistent with the parent financing hypothesis.

A recent study by Prezas and Simonyan (2015) examines the announcement effects of 378 spin-offs and 4,192 sell-offs from 1980 to 2011 in the US, and finds that both groups of firms reap significantly positive announcement effects. The mean (median) cumulative abnormal returns (CARs) of spin-offs range from 3.18% (1.33%) to 4.81% (2.60%) and the mean (median) CARs of sell-offs range from 1.04% (0.21%) to 1.58% (0.42%), depending on the event window. Moreover, the authors report that spin-offs have significantly larger announcement effects than sell-offs. The differences in the mean (median) announcement effects of spin-offs and sell-offs range from 1.96% (0.96%) to 3.23% (2.18%) and are statistically significantly different from zero at the 1% level.

Based on the above propounded hypotheses, ECOs are perceived favorably by the market and, therefore, are expected to instigate a positive stock price reaction on announcement dates. Though the legal protection of minority shareholders has not been tested in association with ECOs, our study attempts to provide a direction for this relationship based on prior evidence on M&As. In particular, Rossi and Volpin (2004) demonstrate that takeover premiums are higher in countries with stronger shareholder protection by highlighting that the takeover premium measures target shareholder capital gains. They posit that the premium might be higher in countries with stronger shareholder protection because this reduces the cost of capital and, therefore, increases (potential) competition among bidders and the premium paid by the winning bidder. Moreover, they claim that dispersed ownership is more common in countries with higher shareholder protection. In turn, diluted ownership aggravates the free-rider problem in takeovers by coercing bidders into paying a higher takeover premium than they would otherwise (Grossman

and Hart, 1980). Following the above rationale, we expect ECO announcements to bring about a stronger market reaction in countries where shareholder protection is stronger.

2.2 Long-term performance following ECO announcements

Another strand of ECO literature focuses on long-term stock price and operating performance. Michaely and Shaw (1995), using 91 master limited partnerships that were issued to the public, find that riskier, more-leveraged and less-profitable firms opt for divesting through spin-offs rather than ECOs. Moreover, they find that the future operating and stock price performance of the carve-out parents is considerably better than that of the spin-off parents. Vijn (1999) investigates the long-term parent and subsidiary returns for 628 ECOs and finds that firms engaging in ECOs fare better than those engaging in IPOs during the three years subsequent to the transaction. On the other hand, Prezas et al. (2000) reveal that carve-out subsidiaries do not receive significantly higher buy-and-hold returns than those of matched IPOs.

Madura and Nixon (2002) provide evidence concerning the long-term performance of 88 ECOs that took place between 1988 and 1993. The authors measured the long-term performance following carve-outs using the buy-and-hold abnormal returns (BHARs) for the carved-out units for four time intervals of 6, 12, 24 and 36 months. The results show that the mean cumulative return for the parent firm relative to a matched firm's return is -39.6%; suggesting that, on average, the carve-outs do not enhance parent company shareholder value. Employing 181 ECOs, Powers (2003) documents positive cumulative excess returns for the first year subsequent to the carve-out through to year +3, but these are negative for years +4 and +5. In addition, Powers (ibid) reports that carve-out operating performance peaks at issue, declining significantly thereafter. He asserts that subsequent performance is poor when parents sell a larger portion of the shares. A negative relation is also detected between long-term excess returns and the percentage of shares sold.

Hogan and Olson (2004) examine the underpricing of ECOs from 1990 to 2000 and find a mean first-day return of 8.75%; however, this increases to 47.76% during the bubble period (1999-2000). They claim that carve-out subsidiaries are willing to accept underpricing and that underpricing is associated with the reputation of underwriters, analyst coverage before the offering, and the level of stock dilution. Finally, Gleason et al. (2006) assess the valuation effects and subsequent performance of those carve-outs that are reacquired. They find that reacquired subsidiaries perform considerably worse than those which are not reacquired. The authors also find that parents enjoy positive buy-and-hold returns when they fully reacquire subsidiaries, while they find negative buy-and-hold returns for those that partially reacquire subsidiaries. They conclude that the long-term performance following reacquisition is subject to the degree to which the parent reintegrates the subsidiary with its business. Thomson (2010) investigates the extent to which carve-out underpricing can be predicted based on information which is publicly available before the announcement and offer dates for a sample of 271 carve-outs and their parents during the period 1988–2006. He demonstrates that 11-35% of the variation in excess equity carve-out returns can be predicted using information made public prior to the offer date.

Thomson (2013a) examines the potential of long-term returns from 91 reacquired carve-outs (RACO) and their parents from 1980 to 2010. In line with Gleason et al. (2006), who anticipated that parent returns would be reduced, Thomson finds that 18-month returns and RACO parent three-year returns are both negative. Thompson (2013b) also investigates the influence of several ex-ante factors on the three-year market-adjusted returns of two-stage carve-out combinations from 1988 to 2006. He finds negative and significant three-year returns for carved-out subsidiaries.

Seistrajkova (2016) delves into the long-term performance of 225 ECOs in the US, selected according to whether the ex-subsidiary managers were awarded incentive stock options at the IPO date. She finds that carve-outs that did not award their executives with IPO options experienced a decline in stock market performance for three years following the IPO and a

decline in operating performance (i.e. return on assets) over the same three-year period. This stock price and operating performance decline is detected both relative to the firm's own performance prior to the IPO and to the performance of ECOs in which executives were awarded with IPO options.

2.3 Evidence from European ECOs

Elsas and Löffler (2001) are the first researchers to explore the wealth effects of ECO announcements in Europe. Specifically, their study focuses on the market reaction to 41 ECOs occurring between 1984 and 2004 in Germany in relation to the governance structure of the German firms participating in ECOs. The main finding is that a high degree of pre-event shareholder concentration or the existence of an ultimate owner of a firm elicits weak abnormal returns. The authors conclude that the governance structure does indeed affect firm valuation.

Fuchs (2003) analyzes German ECOs that took place between 1984 and 2002. His study mainly concerns both financial and efficiency issues as well as market-related hypotheses. The author finds a positive relation between a parent firm's capital constraint and the revenue flow to that firm. Wagner (2004) examines a parent firm's decision to create a new, publicly-traded company from a subsidiary unit using a hand-collected sample of 82 carve-out announcements in Germany between 1984 and 2002. The results show that parent-firm managers make use of the relative cost advantages of external financing and finance past investments through carve-outs. The evidence does not support the view that the carve-out decision is driven by market timing considerations. Furthermore, parent firms seem to alleviate internal conflicts through the restructuring. Finally, Wagner (2004) shows that the reduction in parent ownership is positively related to the value of the carve-out firm.

Pojezny (2006) investigates the short-term market reaction of 100 European ECOs over the period 1984-2004. The main finding is that ECO announcements bring about a share price appreciation on the announcement date. However, an immediate price reversal cancels out any

profits reaped on ECO announcement dates. Another objective of this study was to investigate the long-term performance of parents and subsidiaries. The author finds little evidence of positive abnormal operating performance in the second and third year following the ECO, casting doubt on the divestiture gains hypothesis, according to which the parent firm should experience an improvement in operating performance following the ECO. For subsidiaries, the author claims that growth continues to be positive in the two years following the ECO, indicating that part of the standalone gains may be permanent.

3. Data and Methodology

3.1 Sample selection

We collected the dates of equity carve-out announcements taking place in Europe between 1997 and 2011 from the Thomson One database². However, we extended our dataset up to 2013 in order to assess the long-term stock price and operating performance two years after the ECOs. To include the ECOs in our sample, we required the partial sale of subsidiary shares to the public (and the subsequent raising of money) where the parent firm maintains a controlling interest in the subsidiary. The announcement dates of the ECOs were cross-checked by searching the Lexis-Nexis newswire. Initially, we identified a sample of 83 ECOs that took place in Europe during the period under study. From this sample, we eliminated ECOs for which either parents or subsidiaries were joint venture firms. We also excluded those ECOs where stock prices for parent firms were not available. This process rendered a final sample of 60 ECOs, which is comparable with many prior studies³. Data on daily closing stock prices and fundamentals were gathered from Bloomberg.

² Searching the Thomson One database, we identified only one ECO occurring after 2011 in Europe and one in the US. Our investigation further suggests significant ECO activity only in Asia at this time.

³ Elsas and Löffler (2001) make use of 54 ECOs that took place in Germany from 1984 to 2004. Fuchs (2003) analyzes 40 German ECOs between 1984 and 2002. Wagner (2004) employs 82 ECOs from Germany between 1984 and 2002. Pojezny (2006) investigates the wealth effects of 100 European ECOs over the period 1984-2004.

