

Partial Price Adjustments and Equity Carve-Outs

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We examine the extent to which market-adjusted ex-date returns reflect public information for 271 equity carve-outs in 1988-2006. Although prior studies focus on ex-post determinants of equity carve-out and IPO returns, our study is the first to explore ex-ante predictors of equity carve-out returns. We use three primary variables: filing range adjustments, the percentage of the offering used to retire subsidiary debt or to pay dividends, and the CBOE Volatility Index (VXO) to predict initial returns. We show that 11%-35% of the variation in market-adjusted equity carve-out returns can be predicted using public information known prior to the offer date.

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1. Introduction

Although prior studies focus on ex-post determinants of equity carve-out and IPO returns, our study is the first to explore ex-ante predictors of equity carve-out returns. The implications are that models with public information lessen the need for models that rely on information asymmetry. Extending the IPO study of Bradley and Jordan (2002) that excluded carve-outs, we include equity carve-outs and show that 11%-35% of the variation in market-adjusted equity carve-out initial returns can be predicted using public information known prior to the offer date such as investment banker reputation, percentage to be retained by parents, option index volatility, and movement due to partial price adjustment. Also, we observe that the CBOE Volatility Index (VXO) has predictive power for carve-out returns.

We investigate the extent to which carve-out (partial IPO) underpricing can be predicted based on public information available before the announcement and offer dates for a sample of 271 carve-outs and their parents during the period 1988-2006. We focus on three variables. Two variables, filing range adjustments and option market volatility, have not been applied to equity carve-outs. The study of filing range adjustments for IPOs starts with Ritter (1991). Bradley and Jordan (2002) extend the literature by examining changes in IPO filing ranges from the initial filing to the final filing and to the offering price. We find that the filing range adjustments are highly significant for carve-out initial returns. We observe that the CBOE Volatility Index (VXO), used to measure the volatility of S&P 100 Index options (OEX), is a highly significant predictor for parent and subsidiary market-adjusted carve-out initial returns.

A third variable, the portion of offering proceeds used to retire debt, is significant for subsidiary ex-date returns. In addition, to preclude possible model mis-specification, we test many variables found in previous carve-out and IPO studies. We conclude that several variables available prior to an equity carve-out can predict underpricing.

2. Background

2.1 Carve-outs

Equity carve-outs are partial IPOs in which parents sell no more than two-thirds of their ownership in wholly owned subsidiaries. Additionally, carve-outs are limited to 20% of the subsidiaries' ownership (80% retention by the parents) if parent companies desire to conduct complete divestitures via a tax-free spin-off (26 US Code Section 355). In some cases, the financial press incorrectly uses the term "spin-off" to include equity carve-outs. However, the finance literature defines spin-offs as pro-rata distributions of subsidiaries to parent shareholders (Schipper and Smith, 1983; Desai and Jain, 1999). In spin-offs, no funds are transferred. We follow Schipper and Smith (1986) and Vijh (1999, 2002) and maintain that carve-outs are partial IPOs and that spin-offs are complete distributions similar to stock dividends.

Carve-outs imply lower risk than typical IPOs due to larger offering size (Vijh, 1999) and reduced information asymmetry because the former subsidiaries are reported as part of existing firms (Schipper and Smith, 1986). In the carve-out announcement period, Vijh (2002) reports that pure carve-outs have lower parent company announcement period returns and lower subsidiary initial period returns than IPOs.

Schipper and Smith (1986) mention that subsidiaries and parents benefit from carve-outs in many ways. First, the subsidiary can obtain separate financing for its own growth opportunities. Next, the newly traded company provides increased disclosure of information, which reduces uncertainty. Also, subsidiary managers can be motivated to increase shareholder wealth and their own, as well, if awarded shares through stock ownership plans.

The carve-out phase generates cash that can be used to retire debt, increase cash for investment, or cash-out insiders. In addition, the carve-out phase of the two-stage combination creates a market for the new subsidiary's stock prior to a spin-off or other second divestiture and

provides more corporate information from additional analyst coverage (Schipper and Smith, 1986). Also, carve-outs allow parents to showcase their subsidiaries to prospective buyers (Klein, Rosenfeld, and Beranek, 1991). The low percentage of secondary shares for carve-outs reflects that insiders prefer to hold the shares to be spun-off (or otherwise divested) and then benefit from the potential market price increases (Leland and Pyle, 1977; Loughran and Ritter, 2002). This creates an overhang of future share sales.

Given the continued partial parent ownership and the implied lower risk, we can anticipate different results from those found for regular IPOs. Reflecting the implied safety as a subsidiary and with larger offering sizes, equity carve-outs should have lower initial returns than pure IPOs. Similar to IPOs, market prices do not exist for carve-outs prior to the initial offering. However, parent market prices reflect information on the combined firms' value (Prezas, Tarimcilar, and Vasudevan, 2000). We examine specific hypotheses for carve-outs below.

2.2 Partial price adjustment hypothesis

Hanley (1993) notes that the initial prospectus expected price range must reflect a "bona fide estimate" of the final offering price per SEC Regulation S-K (17 Code of Federal Regulations Section 229) and that this range depicts the lowest acceptable price from the issuer and the highest offering price that the investment banker predicts will clear the market. Thus, Hanley validates the Benveniste and Spindt (1989) theory that due to a partial adjustment of offering prices, IPO offering prices that are above the initial filing price range contribute to underpricing. Since this range should be the best credible offer for the issuer, prices within this range demonstrate that all information is reflected in the offering price. Also, if offering prices are within the initial filing range, there should be low underpricing.

However, if there is an excess pre-offering demand, investment bankers can increase the price range with an amended filing. This creates a challenge for the investment bankers in that

they must sell all offering shares to maintain the underwriter's reputation. Thus, the price must be high enough to meet increased demand and to appease the issuer, but low enough to entice buyers with a potential price increase. This partial adjustment creates underpricing as the issuer leaves money on the table. Bradley and Jordan (2002) expand the partial price adjustment analysis to include changes in filing range from initial filing through final filing to the offer price. This study examines the impact of the adjusted filing mid-points and partial price adjustments on carve-out offerings.

2.3 *Overhang hypothesis*

Carve-out companies sell no more than two-thirds of their ownership at initial offerings. Thus, overhang, unsold subsidiary shares divided by the shares sold, could be related to underpricing, as defined as the percentage change in price from the initial offering price to the first closing price. However, only the shares from the offering are underpriced. The subsidiary shares retained by parent company insiders reflect their market value. Thus, for a given level of underpricing, share dilution declines as overhang increases (Bradley and Jordan, 2002). Overhang is defined by Bradley and Jordan (2002) as:

$$\text{overhang} = \text{subsidiary shares retained} / \text{primary shares sold}. \quad (1)$$

Using the percentage of the subsidiary shares retained by the parent (% retained), an equivalent definition of overhang is:

$$\text{overhang} = \% \text{ retained} / (1 - \% \text{ retained}). \quad (2)$$

In their prospect theory, Loughran and Ritter (2002) show that insiders receive a wealth increase despite the underpricing that caused the dilution of share values. If the offering is large relative to the pre-issue shares outstanding, the dollar loss due to underpricing and dilution will exceed the wealth increase for non-selling shareholders. Given that equity carve-out parents retain at least one-third ownership (with a mean of 70%), overhang can be 0.50 or greater. With

the Sarbanes-Oxley Act of 2002, parents will most likely retain at least 50% share ownership and the overhang is one or greater.¹ Loughran and Ritter (2002) suggest two reasons for overhang. First, there could be a scarcity premium for firms that sell a small fraction of the company to the public. This is especially true for companies that plan to spin off their subsidiaries. In this case, the parent must retain at least 80% ownership to effect a tax-free dividend (26 US Code, Section 355). Thus, it is most likely that equity carve-outs generate wealth increases for non-selling shareholders. A second reason is that there could be an optimal amount of capital to be raised in an IPO.

2.4 Investment banker reputation

Prestigious underwriters can help their clients successfully complete the process and maximize wealth. Carter and Manaster (1990) develop investment banker reputation rankings that are based on the underwriters' relative order on the prospectus (tombstone). This study adapts the Loughran and Ritter (2004) revised investment banker reputation ratings that range from a low of 1.0 to a high of 9.1. These ratings account for penny stock IPOs that are avoided by prestigious investment bankers.

Welch (1989) finds that prestigious underwriters use their reputation capital to certify or signal high quality issues. Thus, returns should vary inversely with investment banker reputation. However, Beatty and Welch (1996) show that underwriter reputation varies inversely with returns before 1990 and with returns after 1990. They find that after 1990 for IPOs, investment bankers redeem (cash in) their reputation to take more risk and avoid the possibility of missing a hot IPO issue such as another Microsoft.² Thompson and Apilado (2006) show that carve-outs

¹ Sarbanes-Oxley and the implementation of the SEC regulations require a parent to retain a 50% or greater ownership to retain control of a subsidiary. With less than 50% ownership, parents must cede majority board membership for the subsidiary.

² Loughran and Ritter (2004) mention that Beatty and Welch (1996) offer no explanation for the reversal in the 1990s.

followed by spin-offs have negative investment banker coefficients before and after 1990 and the underwriters for these large partial IPOs retain their reputation.