Panel A of Table 1 presents the distribution of the 60 ECOs across the 14 years in question. In general, the ECOs are scattered over the years. However, the exception is the year 2000, which seems to have attracted the majority of ECOs (9 observations), leaving years 2001 and 2008 in second position with 7 deals each. Panel B displays the distribution of ECOs according to country of origin. The UK appears to be the market that most favors ECOs with 16 deals, followed by Germany with 9 transactions and Sweden with 8 transactions. Belgium and Denmark are the two countries where ECOs did not find fertile ground to flourish with only 1 transaction in each country. As a rule of thumb, we can say that the northern European countries (UK, Scandinavian countries, Germany) constitute the hub of equity carve-out transactions.

[Insert Table 1 here]

Table 2 reports the descriptive statistics for parent firms at the end of the year prior to the ECO transaction. Parents sell an average (median) of 26.90% (20.01%) of their ownership in the carve-out subsidiary. Compared with the mean percentage of shares sold (37.90%) in the US reported by Powers (2003), European parents seem more reluctant to dispose of a large part of their subsidiaries. Gross proceeds average €109.98 million which amounts to only 3.15% of parents' sales at the end of the fiscal year prior to the deal. Finally, parent firms have mean (median) total assets of €26.75 (€25.75) million and a mean (median) market value of €16.89 (€3.58) million.

[Insert Table 2 here]

3.2 Methodology

The main focus of the current paper is the analysis of the short- and long-term stock price reaction for parent firms following the announcement of ECOs. To gauge the market reaction we employ the classical event study methodology. The short-term valuation effects of ECOs are examined by computing excess returns over a period of 41 days surrounding the announcement date [-20, +20]. According to the efficient market hypothesis, all publicly-available information should instantly be reflected by stock prices, even privileged or inside information. Therefore, we expect that the corporate information emanating from ECOs should be absorbed instantaneously

by the market. To compute abnormal returns around the announcement of ECOs, we employ the market model. According to Brown and Warner (1985), the market model is a powerful and well-specified model under a variety of conditions. Using the market model for each day of the event window, we compute the abnormal return to be the difference between the actual ex-post return and the security's normal return as follows:

$$AR_{it} = R_{it} - (\hat{\alpha} + \hat{\beta} * R_{mt}) \quad (1)$$

where:

R_{it} is the raw return of each security on day t.

R_{mt} is the return on the market portfolio on day t, proxied by the general market index of each stock exchange.

α_i and β_i are the market model parameters estimated using 200 observations prior to the event date [-220, -21]. According to Bartholdy et al. (2009, p. 228), the standard estimation period is between 200 and 250 observations, i.e. about a year of trading prior to the event date.

We also calculate abnormal returns using the market-adjusted model which is defined as:

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

Following Agrawal et al. (1992), Cusatis et al. (1993), Gleason et al. (2006) and Madura and Nixon (2002), we investigate the long-term valuation effects of ECOs by deploying the buy-and-hold abnormal returns (BHAR) method. BHARs are computed for 6, 12, 18 and 24 months subsequent to the equity carve-out announcement month as the difference between the compounded actual return of the parent firm and the compounded return of the market:

$$BHAR_{it} = \prod_{t=0}^T [1 + R_{it}] - \prod_{t=0}^T [1 + R_{mt}] \quad (3)$$

where:

R_{it} is the time t arithmetic return (including dividends) on security i.

R_{mt} is the time t arithmetic return on the value-weighted market index.

To test the statistical significance of BHARs, we first compute t-statistics for the different normal return estimation procedures. Due to the employment of reference portfolios (market returns) to estimate normal returns, the distribution of long-term abnormal returns is positively skewed, which results in mis-specified t-statistics. For this reason, we calculate the skewness-adjusted t-statistic (Pastor-Llorca and Martin-Ugedo, 2004) as follows:

$$t_{Skewness-adjusted} = \sqrt{N} \left(S + \frac{1}{3} \hat{\gamma} S^2 + \frac{1}{6N} \hat{\gamma} \right) \quad (4)$$

where:

$$N \text{ is the number of events in the sample, } S = \frac{ABHAR_t}{[\sigma(BHAR_t)]},$$

$$\hat{\gamma} \text{ is the coefficient of skewness, estimated as } \sum_{i=1}^N = \frac{(BHAR_{i,t} - ABHAR_t)^3}{[N\sigma(BHAR_t)^3]},$$

$ABHAR_t$ and $\sigma(BHAR_t)$ are the sample mean and cross-sectional standard deviations of the buy-and-hold returns for the sample of N events.

To estimate the long-term operating performance of parent firms involved in ECOs, we analyze profitability ratios such as: return on assets (ROA), defined as net income scaled by total assets; return on equity (ROE), defined as net income scaled by total equity; and Tobin's Q which is the ratio of book value of debt plus the market value of equity divided by the book value of total assets. All variables are investigated from one year prior to two years after the ECO deal [-1, +2]. We define the year of ECO as year 0 and the time windows that are examined are [-1, 0], [-1, +1] and [-1, +2]. The statistical significance of mean and median differences in ratios is tested employing the two-tailed test and the non-parametric Wilcoxon/Mann-Whitney test respectively. According to Barber and Lyon (1996), the non-parametric test statistics are more powerful than parametric t-statistics for comparing two populations, especially when the normality assumption is questionable.

Another task of the current research is to gauge the short- and long-term stock price performance of the carved-out subsidiaries' IPOs. According to Thomadakis et al. (2012), one main problem with the long-term stock price performance of IPOs is the non-standard distribution of their returns. Barber and Lyon (1997) assert that many of the commonly-used methods to assess long-term returns are conceptually flawed and may lead to biased test statistics. They also contend that cumulative abnormal returns (CARs) are a biased predictor of long-term buy-and-hold abnormal returns, therefore they favor the use of buy-and-hold abnormal returns (BHARs) in tests designed to detect long-term abnormal returns. In addition, they suggest that the distribution of BHARs is positively skewed and does not have a zero mean.

Following Thomadakis et al. (2012), we measure the short- and long-term performance of subsidiaries' IPOs by using the raw returns and the excess or adjusted returns method. Based on the listing price of subsidiaries' IPOs, the returns are calculated by taking into consideration the following time points:

- i. The 1st trading day on the local stock exchange.
- ii. The 5th trading day on the local stock exchange.
- iii. The 10th trading day on the local stock exchange.
- iv. The one-month trading period on the local stock exchange (21st day of trading).
- v. The six-month trading period on the local stock exchange (126th day of trading).
- vi. The one-year trading period on the local stock exchange (250th day of trading).
- vii. The one-and-a-half year trading period on the local stock exchange (376th day of trading).
- viii. The two-year trading period on the local stock exchange (500th day of trading).

The raw returns are calculated as a percentage change of price that takes place between two time points. For example, the raw return of the 126th day of trading is calculated as:

$$\frac{(\text{Closing price on 126}^{\text{th}} \text{ day of trading}) - (\text{Closing price on 1}^{\text{st}} \text{ day of trading}) * 100}{\text{Closing price on 1}^{\text{st}} \text{ day of trading}} \quad (5)$$

In a similar vein, the raw returns of the 250th day, 376th day and 500th day of trading are calculated taking as a base of comparison the closing price on the 1st day of trading of new listings on the stock market.

Excess or adjusted returns are also computed in order to take into consideration market movements and trends. The adjusted return (AR) for firm *i* is defined as the raw return (RR) less the corresponding market return (MR) for the same time period used for the raw return calculation.

4. Empirical Results

4.1 Stock market reaction for parent firms

Table 3 presents the results for the short-term stock price reaction to the announcement of ECOs for parent firms on days -1, 0 and +1, as well as for various windows surrounding the announcement day (day 0), by employing the market model as well as the market-adjusted model. To save space, we discuss the results from the market model. The empirical results show that parent firms experience a statistically-positive abnormal return of 1.67% on the announcement day and a three (two) day CAR of 2.23% (2.01%), both statistically significant at the 1% level. We do not observe any abnormal stock price reaction prior to the announcement, implying that there is no information leakage that may lead to the exploitation of excess returns. Specifically, the mean CAR of 19 days prior to the event period (-20, -2) has a negative and non-significant value (-2.84%). On the other hand, the post-equity carve-out behavior of parents (+2, +20) shows a positive, though statistically non-significant, market reaction of 0.48%. On splitting the sample into two sub-periods, the pre-crisis (1997-2007) and the post-crisis (2008-2011) period, we observe that the AR of day 0 is 2.08% in the pre-crisis period and 0.62% in the post-crisis period. The difference in the market response on this date is statistically significant at the 5% level. Looking at the two-day CAR (-1, 0), this is equal to 2.64% during the first period and 0.43% during the second period. The difference of the mean two-day CAR between the two discrete

periods is statistically significant at the 1% level (Z -statistic = 3.47). The above results show that the global credit crunch adversely affected the abnormal returns of parent firms which were smaller in magnitude compared to the pre-crisis period. Though the small number of post-crisis carve-outs does not allow us to make unequivocal inferences, we can assert that the pecuniary benefits of ECOs for parents appear to shrink during periods of financial turmoil.

Overall, our empirical findings show that the announcement of ECOs conveys significant and valuable information to the market and to the shareholders of parent firms. These findings are in line with prior evidence conducted in the US. Specifically, Schipper and Smith (1986) find an excess return of 1.83%; Klein et al. (1991) 1.06%; Slovin et al. (1995) 1.23%; Michaely and Shaw (1995) 1.20%; Chemmanur and Paeglis (2000) 1.96%; Hulburt et al. (2002) 1.92%; Madura and Nixon (2002) 1.35%; Vijh (2002) 1.93%; and Otsubo (2013) 0.82%. An exception to this rule is the study of Gleason et al. (2006) which investigates a sample of parent firms that reacquired ECOs; the authors find a negative stock price response of -1.07% in the three-day period (-1, +1). Comparing our results with others found in Europe, we see that Wagner (2004) for his sample of 71 ECOs finds an abnormal return of 0.70% on day 0 and a CAR of 1.71% for the three-day event window centered on the event. Pojezny (2006) documents a two-day CAR (-1, 0) of 1.16% and a three-day CAR (-1, +1) of 0.99%. In sum, we can assert that the market applauds ECO announcements as long as these are associated with improvements in the company's efficiency through major corporate restructuring.

[Insert Table 3 here]

Our study analyzes whether the degree of protection for minority shareholders in each country affects the short-term market reaction to European ECOs. The protection of minority shareholders is assessed every year by the World Economic Forum's Global Competitiveness Report Index. The index ranges from 1 to 7, with higher values indicating more protection for

minority shareholder interests from the legal system. For example⁴, the index is 6.1 for Finland, 6 for Norway, 5.4 for Sweden, 5.4 for the UK, 5.3 for the Netherlands and 5.1 for the US. According to this report, some European countries (Finland, Norway, Sweden, the UK and the Netherlands, among others) experience higher protection of minority shareholder interests compared to other European countries, suggesting that these minority shareholder interests are better protected by the law and governance structures. We conjecture that the market reaction to ECO announcements will be higher in countries with stronger protection for minority shareholders. We base our assumption on Rossi and Volpin's (2004, p. 295) rationale, according to which shareholder protection has been found to reduce the cost of capital and reduce information asymmetry between all groups of shareholders (including minority ones). In a shareholder-friendly environment, the expropriation of minority shareholders is less likely to occur, thus ECOs are rewarded in countries that have adopted such governance structures.

To explore the market reaction to heterogeneous environments of minority shareholder protection, we split our ECO sample into two groups based on the mean index value. However, when partitioning the sample based on medians we end up with the same sub-samples. Panel A of Table 4 reports the results from the group of ECOs enjoying minority shareholder protection. We demonstrate a strong market response on day 0 of 2.08% (t-statistic = 3.22). The two-day CAR is 3.12%, while that of three days is 3.87%, both statistically significant at the 1% level. Turning to the sample of ECOs in countries with low-level minority shareholder protection (Panel B), we observe a weaker market reaction for all days surrounding the event date. Specifically, the two-day CAR is 0.52%, statistically non-significant, while that of three days is -0.04%. Panel C of Table 4 shows the statistical difference in market reaction between the two sub-samples. In particular, the differences in mean CARs for two and three days between the two sub-samples are statistically significant at the 1% level. These results corroborate our assumption that, in countries

⁴ Based on the Global Competitiveness Report Index 2015-2016 (<http://reports.weforum.org/global-competitiveness-report-2015-2016/competitiveness-rankings/>)

with high shareholder protection, market participants are more willing to pay a higher premium, thus provoking stock price appreciations. These results are in line with Cao et al. (2016) who find that greater investor protection in all types of takeovers, including leveraged buyouts (LBOs), positively affects the wealth gains emanating from the deal announcement. Betzer (2006) further affirms that strong corporate governance mechanisms are beneficial to target firms' shareholders at the event of an LBO. More recently, Dasilas et al. (2017) document a stronger market reaction to reverse takeover announcements in countries that offer high shareholder and investor protection as well as strong auditing and financial standards.

[Insert Table 4 here]

Apart from the substantial and growing body of literature that highlights the positive announcement effects of ECOs, there is also a branch of studies analyzing the long-term abnormal returns following ECOs. The analysis of long-term performance aims to accurately capture the total value created by corporate events such as ECOs. Though the long-term stock market performance of US carve-outs has been adequately investigated, very few studies on the long-term performance of European carve-outs have been conducted to date (Rüdisüli, 2005). Following previous studies that have assessed the long-term performance of parent firms following ECOs, we find that European parents fare poorly in the months subsequent to the carve-out (Table 5). Specifically, European parents earn negative buy-and-hold returns for all periods following the carve-out transaction; approximately -13.15% in the 6-month period afterward (significant at the 1% level) and -40.07% in the 24-month period after the transaction (significant at the 1% level). Surprisingly, the poor long-term stock performance of parents is more pronounced in the pre-crisis period rather in the post-crisis era. The mean buy-and-hold returns of two years following the ECO are -36.48% during the pre-crisis period and -30.92% during the post-crisis period. These results imply that the price reversal of the initial positive response to ECO announcements is more moderate for firms announcing the deal during the financial crisis. In other words, during economic crises the market discounts the positive effect of

corporate events such as carve-outs much earlier. Moreover, the poor long-term performance of parents enjoying high shareholder protection is more apparent at all post-ECO intervals. This result can be explained by the breakdown of market expectations that are formed in highly-protected shareholder environments that market participants will continuously reap capital gains from the separation of the subsidiary from the parent.

Overall, our results from the long-term parent stock performance are similar to the majority of US studies. For example, Madura and Nixon (2002) find buy-and-hold returns of -7.19% in year +1 and -12.97% by the end of year +2; while Gleason et al. (2006) show that parents undergo severe underperformance 12 (-23.19%) and 18 (25.65%) months after the ECO. Finally, in the European context, Pojezny (2006) finds a stock price reversal in year +1 that ranges between -1.1% and -7.3%, depending on the method used to gauge long-term stock price performance; moreover, in year +2, the stock price depreciation lies between -4.1% to -25.7%. Overall, the above results reveal a significant stock price reversal subsequent to ECOs which more than outweigh the short-term positive wealth gains during the announcement period.

[Insert Table 5 here]

4.2 Long-term operating performance for parent firms

Another task of our study is the investigation of the long-term operating performance of parent firms. To measure this, we employ ROA, ROE and Tobin's Q from one year prior [year -1] to two years after [year +2] the ECO year [year 0]. Table 6 reports the results from the ratio analysis. Looking at the ROE, we observe a substantial improvement after the ECO deal and beyond. Specifically, in year -1 the mean (median) ROE is 13.84% (5.93%) and increases to 21.31% (9.65%) in year 0, 28.04% (13.16%) in year +1, and peaks in year +2 at 32.67% (14.25%). The mean (median) differences in ROE from year -1 to the two post-event years are statistically significant at the 1% level. A similar upward trend is detected when analyzing ROA. The mean ROA is 4.44% one year prior to the deal and rises to 5.42% in the year of the event; it then rises to 9.17% and 10.18% in years +1 and +2. The mean differences between years -1 and

+1 and between years -1 and year +2 are statistically significant at the 1% level. Finally, the mean Tobin's Q shows a slight decline between years -1 and year +2, while median values are unaltered during the same intervals.

Collectively, the results from the long-term operating performance reveal that the decision of parent companies to dispose of some of their business units yields significant operating benefits for parent firms. In contrast with the deterioration of their stock prices two years after the ECO, parent firms experience a remarkable increase in their profitability as well as in the use of assets. One plausible explanation for this disparity between stock and operating performance is the phenomenon of market under-reaction commonly encountered in IPO studies when the listing takes place in periods where stocks are overvalued and a subsequent downward price adjustment follows the initial positive market sentiment.