2.5 Managerial discretion hypothesis

In the managerial discretion hypothesis of Allen and McConnell (1998), they propose that corporations initiate carve-outs due to their high levels of leverage or operational troubles and find that stock returns increase with the percentage of issuer proceeds paid to creditors and decrease with the percentage retained by the issuer. A contrary position, according to Mikkelson and Partch (1986), is that returns vary with the percentage of the offering retained by the issuer. As noted by Schipper and Smith (1986), companies that use carve-out funds for positive net present value projects can have high returns. As robustness checks, we test the managerial discretion, partial price adjustment, investment banker reputation, and overhang hypotheses in the Section 4.3 sensitivity analysis.

3. Sample selection and data

To be included in this study, a carve-out has to meet three initial criteria. First, we adopt *Mergers and Acquisition Magazine's* definition of a carve-out that the parent must retain one-third or more ownership in the subsidiary after the carve-out. For the 1990 and prior period, we examine new releases for initial public offerings of subsidiaries. For the post-1990 period, *Mergers and Acquisition Magazine* provides a list of carve-outs each year. From these sources and after adjusting for divestiture IPOs, there are 333 carve-outs with an offering price of \$5 or better from 1988 to 2006.³ Second, to preclude the confounding effects of joint ownership, we eliminate six subsidiaries with more than one parent. Third, we eliminate 56 private or foreign parents that did not trade on the NYSE, Amex, or Nasdaq (over-the-counter). This provides a sample of 271 carve-outs.

³ We exclude divestiture IPOs because parent companies retain less than one-third of the subsidiaries' shares and there is no second event.

We cross check all carve-outs with *Lexis-Nexis*, *the Investment Dealer's Digest*, *Standard and Poor's Dividend Record*, *Mergent Dividend Record* (formerly *Moody's*), *Mergent Industrial Manual* (formerly *Moody's*), and the *Dow Jones News Service*. *Compustat* and *Mergent* provide operating data including book values of equity and debt. SEC filings and news articles provide additional information for the sample.

Consistent with Bradley and Jordan (2002) and Loughran and Ritter (2002), the carve-out subsidiary ex-date return is the offering price to first-day closing price (first-day return). *Thomson Datastream* and the Center for Research in Security Prices (CRSP) provide stock return data. Similar to Ritter (1991) and Vijh (2002), we subtract CRSP equal-weighted index results (to include distributions) from carve-outs stock returns to obtain market-adjusted returns. Ritter (2007) provides investment banker reputation rankings.

4. Empirical analysis and initial results

4.1 Summary statistics

Tables 1 and 2 show descriptive statistics for the sample. Table 1 provides summary statistics. Panel A shows the number of carve-outs by carve-out year, the fraction of the subsidiary's ownership retained by the parent, and mean and median offering proceeds. For the 271 carve-outs and parent companies from 1988 to 2006, the percent of subsidiary ownership retained ranges from 36% to 98%, with a mean of 73% and a median of 80%. This is similar to the Allen and McConnell (1998) mean (median) of 69% (80%) and the Vijh (2002) median of 71.9%.

(Insert Table 1 about here)

The mean and median gross offering proceeds for this study are \$336.32 million and \$90.00 million, respectively. Pure IPOs for a similar period have a mean offering size of \$92.32 million (Ritter, 2007). With a mean carve-out offering size over three times greater than the av-

erage IPO, it is no surprise that many carve-outs, such as Kraft Foods, have set records for offering size. Since several carve-outs are the largest IPOs, there can be an upward limit on the amount that can be sold in an offering. Given that approximately 20-25% of the shares of subsidiaries are sold in the carve-out offering, the market capitalization of these partial IPOs can be four or five times the offering size. Thus, the percentage of the offering retained by parents is an important variable.

Panel B reports the parent company leverage (long-term debt to market capitalization) prior to the carve-out, the ratio of carve-out proceeds to parent market capitalization prior to the carve-out announcement, and the proportion of funds used to retire debt. The mean (median) leverage (long-term debt to equity market value) of 226.94% (26.14%) contrasts with the Allen and McConnell (1998) sample mean (median) of 20.36% (19.09%).⁴ Thus, our sample companies are more highly leveraged than the previous study. This study's mean (median) ratio of carve-out proceeds to parent market capitalization of 0.2317 (0.0742) compares with the Vijh (2002) median of .079. The mean (median) proportion of proceeds used to retire debt or to pay dividends is 36.26% (17.65%).

Panel C provides three calendar day periods: between the initial filing (Form S-1) to the first filing range adjustment, the period from the first filing range adjustment to the final filing range adjustment before the pricing, and from the final adjustment to the offering price. The periods precede the subsidiary's trading in the secondary market (Bradley and Jordan, 2002). We observe that the average timeframe from the initial filing to the first filing range adjustment is 28.71 days. The period from the first price range to the first filing range adjustment (UP1 or DW1) averages 18.59 days. However, the zero medians for both timeframes indicate that the ma-

⁴ The higher mean leverage for our study reflects that one-third of the companies have 50% or greater leverage. If we remove the ten highest leveraged or the most recent ten companies, the mean leverage remains over 150%.

majority of firms provide a pricing range with the initial filing. Since the expected price range must reflect a bona fide estimate of the final offering price, many offerings must change their price ranges either up or down. The mean (median) period from the last filing range adjustment to the offering price is 39.14 (29) days. Thus, the filing range adjustments occur approximately 30 days prior to the official offering price (shown on SEC Form 424B) and the subsequent trading in the secondary market.

Table 2 shows the two-digit SIC codes for the parent and subsidiary industries represented. The largest number of subsidiary firms is SIC 73 (Business services) with 45 companies. SIC 38 (Instruments and related products) is second with 20 firms. Thus, similar to the findings of Eberhart and Siddique (2002) for seasoned equity offerings, no single industry dominates the sample of 271 companies.

(Insert Table 2 about here)

4.2 Subsidiary single variable regressions

Table 3 provides results for subsidiary single variable regression for the non-bubble period (1988-1998 and 2001-2006) in column 1, the bubble period (1999-2000) in column 2, and the full period (1988-2006) in column 3. We use the variables detailed below to develop our multiple regressions. As a robustness check we isolate bubble period (1999-2000), non-bubble period (1988-1998 & 2001-2006), and total period results (1988-2006). Similar to Johnston and Madura (2009), we use a dummy variable for the bubble period. The variables detailed below are statistically significant and maintain their expected coefficient sign. From these variables, we construct our cross-sectional tests for stock return multiple regressions.⁵

(Insert Table 3 about here)

⁵ We examine leverage and log of offering size variables, but we find them to be statistically insignificant in the event phase. Also, we observe that the investment banker reputation parameter is statistically insignificant during the single variable regressions, but is marginally significant during the multiple regressions

4.2.1 Percentage retained by parents

Loughran and Ritter (2004) show that returns can vary positively with the percentage of ownership retained (% retained). We observe that the % retained coefficient is positive and marginally significant for the bubble period (Table 3, column 2) and the full period (Table 3, column 3). Thus, market-adjusted returns vary with the % retained parameter. Results are influenced by the bubble period.

4.2.2 Proportion of proceeds used for debt reduction

Allen and McConnell (1998) find that carve-out returns vary with the proportion of proceeds used to retire subsidiary debt or to pay dividends from the total offering proceeds (DEBT). Contrary to Allen and McConnell (1998), the bubble period and the full period negative DEBT coefficients are significant at the 5% and 10% levels, respectively. The bubble period influences the full period factor results.

4.2.3 Market volatility

The CBOE Volatility Index (VXO) represents the implied volatility of S&P 100 Index options. The VXO predicts future index returns and represents market ebullience and the potential for future public offerings. A high (low) VXO indicates high (low) levels for public offerings. These results support Dennis, Mayhew, and Stivers (2006) who show that the S&P 100 Index options and the CBOE Volatility Index predict stock returns. For subsidiaries, the VXO parameter is marginally significant and is negative for bubble period returns (Table 3, column 2) and positive and significant at the 1% level for full period returns (Table 3, column 3). Surprisingly, the bubble period results imply lower risk, but the full period results indicate the expected higher risk for subsidiaries.⁶

⁶ The VXO index is used in lieu of the VIX, the CBOE Volatility Index for S&P 500 options, to retain the companies for the 1988 and 1989 period.

4.2.4 Partial price adjustment

Extending the Hanley (1993) study, Bradley and Jordan (2002) and Loughran and Ritter (2002) show that the timing of the increase or decrease of the filing range influences the underpricing. The Bradley and Jordan (2002) measures for increases and decreases of initial filing ranges are UP1 and DW1. UP1 (DW1) is the percentage difference between the original midrange file price and the amended midrange file price for those companies that amend their file range up (down), zero otherwise. We define the variables as:

$$UP1 = \max [0, (\text{midpoint amended} - \text{midpoint original}) / \text{midpoint original}] * 100\% \quad , \quad (3)$$

$$DW1 = \min [0, (\text{midpoint amended} - \text{midpoint original}) / \text{midpoint original}] * 100\% \quad , \quad (4)$$

where amended and original reflect the original and final amended file ranges. These two variables allow for the possibility of an asymmetric effect from file range increases or decreases. UP1 is negative and significant at the 5% level for parent ex-date full period returns (Table 3, column 4). For parent ex-date returns DW1 is positive and significant for the non-bubble period (Table 3, column 2) and the full period (Table 3, column 4) at the 1% and 10% levels, respectively. The inverse (positive) relation between parent stock returns and the UP1 (DW1) variable warrants further explanation. Assuming there are no other variables affecting the parent company return, the loss of parent market capitalization from the carve-out is mitigated somewhat by the increase in the parent's ownership share in the subsidiary. This relation is shown by:

$$\% \text{ change in ownership value} = (\text{overhang}) * (\text{ratio of offering price to parent market capitalization before the carve-out}) * (\% \text{ change in subsidiary value}) - (\text{ratio of offering price to parent market capitalization before the carve-out}). \quad (5)$$

From equation 2, overhang is $\% \text{ retained} / (1 - \% \text{ retained})$. For our total period sample the mean overhang is 2.70 (0.73 / 0.27) (Table 1, Panel A); the ratio of offering price to parent market capitalization before the carve-out is 0.2317 (Table 1, Panel B); and the change in subsidiary value is 0.1898 (Table 3, column 3). Without a change in parent stock price, the resulting change in parent company value is -11.28%. However, parent returns average 1.70% for the total

period, which indicates that investor anticipation of future returns reduces these possible losses by almost 10%.