[Insert Table 6 here]

4.3 Stock market reaction for subsidiaries

In this sub-section, we gauge the market behavior of the units carved-out in Europe. Considering the phenomenon of negative stub values, i.e. the equity market value of the parent being less than that of its equity holdings in the carved-out firm (Bayar et al., 2011), we analyze both the short- and long-term stock price behavior of subsidiary IPOs after the equity carve-out deal. The main difference between the conventional IPOs (new shares sold to the public for first time) and those of subsidiaries resulting from ECOs is that, in the latter case, parent firms continue to some extent to own a monitoring position in the subsidiary, selling a portion of the shares to existing parent-company shareholders. Therefore, it is intriguing to explore the IPO performance of these subsidiaries and compare them with those of classical IPOs. Table 7 presents both the raw and adjusted excess returns for various time points. Panel A shows the results for the raw returns. We observe that shareholders participating in subsidiary IPOs experience a mean initial return of 3.23% on the first trading day, which is statistically significant at the 5% level. This market reaction remains positive up to one month (21 trading days) following the IPO, though without

being statistically significant. Our findings are in line with those of Schipper and Smith (1986) who find a mean initial return of 4.9%, Vijh (1999) who documents an average initial return of 6.2% and Prezas et al. (2000) who report a mean initial-day return of 5.83%.

Looking at longer time intervals, we observe that in 6 months the raw returns turn negative (-1.12%), though not statistically significant. At 18 and 24 months following the IPO, the mean raw return is -19.08% and -23.57% respectively, both statistically significant. Similar results are obtained from adjusted or excess returns (Panel B). On the first day, we detect a statistically-significant initial mean abnormal return of 3.20%, and 6 months later the mean abnormal return takes a negative sign (-1.14%). In the following 18 and 24 months, the mean excess return is -14.35% and -23.45% respectively, both statistically significant. The long-term price behavior of carve-outs is similar to that found by Gleason et al. (2006), but in stark contrast with that of Prezas et al. (2000) and Vijh (1999), who argue that the newly-issued subsidiary stocks do not underperform appropriate benchmarks over a three-year period following carve-outs.

We further examine the short- and long-term stock price performance of IPOs based on the level of minority shareholder protection in the subsidiaries' country of origin. Surprisingly, we observe that both the short- and long-term market reaction is positive in countries where the level of protection is low. Specifically, on the first day the mean excess return is 4.62%, compared to 2.70% for the sample of high minority protection. Another distinct difference between the two sub-samples is the notable underperformance of IPOs in countries that better protect minority shareholders. Specifically, 24 months after the IPO the price reversal culminates, approximating -37% as measured by both raw and adjusted returns. In contrast, the good stock price performance of subsidiaries' IPOs continues to exist in the long-term; at 12 months the capital gains exceed 21%, while these gains appear to shrink thereafter.

As previously mentioned, a characteristic of ECOs is that parent firms continue to hold a significant share of the subsidiaries for some time following the IPO. However, some parent firms opt to sell off their stake in the subsidiaries one or more years after the IPO. To discern a

possible heterogeneous, long-term market reaction between subsidiaries with a more- or less-dispersed ownership structure, we consider parent stakeholdings in subsidiaries 12 months subsequent to IPOs. We define high-ownership IPOs as those where parent firms have a majority stakeholding (>50.01%) 12 months after the IPO and low-ownership IPOs as those where parent firms have a stakeholding of less than 50%. For this reason, we report the long-term stock price reaction for 12, 18 and 24 months subsequent to IPOs. The results reveal a greater long-term underperformance for the sample of low-ownership IPOs. Specifically, for the sample of low-ownership IPOs the mean (adjusted) raw return is -11.401% (-11.49%), -22.88% (-22.33%) and -24.13% (-24.02%) at 12, 18 and 24 months after the IPO respectively. Contrarily, high-ownership IPOs have a mean (adjusted) raw return of -5.98% (-5.76%), -13.56% (-13.58%) and -15.13% (-14.22%) at 12, 18 and 24 months after the IPO respectively. Various explanations have been propounded to explain the long-term underperformance of IPOs as surveyed by Ritter (2003). However, the divergence of opinion hypothesis of Morris (1996) is deemed the most plausible explanation of the price reversal of IPOs. The main premise of the divergence of opinion hypothesis is that, “In IPO markets, which feature severe short sales constraints, divergence of opinion among investors leads to inflated early aftermarket prices, and hence results in underperformance in the long run” (Gao et al., 2006, p. 128). In other words, after the initial stock price appreciation in the first days of trading, stock prices converge towards their real value over time as more information about the security becomes publicly available and the divergence of beliefs between investors decreases.

[Insert Table 7 here]

4.4 Regression analysis

To detect the factors that explain the short-term stock price reaction to ECO announcements for parents, we perform a pooled cross-sectional regression analysis since we have both cross-sectional and time-series data. We run regressions using OLS with White-corrected standard errors (White, 1980). As dependent variables we use either the mean announcement abnormal

returns on day 0 or the two-day CARs (-1, 0). Following prior studies (i.e., Allen and McConnell, 1998; Gleason et al. 2006; Madura and Nixon, 2002; Pojezny, 2006), we employ a gamut of control variables that capture firm-specific characteristics. Specifically, we consider informational asymmetry, as proxied by the standard deviation of the market model residuals in the estimation period (-221, -21). Prior studies (e.g. Krishnaswamy and Subramaniam, 1999; Pojezny, 2006) advocate that the level of pre-event informational asymmetry should be positively related to abnormal returns. The systematic risk (beta) computed in the estimation period (-221, -21) through the market model is also considered as a potential source of value gains in ECOs. We expect that higher levels of systematic risk have an adverse effect on abnormal returns. The Crisis dummy takes 1 for the period 1997-2007 and 0 for the period 2008-2011. Debt ratio is total debt scaled by total assets at the end of the fiscal year prior to the ECO. Size is computed as the natural logarithm of total sales of the parent firm at the end of the fiscal year prior to the carve-out. Minority is a dummy that takes 1 for the ECOs in countries with high protection of minority shareholder interests and 0 otherwise. The Majority control dummy equals 1 if a parent owns more than 50% of the subsidiary after the carve-out and 0 otherwise. Relatedness is a dummy that takes 1 if the parent and the subsidiary have the same two-digit SIC code and 0 otherwise. ROA is the ratio of net income to total assets at the end of the fiscal year prior to the ECO. Run-up is the cumulative parent firm return in the year before the equity carve-out announcement. Run-up captures whether a parent firm is over or undervalued before the ECO announcement. To identify the growth opportunities of parent firms prior to ECOs, we follow Otsubo (2013) and employ Tobin's Q, which is the ratio of the market value of equity plus the book value of debt divided by the book value of total assets at the end of the fiscal year prior to the ECO.

Table 8 displays the results of the regression analysis. The first two columns report regression results from the market model with abnormal and cumulative abnormal returns as the dependent variables. Columns 3 and 4 report results from the market-adjusted abnormal returns. The coefficient of the Crisis variable is positive and statistically significant when CARs are the

dependent variables (models 1 and 3). This result indicates that during the pre-crisis period abnormal returns on ECO announcements days were more positive than in the post-crisis period. This result corroborates earlier findings from the event study results. Minority is another variable that displays a statistically positive and significant coefficient in models 1 and 3, implying that carve-outs in countries with strong minority shareholder protection elicit higher abnormal returns on and around event dates. This is congruent with the event study results from the stock price reaction between ECO-hosting countries which provide high and low minority shareholder protection. Parent size exerts a significantly negative effect on abnormal returns in three out of the four models (i.e. 1, 2 and 4). Therefore, a 1% increase in total sales results in an approximate 0.01% decrease in abnormal returns around ECO announcement days. The size effect phenomenon, which is well known in finance literature, implies that smaller firms earn higher capital gains upon the announcement of pivotal corporate events such as ECOs.

The stock price performance of parent firms prior to the ECO announcement also appears to construe the market reaction on the event date. In fact, the coefficient of run-up is negative and statistically significant in all regressions, implying that parents with a more pronounced stock price run-up are less likely to gain from ECOs. Relatedness is another variable that explains the dependent variation in all regressions, which indicates that parents operating in the same industry as subsidiaries receive less-favorable abnormal returns on ECO announcement dates. The remaining variables are not significant.

[Insert Table 8 here]

To explain the stock price performance of parents subsequent to ECOs, we employ a pooled, cross-sectional regression analysis using OLS with White-corrected standard errors (White, 1980). We conduct four regression models where the dependent variable is the 6-month BHAR, the 12-month BHAR, the 18-month BHAR, and the 24-month BHAR respectively. Following prior studies (see Madura and Nixon, 2002; Pojezny, 2006), we utilize a gamut of independent variables that have been alleged to explain the variation in long-term performance. Specifically,

we use: Debt, defined as the ratio of total debt to total assets at the end of the fiscal year prior to the ECO; Size is the natural logarithm of total sales at the end of the fiscal year prior to the ECO; Divest is a dummy that takes 1 if 50% or more of the unit was divested and 0 otherwise; Relatedness is a dummy that takes 1 if the parent and the subsidiary have the same two-digit SIC code and 0 otherwise; ROA is the ratio of net income to total assets at the end of the fiscal year prior to the ECO; Tobin's Q is the market value of equity plus the book value of debt divided by the book value of total assets at the end of the fiscal year prior to the ECO; Current is the ratio of current assets to current liabilities at the end of the fiscal year prior to the ECO; and Minority is a dummy that takes 1 for ECOs in countries with high minority shareholder protection and 0 otherwise. The results are presented in Table 9.