Next, two variables capture possible asymmetric effects between the final file range and the final offering price. UP2 (DW2) is the percentage difference between the final midrange file price and the final offer price for the companies that have offer prices above (below) the amended midrange file price, zero otherwise.

In Table 3, UP1 is positive for the non-bubble period (column 1), bubble period (column 2), and full period (column 3) and is significant at the 5% level or greater. DW1 is positive and significant at the 5% level for the non-bubble period (column 1) and the full period (column 3). The UP1 and DW1 results differ slightly from the Bradley and Jordan (2002) IPO findings, who found that positive UP1 coefficients were over three times the DW1 coefficients. Our UP1 parameters are less than the DW1 parameters and reflect lower risk for equity carve-outs than for pure IPOs. For subsidiary ex-date returns, UP2 and DW2 are positive and significant at the 1% level for all periods. These results are consistent with Bradley and Jordan (2002).

4.2.5 Overhang

Bradley and Jordan (2002) show that overhang, the ratio of subsidiary shares retained to shares sold in the offering, provides a positive signal for investors and later benefits from the subsidiary's price appreciation. We observe that the overhang variable is statistically insignificant for all periods. In Table 3, the log (overhang) coefficient is positive and marginally significant for the bubble period (column 2) and the full period (column 3). This implies that, consistent with Bradley and Jordan (2002), market-adjusted returns vary with the log (overhang) parameter. As with other results, the bubble period appears to influence total period results.

4.3 Sensitivity analysis - subsidiary carve-out ex-date returns

As an additional robustness check and similar to Allen and McConnell (1998), we conduct a sensitivity analysis to test the managerial discretion hypothesis for carve-out returns in this section. We segment the results by those companies that reinvest the majority of the carve-out proceeds (reinvestment sample) and those that distribute the majority to creditors or shareholders (payout sample).

Table 4 provides results for carve-out subsidiary ex-date returns. The sensitivity analysis of subsidiary ex-date returns uses significant variables from the ex-date single variable regressions plus the leverage and spin-off control variables. The leverage ratio is the ratio of parent long-term debt to market capitalization. The leverage ratio is expected to be positively related to stock returns (Schipper and Smith, 1986). Significant single variable coefficients and control variables are used in the sensitivity analysis for subsidiary ex-date returns.⁷

(Insert Table 4 about here)

Panel A of Table 4 categorizes the samples by two-digit SIC codes, the relation of parents to subsidiaries. On balance, the empirical evidence for carve-outs (partial IPOs) shows that higher parent firm returns result from increased corporate focus (Schipper and Smith, 1986; Vijh, 2002). Vijh (2002) observes superior carve-out announcement returns for parent and subsidiary carve-out companies that increase focus. The increased returns for cross-industry carve-outs are due to increased scrutiny by investors and eliminated cross-subsidies for parents and subsidiaries. Thus, the cross-industry indicator should be positively related to carve-out stock returns. The 10% significant, cross-industry payout sample increases corporate focus and supports the managerial discretion hypothesis. With only seven companies, the 5% significant high proportion

⁷ For subsidiary ex-date returns, we observe inconclusive results for the sensitivity analysis of the ratio long-term debt to market capitalization, the ratio of offering proceeds to parent market capitalization, the investment banker reputation (IBR), and spin-offs and other second events.

reinvestment sample provides limited evidence contrary to the managerial discretion hypothesis (Table 4, Panel B).

Panel C of Table 4 relates the samples classified by the log of overhang. The reinvestment samples with the $\log(\text{overhang}) \geq 0$ are marginally significant. The difference between the companies with $\log(\text{overhang}) \geq 0$ is significant at the 1% level. With market-adjusted returns over twice those for the payout sample, the reinvestment sample dominates the payout sample and contradicts the managerial discretion hypothesis. This reflects that investors reward carve-out companies that retain their offering proceeds (Mikkelson and Partch, 1986).

Panel D of Table 4 shows the samples by partial price adjustment. The UP1 and UP2 reinvestment samples are significant at the 1% level. The UP2 payout sample and the difference between the UP2 samples are significant at the 1% level. The increases in filing range adjustments indicate positive subsidiary market-adjusted ex-date returns as shown by Bradley and Jordan (2002) and Loughran and Ritter (2002) for pure IPOs.