The Debt variable is negative in all four models; however, it is significant only when 6-month BHARs are regressed, suggesting that the higher the pre-ECO debt level of parents the lower their stock price performance subsequent to ECOs. The parent size in the year prior to the ECO seems to positively affect BHARs in the 6-month period, but negatively thereafter. In particular, the pre-ECO debt level is a significant determinant of the long-term stock price behavior. Thus, a 1% increase in pre-ECO total sales results in a 0.26% decrease in the 24-month BHARs. Parent growth opportunities, as proxied by Tobin's Q, seem to negatively impact long-term performance in all four model specifications, though these are statistically significant only in the first three models. This result implies that the decision of firms with high pre-ECO growth opportunities to carve out subsidiaries is not greeted with enthusiasm by the market, at least in the first 18 months following the announcement. Further, parents operating in the same industry as their subsidiaries seem to reap higher long-term abnormal returns up to 18 months after the ECO transaction, compared to parents belonging to a different industry than that of their subsidiaries. This result refutes claims that the divestment of unrelated business brings about long-term benefits for corporations (e.g. Desai and Jain, 1999). Finally, profitability prior to the ECO positively affects the stock price behavior subsequent to the ECO, as shown in three out of the

four models. This result is congruent with Pojezny (2006), suggesting that high profitability levels lead to higher market values. In fact, one unit increase in ROA results in more than a 0.02% increase in BHARs. The remaining variables are not significant determinants of the long-term stock price performance of parents.

[Insert Table 9 here]

4.5 Robustness tests

We perform additional robustness tests to assess the validity of our findings. In Table 10 we report the results from regressions of CARs and ARs from both the market and market-adjusted models. We use alternate measures for debt, size, performance and growth opportunities. Specifically, we use leverage (defined as total debt scaled by total equity) instead of debt ratio. ROA is replaced by ROE (defined as net income scaled by total equity). Additionally, we estimate size using the logarithm of total assets instead of total sales. Finally, we approximate growth opportunities using the average sales growth over the three years prior to the ECO instead of Tobin's Q. The results are qualitatively similar to those reported in Table 8.

[Insert Table 10 here]

Table 11 presents robustness results from the long-term stock price performance of parent firms following the ECO. As before, we replace debt ratio with leverage (debt-to-equity ratio), ROA with ROE and size takes the logarithm of total assets instead of total sales. As in Table 9, debt levels prior to the ECO are negatively associated with parents' long-term performance two years following the announcement. The negative effect of leverage on BHARs is statistically significant in three out of the four models (1, 3 and 4). These results suggest that debt levels prior to the ECO have notably adverse effects on the post-ECO stock price performance of parent firms. Size has a positive and significant effect on the 6-month BHARs; however, this effect reverses to negative for 18 and 24-month BHARs. Contrary to common perception, carving out related units renders pecuniary benefits for parents, as shown by the positive and significant coefficient of the relatedness variable in the first three regressions. Profitability as measured by

ROE seems to favorably affect the parent's values in the long term, as shown by the strong coefficient in models 2, 3 and 4. Finally, the coefficient of Tobin's Q displays a negative sign for all regressions, though it is statistically significant only in the first regression. Overall, the above results are similar to those presented in Table 9.

[Insert Table 11 here]

5. Conclusions

The purpose of this paper is to examine the valuation effects produced by ECOs in Europe. Prior research, mainly concentrated on the US market, has revealed that parent firms carving out subsidiaries reap significant positive returns on the announcement date. However, these parent firms experience a significant market under-reaction over the next two years following the deal. Our study, using a sample of European ECOs, complements and further extends prior research on ECOs. When measuring the short-term response to the announcement of ECOs, we verify the commonly-accepted view that carve-outs produce significant appreciations for stock prices. However, we demonstrate that this market reaction is stronger in countries that have established stronger mechanisms for protecting minority shareholder interests. Additionally, we show that the market reaction to equity carve-out announcements is dependent on market conditions, as can be observed from the separation of our sample into the pre- and post-crisis periods.

Looking for the determinants of the abnormal market reaction surrounding ECOs, regression analysis shows that the main drivers are: the portion of units carved-out, the level of minority shareholder protection in countries accommodating ECOs, parent firm size and the separation of related business operations between parents and subsidiaries. Our results support the financing rationale used to explain carve-out decisions (Nanda, 1991); that is, parent firms exploit the opportunity to raise external equity capital and do not dilute much of their shareholder wealth when they are assumed to be undervalued and their subsidiaries overvalued. This rationale is verified by the negative coefficient of the run-up variable in our regression analysis. We also

provide evidence that carve-out IPOs induce positive abnormal returns on the first trading day which endures for one month.

We document significant stock price losses from 6 months to 24 months following the transaction. In particular, we find that parent firms experience negative buy-and-hold returns of -13.15% at 6 months, a loss which peaks after two years (-40.07%). Debt, size, profitability and growth opportunities prior to the ECO are found to affect the long-term stock price performance of parent firms. Moreover, the separation of units operating in the same industry with parents seems to explain much of their long-term stock price variation. Finally, we observe a remarkable improvement in the profitability levels of parent firms up to two years following the ECO.

The empirical findings of our study could be useful to companies, investors and policy-makers when taking a decision over whether to split business operations into independent entities. In particular, our results demonstrate that companies can benefit from divesting subsidiary assets rather than selling the firm's securities; this is reflected in the operating improvement of the post-ECO period. Moreover, market participants may increase their portfolio wealth by investing in parent firms and subsidiaries involved in an ECO, at least in the short run. The wealth is maximized in calm market conditions and when shareholder protection is high on the agenda of market regulators.

We also suggest that European ECOs appear to be a sub-optimal corporate decision for parent firms in the sense that, although they enjoy an instantaneous positive effect on stock prices and within a two-year period they experience considerable operating benefits, they also experience severe stock price losses within that same two-year period. Future research should focus on the reasons behind the unprecedented good operating performance of European carve-outs vis-à-vis the poor stock price behavior in the long run. In this way, an investigation of the long-term operating performance of subsidiaries could allow us to make the appropriate generalizations regarding the successfulness of corporate restructurings through ECOs. Moreover, it would also be interesting to test the extant conditions involved in the decision of European parent firms to

reacquire the carved-out units and investigate whether subsidiaries are involved in future cash injections through seasoned equity offerings. Finally, it could be important to investigate the reasons behind the deteriorated ECO activity in Europe and the US and the enhanced ECO activity in Asia.

Acknowledgements

The authors would like to thank two anonymous reviewers and the editor for their useful comments and suggestions which have considerably improved the paper.

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Table 1: Distribution of ECOs across years and countries

Panel A: Distribution by year		
	No	%
1997	1	2
1998	4	7
1999	5	8
2000	9	15
2001	7	12
2002	1	2
2003	2	3
2004	3	5
2005	1	2
2006	3	5
2007	6	10
2008	7	12
2009	1	2
2010	4	7
2011	6	10
Total	60	100
Panel B: Distribution by country of parent firm		
	No	%
Belgium	1	2

Denmark	1	2
Finland	2	3
France	5	8
Germany	9	15
Italy	3	5
Netherlands	2	3
Norway	6	10
Portugal	3	5
Spain	2	3
Sweden	8	13
Switzerland	2	3
United Kingdom	16	27
Total	60	100

Table 2: Descriptive statistics for parent firms

	Mean	Median	St. dev.	Max	Min
Ratio of deal value to parent's sales (%)	3.15	1.87	6.28	35.31	0.01
% of shares sold	26.90	20.01	26.31	100	0.17
Gross proceeds	109.89	98.87	5.56	156.70	27.59
Parent assets (in millions of euros)	26.75	25.75	5.91	354.86	3.77
Parent market value at announcement (in millions of euros)	16.89	3.58	29.42	127.54	1.00

Notes: The deal value of the carve-out is divided by the parent's sales in the year prior to the carve-out. Percentage of shares sold is defined as the total carve-out subsidiary shares sold in the carve-out. Gross proceeds are carve-out proceeds in millions of euros. Parent assets are total book value of assets in the year prior to the carve-out in millions of euros. Parent market value is estimated as the closing stock price multiplied by the number of shares outstanding at the announcement date in millions of euros.

Table 3: Announcement-period abnormal returns for parent firms around ECOs

Panel A: Full sample of ECO announcements

N = 60		<u>Market model</u>		<u>Market-adjusted model</u>	
Days	AR %	t-statistic	AR %	t-statistic	
-1	0.344	0.75	0.342	0.90	
0	1.670***	3.62	1.664***	2.82	
1	0.224	0.49	0.284	0.69	
Interval	CAR %	t-statistic	CAR%	t-statistic	
CAR (-1 0)	2.014***	3.09	2.006***	3.41	
CAR (-1 +1)	2.238***	2.80	2.290***	3.18	
CAR (-20 -2)	-2.849	-1.42	-2.924	-1.61	
CAR (+2 +20)	0.489	0.24	0.495	0.27	

Panel B: Pre-crisis sub-sample 1997-2007

N = 43		<u>Market model</u>		<u>Market-adjusted model</u>	
Days	AR %	t-statistic	AR %	t-statistic	
-1	0.555	1.00	0.551	1.36	
0	2.085***	3.74	2.068***	2.42	
1	-0.243	-0.44	-0.211	-0.24	
Interval	CAR %	t-statistic	CAR%	t-statistic	

CAR (-1 0)	2.640***	3.35	2.619***	3.53
CAR (-1 +1)	2.397**	2.48	2.408***	2.76
CAR (-20 -2)	-3.464	-1.43	-3.657	-1.59
CAR (+2 +20)	0.428	0.46	0.459	0.21

Panel C: Post-crisis sub-sample 2008-2011

N = 17	<u>Market model</u>		<u>Market-adjusted model</u>	
Days	AR %	t-statistic	AR %	t-statistic
-1	-0.189	-0.24	-0.220	-0.62
0	0.621	0.77	0.640*	1.70
1	1.406*	1.75	1.473	1.54
Interval	CAR %	t-statistic	CAR%	t-statistic
CAR (-1 0)	0.432	0.38	0.420	0.77
CAR (-1 +1)	1.838	1.32	1.867	1.44
CAR (-20 -2)	-1.325	-0.38	-1.366	-0.39
CAR (+2 +20)	0.489	0.32	0.475	0.26

Panel D: Differences between pre- and post-crisis periods

	<u>Market model</u>		<u>Market-adjusted model</u>	
	Differences %	p-value	Differences %	p-value
Day -1	0.745	0.364	0.772	0.221
Day 0	1.464*	0.053	1.428*	0.079
Day +1	-1.649*	0.053	-1.684	0.133
	Differences %	z-statistic	Differences %	z-statistic
CAR (-1 0)	2.208***	3.47	2.200***	3.32
CAR (-1 +1)	0.559	1.05	0.541	1.00
CAR (-20 -2)	-2.140***	-12.08	-2.291***	-12.18
CAR (+2 +20)	-0.061	-0.44	-0.016	-0.10

Notes: Day 0 is the announcement date. Abnormal returns (ARs) are calculated as the difference between realized returns and expected returns obtained from a least square regression over a pre-event period from -220 to -21 days prior to an equity carve-out announcement. Standardized cross-sectional t-statistics are in parentheses. *, **, *** denote statistical significance at the 10%, 5% and 1% level respectively.

Table 4: Protection of minority shareholder interests and ECOs

Panel A: High protection of minority shareholder interests					
N = 35		<u>Market model</u>		<u>Market-adjusted model</u>	
Days	AR %	t-statistic	AR %	t-statistic	
-1	1.033	1.59	0.952*	1.93	
0	2.088***	3.22	1.993**	2.14	
1	0.750	1.16	0.739	1.49	
Interval	CAR %	t-statistic	CAR%	t-statistic	
CAR (-1 0)	3.121***	3.41	2.945***	3.93	
CAR (-1 +1)	3.870***	3.45	3.684***	4.02	
CAR (-20 -2)	-2.583	-0.91	-2.535	-0.97	
CAR (+2 +20)	-1.395	-0.49	-1.206	-0.52	
Panel B: Low protection of minority shareholder interests					
N = 25		<u>Market model</u>		<u>Market-adjusted model</u>	
Days	AR %	t-statistic	AR %	t-statistic	
-1	-0.619	-1.07	-0.608	-1.15	
0	1.085*	1.88	1.129**	2.24	
1	-0.512	-0.89	-0.458	-0.71	
Interval	CAR %	t-statistic	CAR%	t-statistic	
CAR (-1 0)	0.465	0.57	0.521	0.84	
CAR (-1 +1)	-0.047	-0.01	0.064	0.30	
CAR (-20 -2)	-3.201	-1.27	-3.327	-1.39	
CAR (+2 +20)	3.128	1.24	2.801	1.21	
Panel C: Differences between high and low minority shareholder interests					
	<u>Market model</u>		<u>Market-adjusted model</u>		
	Differences %	p-value	Differences %	p-value	
Day -1	1.652*	0.025	1.560*	0.038	
Day 0	1.003	0.392	0.864	0.469	
Day +1	1.262	0.107	1.197	0.139	
	Differences %	z-statistic	Differences %	z-statistic	
CAR (-1 0)	2.656***	4.22	2.424***	3.72	
CAR (-1 +1)	3.917***	7.89	3.620***	7.08	
CAR (-20 -2)	0.618***	3.43	0.792***	4.19	
CAR (+2 +20)	-4.523***	-30.82	-4.007***	-25.46	

Notes: Day 0 is the announcement date. Abnormal returns (ARs) are calculated as the difference between realized returns and expected returns obtained from a least square regression over a pre-event period from -210 to -11 days prior to an equity carve-out announcement. Standardized cross-sectional t-statistics are in parentheses. The protection of minority shareholder index ranges from 1 to 7, with higher values indicating more protection of minority shareholder interests by the legal system. *, **, *** denote statistical significance at the 10%, 5% and 1% level respectively.

Table 5: Long-term performance of parent firms following ECOs

Panel A: Buy-and-hold returns up to 6, 12, 18 and 24 months after the equity carve-out transaction for the full sample

	Months (+1, +6)	Months (+1, +12)	Months (+1, +18)	Months (+1, +24)
BHAR %	-13.15	-23.01	-32.52	-40.07
t-statistic	-3.60***	-4.28***	-2.98***	-4.38***
% Positive BHAR	29.31	29.41	28.89	22.22
No. of observations	N = 58	N = 53	N = 45	N = 45

Panel B: Buy-and-hold returns up to 6, 12, 18 and 24 months after the equity carve-out transaction for the pre-crisis period (1997-2007)

	Months (+1, +6)	Months (+1, +12)	Months (+1, +18)	Months (+1, +24)
BHAR %	-13.89	-28.15	-39.41	-36.48
t-statistic	-3.06**	-3.18***	-4.05***	-3.96***
% Positive BHAR	27.50	28.95	25.00	26.47
No. of observations	N = 41	N = 38	N = 36	N = 36

Panel C: Buy-and-hold returns up to 6, 12, 18 and 24 months after the equity carve-out transaction for the post-crisis period (2008-2011)

	Months (+1, +6)	Months (+1, +12)	Months (+1, +18)	Months (+1, +24)
BHAR %	-9.54	-26.35	-29.53	-30.92
t-statistic	-1.55	-2.94***	-1.38	-2.66***
% Positive BHAR	35.29	26.67	33.33	11.11
No. of observations	N = 17	N = 15	N = 9	N = 9

Panel D: Buy-and-hold returns up to 6, 12, 18 and 24 months after the equity carve-out transaction for the high protection of minority shareholder interests

	Months (+1, +6)	Months (+1, +12)	Months (+1, +18)	Months (+1, +24)
BHAR %	-16.16	-24.09	-33.10	-37.37
t-statistic	-2.89***	-3.53***	-1.98**	-4.05***
% Positive BHAR	24.24	31.03	26.92	26.92
No. of observations	33	29	26	26

Panel E: Buy-and-hold returns up to 6, 12, 18 and 24 months after the equity carve-out transaction for the low protection of minority shareholder interests

	Months (+1, +6)	Months (+1, +12)	Months (+1, +18)	Months (+1, +24)
BHAR %	-9.33	-18.60	-20.80	-24.85
t-statistic	-2.23**	-2.48**	-2.12**	-3.02***
% Positive BHAR	36.00	28.57	35.29	18.75
No. of observations	25	21	17	16

Notes: Long-term abnormal returns are estimated using the buy-and-hold returns (BHARs). BHARs are calculated for 6, 12, 18 and 24 months subsequent to the equity carve-out announcement month as the difference between the compounded actual return of the parent firm and the compounded return of the market. *, **, *** denote statistical significance at the 10%, 5% and 1% level respectively.