Controlling for the bubble period, the positive non-bubble period payout sample is marginally significant (Panel E of Table 4). These results support the managerial discretion hypothesis.

5. Multiple regression analysis

Prior to performing our multiple regression analysis, we use the variance inflation factor (VIF) to check our significant variables for multicollinearity in all periods. We observe that the % retained and $\log(\text{overhang})$ coefficients are significantly correlated ($\text{VIF} > 10$), but all others are not. Since overhang is derived from % retained in equation 2, correlation should be expected. Once we drop the % retained variable, there is no significant correlation (VIF close to 1) and multicollinearity is abated. Thereafter, we apply the Akaike Information Criterion (AIC) to the remaining significant variables from the single variable analysis (Section 4.2) to obtain the op-

timal variables for the multiple regressions. Similar to the adjusted R^2 , the AIC provides a tradeoff between maximizing the explained variance, and limiting an increase in the number of independent variables. Initially we select the models with the lowest AIC for each period. Thereafter we use all variables from the three models to contrast the significance of coefficients over the three periods. The explanatory power for the resulting models approaches that for the lowest AIC models.

Table 5 provides the carve-out subsidiary ex-date regression results for the period from 1988 to 2006. There are three sets of regressions: non-bubble period (column 1), bubble period (1999-2000) (column 2), and total period (1988-2006) (column 3).

(Insert Table 5 about here)

The non-bubble period regression (Table 5, column 1) has positive UP1 and UP2 coefficients and an F-value significant at the 5% level or higher. The negative IBR parameter is marginally significant. These parameters explain 16.55% of the variation in market-adjusted returns. The positive filing period adjustment parameters (UP1 and UP2) have a significant influence on carve-out market-adjusted returns. The negative IBR coefficient indicates that investment bankers retain their reputation during the non-bubble period. This contradicts the Beatty and Welch (1996) claim that reputations are redeemed and confirms the Thompson and Apilado (2006) findings that underwriters retain their reputations.

For the bubble period (Table 5, column 2), the positive UP1 and UP2 coefficients and F-value are 1% significant and validate the Bradley and Jordan (2002) partial price adjustment hypothesis. These independent variables explain 45.78% of the variation in bubble period returns.⁸

⁸ For subsidiaries, the bubble period regression coefficients explain almost three times the non-bubble period parameters. Several bubble period coefficients [notably DEBT, VXO, UP1, UP2, DW1, and log (overhang)] show a dramatic increase in R^2 from the non-bubble period. Also, we observe, but do not report in detail the increased VIFs for the variables in the bubble period.

The full period regression (Table 5, column 3) positive UP1, UP2, and VXO parameters and F-value are significant at the 5% level or higher. The positive VXO and negative DEBT coefficients are marginally significant. The UP1 and UP2 variables maintain their influence over subsidiary market-adjusted carve-out returns in all periods. The positive file revision parameters (UP1 and UP2) indicate that midrange and final filing range increases predict carve-out returns. In contrast with our observations for parent returns, the negative VXO parameter reflects increased subsidiary risk. Also, the negative DEBT coefficient contradicts Allen and McConnell (1998). These variables explain 35.12% of the variation in market-adjusted returns.

6. Conclusions and implications

The implications of these results are that publicly available information known prior to the carve-out offering date can predict market-adjusted initial carve-out returns and can explain 11%-35% of the variation. This lessens the need for models that depend on information asymmetry.

Using a series of single variable regressions and multiple regressions, we find several variables to be significant predictors of carve-out market-adjusted initial returns. We find that the following four variables are significant predictors of subsidiary equity carve-out market-adjusted initial returns: positively with the initial upward revision of the file range (UP1), the increase from the final file range to the offering price (UP2), and the CBOE Volatility Index (VXO) and negatively with the percentage of the carve-out proceeds to be used to retire debt or pay dividends (DEBT).

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Table 1
Summary Statistics

This table reports the annual frequency of equity carve-outs during the period 1988 through 2006. Panel A shows the mean and median fraction of the subsidiary's outstanding shares retained by parent firms following carve-outs and the mean and median gross proceeds raised in the carve-out. Panel B reports leverage, the ratio of the offering price to parent market capitalization, and the portion of proceeds used to retire debt. Panel C shows the calendar days from initial filing, the first and final price ranges, and the offering price.

Panel A: Fraction of subsidiary shares retained by parents and carve-out offering proceeds

Carve-out year	Number of firms	Fraction of subsidiary's shares retained by parent		Offering proceeds (\$Millions)	
		Mean	Median	Mean	Median
1988	12	0.76	0.80	86.32	35.50
1989	9	0.71	0.74	225.66	89.54
1990	7	0.75	0.80	79.21	59.71
1991	13	0.63	0.61	82.51	40.00
1992	18	0.67	0.71	144.71	77.65
1993	21	0.70	0.75	248.78	81.00
1994	24	0.66	0.66	115.69	69.30
1995	12	0.78	0.83	271.86	70.50
1996	39	0.74	0.81	250.58	83.52
1997	17	0.75	0.80	114.61	31.90
1998	16	0.75	0.70	621.17	87.50
1999	24	0.76	0.81	411.68	94.95
2000	24	0.80	0.82	449.29	163.90
2001	9	0.81	0.82	1693.74	420.00
2002	6	0.67	0.69	851.01	292.54
2003	---	-----	-----	-----	-----
2004	8	0.72	0.80	702.99	129.19
2005	6	0.72	0.73	233.75	218.50
2006	6	0.81	0.83	355.55	344.12
Total	271	0.73	0.80	336.32	90.00

Panel B: Leverage, ratio of offering value to parent market cap, and proportion of offering used to reduce debt

	<u>Mean</u>	<u>Median</u>
Leverage	226.94%	26.14%
Offering proceeds/parent market capitalization	0.2317	0.0742
Offering proportion used for debt reduction	36.26%	17.65%

Panel C: Timeframes for filings (calendar days)

	<u>Mean</u>	<u>Median</u>
Initial filing to first price range	28.71	0
First price range to final price range	18.59	0
Final price range to offering price	39.14	29

Table 2
Industry classification of carve-out parents and subsidiaries

This table reports the most frequent two-digit SIC industries of parent and subsidiary firms for the period 1988 to 2006. Data are obtained from COMPUSTAT, CRSP, and Mergent.

Parent primary two-digit SIC code	Number of firms	Subsidiary primary two-digit SIC code	Number of firms
28 (Chemicals & allied products)	27	73 (Business services)	45
73 (Business services)	24	38 (Instruments & related products)	20
48 (Communications)	18	35 (Industrial machinery & equipment)	17
38 (Instruments & related products)	17	13 (Oil & gas extraction)	16
35 (Industrial machinery & equipment)	15	36 (Electronic & other electric equipment)	14
49 (Electric, gas & sanitary services)	13	63 (Insurance carriers)	14
63 (Insurance carriers)	13	48 (Communications)	13
36 (Electronic & other electric equipment)	12	49 (Electric, gas & sanitary services)	13
60 (Depository institutions)	11	61 (Non-deposit credit institutions)	12
		62 (Security & commodity broker)	10
Fewer than ten parents per SIC	121	Fewer than ten subsidiaries per SIC	97

Table 3
Subsidiary single variable analysis carve-out ex-date returns

This table shows subsidiary ex-date returns calculated as the percentage change from the offering price to first day close for the non-bubble period: 1988-1998 & 2001-2006 (column 1); the bubble period, 1999-2000 (column 2); and the full period January 1, 1988 to December 31, 2006 (column 3). Daily stock returns are adjusted by subtracting the contemporaneous returns for the CRSP equal-weighted index. The market-adjusted returns are regressed separately on several independent variables: the percentage of the subsidiary retained by the parent (% retained); the percentage of the offering used to retire debt or to pay dividends (DEBT); CBOE Volatility Index (VXO); a dummy variable, the ratio of the mid-point of the adjusted filing range to the initial filing range where UP1 (DW1) is positive (negative) and zero otherwise; the ratio of the offering price to the mid-point of the final filing range where UP2 (DW2) is an increase (decrease) and zero otherwise; and the log of overhang, % retained / (1 - % retained). (*t*-values are in parentheses.)

Variable	(1) Non-bubble period	(2) Bubble period	(3) Total period
N	223	48	271
Mean	0.1105	0.5583	0.1898
(Median)	(0.0541)	(0.1555)	(0.0686)
% retained	-0.0747 (-0.70)	1.3959 (1.77)*	0.3154 (1.83)*
DEBT	0.0172 (0.44)	-0.5666 (-2.13)**	-0.1125 (-1.79)*
VXO	0.2616 (0.87)	-6.0627 (-1.75)*	1.2562 (2.78)***
UP1	0.3137 (2.23)**	1.8310 (4.25)***	1.1861 (7.01)***
DW1	0.4202 (2.00)**	1.2800 (0.98)	0.7776 (2.36)**
UP2	1.2467 (6.31)***	3.2662 (3.65)***	2.3125 (8.70)***
DW2	0.6667 (3.42)***	6.0715 (3.04)***	1.3210 (4.00)***
Log (Overhang)	-0.0141 (-0.76)	0.2124 (1.70)*	0.0558 (1.90)*

*** indicates significance at the 0.01 level.

** indicates significance at the 0.05 level.

* indicates significance at the 0.10 level.