Table 6: Mean and median profitability ratios for parent firms surrounding the ECO year

Panel A: Return on equity (ROE) surrounding equity carve-out years and periods									
Years	-1	0	1	2	Period	(-1. 0)	(0. 1)	(-1. +1)	(-1. +2)
Mean (%)	13.84	21.31	28.04	32.67	Mean change	7.47***	6.99***	14.46***	18.83***
					p-value	0.000	0.000	0.000	0.000
Median (%)	5.93	9.65	13.16	14.25	Median change	3.72***	3.51***	7.24***	8.32***
N	55	56	47	39	Wilcoxon p-value	0.005	0.020	0.016	0.000
Panel B: Return on assets (ROA) surrounding equity carve-out years and periods									
Years	-1	0	1	2	Period	(-1. 0)	(0. 1)	(-1. +1)	(-1. +2)
Mean (%)	4.44	5.42	9.17	10.18	Mean change	0.98	3.75***	4.73***	5.74***
					p-value	0.631	0.000	0.000	0.000
Median (%)	3.17	4.34	3.63	3.73	Median change	1.16	-0.70	0.46	0.56
N	56	57	49	39	Wilcoxon p-value	0.339	0.879	0.454	0.644
Panel C: Tobin's Q ratio surrounding equity carve-out years and periods									
Years	-1	0	1	2	Period	(-1. 0)	(0. 1)	(-1. +1)	(-1. +2)
Mean	1.80	1.68	1.55	1.44	Mean change	-0.12	-0.14	-0.26	-0.36*
					p-value	0.537	0.545	0.282	0.087
Median	1.38	1.36	1.38	1.33	Median change	-0.02	0.03	0.00	-0.05
N	54	54	53	51	Wilcoxon p-value	0.630	0.638	0.330	0.104

Notes: Return on equity ratio (ROE) is net income scaled by total equity. Return on assets ratio (ROA) is net income scaled by total assets. Tobin's Q is the market value of equity plus the book value of debt scaled by the book value of total assets. *, **, *** denote statistical significance at the 10%, 5% and 1% level respectively.

Table 7: Raw and adjusted returns (R) for subsidiary IPOs

Panel A: Raw Returns

	Full sample		High minority		Low minority		High ownership		Low ownership	
	Mean R %	t-statistic	Mean R %	t-statistic	Mean R %	t-statistic	Mean R %	t-statistic	Mean R %	t-statistic
1st day	3.236**	2.15	2.700*	1.89	4.629***	2.81				
5th day	0.987	0.35	-0.159	-0.04	3.967**	2.43				
10th day	1.516	0.51	0.357	0.09	4.529**	2.04				
1 month	0.008	0.01	-3.282	-0.76	8.233**	2.14				
6 months	-1.127	-0.18	-8.540	-1.16	15.922	1.54				
12 months	-8.784	-1.14	-23.302***	-3.01	21.705	1.61	-5.982	-0.58	-11.410	-0.97
18 months	-19.085*	-1.70	-24.483***	-2.93	7.092	0.34	-13.564	-0.86	-22.881	-1.45
24 months	-23.576**	-2.55	-36.775**	-2.09	5.823	0.28	-15.132	-1.12	-24.131**	-2.03

Panel B: Adjusted or excess returns

	Mean R %	t-statistic	Mean R %	t-statistic	Mean R %	t-statistic	Mean R %	t-statistic	Mean R %	t-statistic
1st day	3.201**	2.13	2.666*	1.88	4.594***	2.81				
5th day	0.989	0.35	-0.308	-0.08	4.361**	2.12				
10th day	1.150	0.40	0.293	0.07	3.377	1.48				
1 month	-0.531	-0.16	-3.208	-0.72	6.160*	1.77				
6 months	-1.144	-0.18	-8.368	-1.14	15.473	1.48				
12 months	-8.725	-1.14	-23.081***	-3.02	21.423	1.59	-5.769	-0.57	-11.496	-0.99
18 months	-14.359	-1.59	-23.402**	-2.15	7.825	0.38	-13.587	-0.82	-22.334**	-2.10
24 months	-23.456**	-1.97	-36.972***	-3.05	5.970	0.28	-14.224	-0.90	-24.025**	-2.49

Notes: The raw returns are calculated as a percentage change of price that takes place between two time points. Adjusted returns are calculated as the raw return less the corresponding market return for the same time period used for raw return calculation. ** and *denote statistical significance at the 5% and 10% level respectively.

Table 8: Regression analysis for parents' abnormal returns on ECO announcements

	Market model		Market-adjusted model	
	CAR (1)	AR (2)	CAR (3)	AR (4)
Intercept	0.056 (1.16)	0.063** (2.09)	0.052 (1.02)	0.050 (1.43)
Asymmetry	0.844 (1.17)	1.167** (2.24)	0.990 (1.32)	1.274** (2.37)
Beta	-0.035 (-1.48)	-0.017 (-1.30)	-0.032 (-1.29)	-0.018 (-1.33)
Crisis	0.046** (2.42)	0.013 (1.38)	0.042** (2.08)	0.017 (1.37)
Debt	0.001 (0.61)	0.001 (-0.66)	0.001 (0.36)	0.001 (-0.60)
Size	-0.017* (-1.76)	-0.015** (-2.26)	-0.015 (-1.49)	-0.013* (-1.67)
Minority	0.053** (2.43)	0.013 (0.91)	0.052** (2.23)	0.014 (0.96)
Majority	-0.027 (-1.17)	-0.004 (-0.29)	-0.030 (-1.25)	-0.002 (-0.15)
Relatedness	-0.029* (-1.66)	-0.024** (-2.26)	-0.033** (-1.80)	-0.025** (-2.05)
ROA	-0.001 (-0.18)	-0.001 (-0.51)	-0.001 (-0.31)	-0.001 (-0.72)
Run-up	-0.113** (-2.52)	-0.107** (-2.52)	-0.144*** (-2.62)	-0.110*** (-2.60)
Tobin's Q	0.002 (0.52)	0.001 (0.42)	0.003 (0.67)	0.001 (0.35)
Year effects	Yes	Yes	Yes	Yes
Adjusted-R ²	0.197	0.230	0.187	0.188
F-statistic	2.18**	2.44**	2.11**	2.12**
N	54	54	54	54

Notes: The dependent variable is either the mean average abnormal return on day 0 or the two-day CAR (-1, 0). Asymmetry is estimated by the standard deviation of the market model residuals. Beta is the systematic risk computed by the market model in the pre-event period (-221, -21). Crisis is a dummy that takes 1 for 1997-2007, and 0 for 2008-2011. Debt is the ratio of total debt to total assets at the end of the fiscal year prior to the ECO. Size is the natural logarithm of total sales at the end of the fiscal year prior to the ECO. Minority is a dummy that takes 1 for ECOs in countries with high protection of minority shareholder interests and 0 otherwise. Majority control dummy equals 1 if a parent owns more than 50% of the subsidiary after the carve-out and 0 otherwise. Relatedness is a dummy that takes 1 if the parent and the subsidiary have the same two-digit SIC code and 0 otherwise. ROA is the ratio of net income to total assets at the end of the fiscal year prior to the ECO. Parent run-up is the cumulative firm return in the year before the ECO announcement. Tobin's Q is the ratio of the market value of equity plus the book value of debt divided by the book value of total assets at the end of the fiscal year prior to the ECO. T-statistics are computed following White (1980) to adjust for heteroskedasticity and are in parentheses beneath coefficient estimates. *, **, *** denote statistical significance at the 10%, 5% and 1% level respectively.

Table 9: Regression analysis of parent BHARs following ECOs

	6M-BHAR (1)	12M-BHAR (2)	18M-BHAR (3)	24M-BHAR (4)
Intercept	-0.137 (-0.69)	-0.303 (-0.54)	0.693 (1.03)	0.901 (1.46)
Debt	-0.004* (-1.94)	-0.005 (-0.82)	-0.006 (-0.82)	-0.007 (-0.94)
Size	0.075* (1.82)	0.060 (0.57)	-0.213 (-1.40)	-0.263** (-2.02)
Divest	-0.113 (-1.23)	-0.239 (-1.13)	-0.024 (-0.09)	0.020 (0.08)
Relatedness	0.123* (1.67)	0.482** (2.20)	0.669** (2.03)	0.248 (0.82)
ROA	0.002 (0.33)	0.021** (2.45)	0.025** (2.37)	0.028*** (3.06)
Tobin's Q	-0.038*** (-2.90)	-0.098* (-1.72)	-0.139* (-1.66)	-0.097 (-1.37)
Current	-0.048 (-1.61)	-0.151 (-1.35)	-0.194 (-1.34)	-0.210 (-1.24)
Minority	0.007 (0.09)	0.041 (0.23)	-0.159 (-0.52)	-0.208 (-0.90)
Year effects	Yes	Yes	Yes	Yes
Adjusted-R ²	0.093	0.099	0.024	0.030
F-statistic	2.64***	2.63***	1.88*	1.86*
N	51	47	40	40

Notes: The dependent variable is: a) the 6-month BHAR (model 1), b) the 12-month BHAR (model 2), c) the 18-month BHAR (model 3) and d) the 24-month BHAR (model 4). Debt is the ratio of total debt to total assets at the end of the fiscal year prior to the ECO. Size is the natural logarithm of total sales at the end of the fiscal year prior to the ECO. Divest is an indicator variable taking 1 if 50% or more of the unit was divested and 0 otherwise. Relatedness is a dummy that takes 1 if the parent and the subsidiary have the same two-digit SIC code and 0 otherwise. ROA is the ratio of net income to total assets at the end of the fiscal year prior to the ECO. Tobin's Q is the ratio of the market value of equity plus the book value of debt divided by the book value of total assets at the end of the fiscal year prior to the ECO. Current is the ratio of current assets to current liabilities at the end of the fiscal year prior to the ECO. Minority is a dummy that takes 1 for ECOs in countries with high protection of minority shareholder interests and 0 otherwise. T-statistics are computed following White (1980) to adjust for heteroskedasticity and are in parentheses beneath coefficient estimates. *, **, *** denote statistical significance at the 10%, 5% and 1% level respectively.

Table 10: Additional regression analysis for parents' abnormal returns on ECO announcements

	Market model		Market-adjusted model	
	CAR (1)	AR (2)	CAR (3)	AR (4)
Intercept	0.098* (1.78)	0.060 (1.57)	0.077 (1.34)	0.045 (1.02)
Asymmetry	0.913 (1.22)	1.343*** (2.73)	1.158 (1.52)	1.427*** (2.84)
Beta	-0.031 (-1.30)	-0.016 (-1.22)	-0.031 (-1.27)	-0.019 (-1.36)
Crisis	0.042** (2.33)	0.013 (1.30)	0.038* (1.84)	0.018 (1.36)
Leverage	0.001 (0.28)	-0.001 (-1.65)	0.001 (-0.49)	-0.001 (-1.28)
Size	-0.023** (-1.99)	-0.016* (-1.88)	-0.017 (-1.54)	-0.013 (-1.37)
Minority	0.048** (2.38)	0.010 (0.70)	0.048** (2.39)	0.012 (0.85)
Majority	-0.024 (-1.04)	-0.002 (-0.12)	-0.023 (-0.98)	-0.001 (-0.03)
Relatedness	-0.026* (-1.66)	-0.021** (-2.02)	-0.030* (-1.74)	-0.022* (-1.80)
ROE	-0.001 (-0.33)	-0.001 (-0.75)	-0.001 (-0.80)	-0.001 (-0.95)
Run-up	-0.138** (-2.12)	-0.124** (-2.42)	-0.183*** (-2.59)	-0.131** (-2.52)
Growth	-0.001 (-0.83)	0.001 (0.09)	-0.001 (-0.45)	0.001 (0.01)
Year effects	Yes	Yes	Yes	Yes
Adjusted-R ²	0.225	0.280	0.223	0.235
F-statistic	2.40**	2.87***	2.38**	2.48**
N	54	54	54	54

Notes: The dependent variable is either the mean average abnormal return on day 0 or the two-day CAR (-1, 0). Asymmetry is estimated by the standard deviation of the market model residuals. Beta is the systematic risk computed by the market model in the pre-event period (-221, -21). Crisis is a dummy that takes 1 for 1997-2007, and 0 for 2008-2011. Leverage is the ratio of total debt to total equity at the end of the fiscal year prior to the ECO. Size is the natural logarithm of total assets at the end of the fiscal year prior to the ECO. Minority is a dummy that takes 1 for ECOs in countries with high protection of minority shareholder interests and 0 otherwise. Majority control dummy equals 1 if a parent owns more than 50% of the subsidiary after the carve-out and 0 otherwise. Relatedness is a dummy that takes 1 if the parent and the subsidiary have the same two-digit SIC code and 0 otherwise. ROE is the ratio of net income to total equity at the end of the fiscal year prior to the ECO. Parent run-up is the cumulative firm return in the year before the ECO announcement. Growth is the average sales growth over the last three years prior to the ECO. T-statistics are computed following White (1980) to adjust for heteroskedasticity and are in parentheses beneath coefficient estimates. *, **, *** denote statistical significance at the 10%, 5% and 1% level respectively.

Table 11: Additional regression analysis of parent BHARs following ECOs

	6M-BHAR (1)	12M-BHAR (2)	18M-BHAR (3)	24M-BHAR (4)
Intercept	-0.321 (-1.61)	-0.419 (-0.88)	0.967 (1.63)	0.846 (1.57)
Leverage	-0.001*** (-3.30)	-0.001 (-1.34)	-0.001*** (-3.09)	-0.001* (-1.87)
Size	0.080* (1.92)	0.031 (0.26)	-0.309* (-1.90)	-0.301** (-2.05)
Divest	-0.130 (-1.49)	-0.294 (-1.63)	-0.033 (-0.13)	-0.066 (-0.28)
Relatedness	0.140* (1.87)	0.486** (2.17)	0.703** (2.06)	0.258 (0.80)
ROE	0.001 (0.47)	0.005*** (3.87)	0.005** (2.16)	0.006*** (3.02)
Tobin's Q	-0.024* (-1.89)	-0.061 (-1.37)	-0.126 (-1.51)	-0.064 (-1.05)
Current	-0.036 (-1.52)	-0.086 (-0.90)	-0.107 (-0.88)	-0.109 (-0.70)
Minority	-0.001 (-0.01)	0.048 (0.27)	-0.293 (-1.17)	-0.210 (-0.89)
Year effects	Yes	Yes	Yes	Yes
Adjusted-R ²	0.110	0.091	0.038	0.064
F-statistic	1.77*	2.57**	1.98**	1.71*
N	51	47	40	40

Notes: The dependent variable is: a) the 6-month BHAR (model 1), b) the 12-month BHAR (model 2), c) the 18-month BHAR (model 3) and d) the 24-month BHAR (model 4). Leverage is the ratio of total debt to total equity at the end of the fiscal year prior to the ECO. Size is the natural logarithm of total assets at the end of the fiscal year prior to the ECO. Divest is an indicator variable taking 1 if 50% or more of the unit was divested and 0 otherwise. Relatedness is a dummy that takes 1 if the parent and the subsidiary have the same two-digit SIC code and 0 otherwise. ROE is the ratio of net income to total equity at the end of the fiscal year prior to the ECO. Tobin's Q is the ratio of book value of debt plus the market value of equity divided by the book value of total assets at the end of the fiscal year prior to the ECO. Current is the ratio of current assets to current liabilities at the end of the fiscal year prior to the ECO. Minority is a dummy that takes 1 for ECOs in countries with high protection of minority shareholder interests and 0 otherwise. T-statistics are computed following White (1980) to adjust for heteroskedasticity and are in parentheses beneath coefficient estimates. *, **, *** denote statistical significance at the 10%, 5% and 1% level, respectively.

Appendix

Description of the variables used

Variable Name	Variable Code	Description
Information asymmetry	Asymmetry	Standard deviation of the market model residuals.
Systematic risk	Beta	Calculated from the regression of firm's abnormal returns in the pre-event period (-221, -21).
Crisis	Crisis	A dummy that takes 1 for 1997-2007 and 0 for 2008-2011.
Debt	Debt	Total debt scaled by total assets at the end of the fiscal year prior to the ECO.
Parent firm size	Size	Logarithm of total sales (or assets) at the end of the fiscal year prior to the ECO.
Minority protection	Minority	A dummy that takes 1 for ECOs in countries with high protection of minority shareholder interests and 0 otherwise.
Majority control	Majority	A dummy that equals 1 if a parent owns more than 50% of the subsidiary after the carve-out and 0 otherwise.
Relatedness of parent and unit	Relatedness	A dummy that takes 1 if the parent and the subsidiary have the same two-digit SIC code and 0 otherwise.
Return on assets	ROA	Net income scaled by total assets at the end of the fiscal year prior to the ECO.
Parent run-up	Run-up	Cumulative parent firm return in the year before the ECO announcement.
Growth Opportunities	Tobin's Q	Market value of equity plus the book value of debt scaled by the book value of total assets at the end of the fiscal year prior to the ECO.
Unit divested	Divest	A dummy that takes 1 if 50% or more of the unit was divested and 0 otherwise.
Current ratio	Current	Current assets scaled by current liabilities at the end of the fiscal year prior to the ECO.
Leverage	Leverage	Total debt scaled by total equity at the end of the fiscal year prior to the ECO.
Return on equity	ROE	Net income scaled by total equity at the end of the fiscal year prior to the ECO.
Sales growth	Growth	Average sales growth over the last three years prior to the ECO.