Table 4
Sensitivity analysis – subsidiary carve-out event phase

This table shows a single variable sensitivity analysis for carve-out subsidiary ex-date returns calculated as the percentage change from the offering price to first day close from 1988 to 2006. Returns are classified by percentage retained by the issuer: payout (< 50%) and retention (\geq 50%). The samples are further classified by relation of parent to subsidiary, 1 = same two-digit SIC and 0 = unrelated (Panel A); proportion of the offering used to retire debt or to pay dividends (Panel B); the log of overhang (LONG) where overhang is the percentage of subsidiary shares retained by the parent divided by the percentage of shares offered (Panel C); partial price adjustment variables UP1, the ratio of the mid-points of the adjusted filing range to the initial filing range if positive and zero otherwise, and UP2, the ratio of the offering price to the mid-point of the final filing range if positive and zero otherwise (Panel D); and a dummy variable for the bubble period, 1 = bubble period and 0 otherwise (Panel E).

	Reinvestment sample		Payout sample		<i>p</i> -values for differences between payout and reinvestment samples
	MAR	<i>p</i> -value	MAR	<i>p</i> -value	
<u>Panel A: Classified by relation of parent to subsidiary</u>					
Cross-industry	0.2180 (N=75)	0.4548	0.1231 (N=97)	0.0938*	0.1458
Related industry	0.3421 (N=57)	0.6809	0.0868 (N=42)	0.5896	0.9575
<u>Panel B: Classified by offering proportion used to retire debt</u>					
High (\geq 0.50)	0.1372 (N=7)	0.0482**	0.1233 (N=93)	0.3435	0.1970
Low (< 0.50)	0.2791 (N=125)	0.8962	0.0896 (N=46)	0.7851	0.8561
<u>Panel C: Classified by the log of overhang</u>					
Log (Overhang) \geq 0	0.2829 (N=123)	0.0780*	0.1117 (N=121)	0.7674	0.0026***
Log (Overhang) < 0	0.1176 (N=9)	0.9454	0.1152 (N=18)	0.7755	0.8501
<u>Panel D: Classified by partial price adjustment</u>					
UP1	0.2736 (N=131)	0.0001***	0.2078 (N=26)	0.3559	0.4248
UP2	0.2779 (N=129)	0.0001***	0.1814 (N=68)	0.0002***	0.0003***
<u>Panel E: Classified by bubble period (1999-2000)</u>					
Bubble period	0.7384 (N=33)	0.9302	0.1621 (N=15)	0.9187	0.1974
Other	0.1160 (N=99)	0.4242	0.1061 (N=124)	0.0880*	0.2011

*** indicates significance at the 0.01 level.

** indicates significance at the 0.05 level.

* indicates significance at the 0.10 level.

Table 5
Multiple regression results - subsidiaries

This table reports OLS regression results for dependent variables and subsidiary ex-date returns calculated as the percentage change from the offering price to first day close for the period January 1, 1988 to December 31, 2006. The non-bubble period is 1988-1998 & 2001-2006 (column 1); the Bubble period, 1999-2000 (column 2); and the full period 1988-2006 (column 3). Daily stock returns are adjusted by subtracting the contemporaneous returns for the CRSP equal-weighted index (including distributions). The market-adjusted returns are regressed on several independent variables: the ratio of the mid-point of the adjusted filing range to the initial filing range where UP1 (DW1) is positive (negative) and zero otherwise; the ratio of the offering price to the mid-point of the final filing range where UP2 is an increase and zero otherwise; the Loughran and Ritter (2002) investment banker reputation variable, a range from 1 to 9.1; the CBOE Volatility Index (VXO); the percentage of offering proceeds used for debt reduction or to pay dividends (DEBT); and a dummy variable for cross industry carve-outs (SIC) where 1 = cross industry and 0 otherwise. (*t*-values are in parentheses.)

Variable	(1) Non-bubble period	(2) Bubble period	(3) Total period
N	223	48	271
Mean (Median)	0.1105 (0.0541)	0.5583 (0.1555)	0.1898 (0.0686)
UP1	0.3162 (2.38)**	1.4691 (3.41)***	1.0283 (6.68)***
UP2	1.2503 (6.25)***	2.9707 (3.20)***	2.1256 (8.65)***
DW1	0.1677 (0.83)	1.6648 (1.57)	0.4045 (1.48)
IBR	-0.0180 (-1.84)*	0.0376 (0.56)	-0.0114 (-0.80)
VXO	0.2589 (0.93)	-2.4110 (-0.75)	0.6704 (1.78)*
DEBT	0.0040 (0.11)	-0.3531 (-1.51)	-0.0853 (-1.65)*
Cross industry	-0.0007 (-0.02)	0.0640 (0.31)	-0.0003 (-0.01)
Adjusted R ²	0.1655	0.4578	0.3512
F-value	7.29***	6.67***	21.88***

*** indicates significance at the 0.01 level.

** indicates significance at the 0.05 level.

* indicates significance at the 0.10 level.