A Comparison of the Characteristics Affecting the Pricing of Equity Carve-Outs and Initial Public Offerings

Karen M. Hogan and Gerard T. Olson[*]

[*]Saint Joseph's University and Villanova University, respectively

Abstract

In contrast to initial public offerings, equity carve-outs (ECOs) refer to the firm created when a parent company sells a portion of a subsidiary or a division to public shareholders. Although both are classified as initial public offerings, IPO firms and ECO firms are fundamentally different with respect to the level of information available to investors and the stage of the firm life cycle. Consistent with the information asymmetry hypothesis, ECOs have a significantly lower level of underpricing than IPOs. For a sample of 219 ECOs during the period 1991 to 2000, we find a mean excess return of 11.42%, a statistically lower return than for a matched sample of IPOs. The results show that variables such as the listing exchange, the over-allotment option (or greenshoe option), the size of the issue, gross spread, and the percentage of the firm carved out affect the initial excess returns earned by investors in ECOs. Other variables that are known to affect returns on IPOs, such as lead underwriter, the number of managers, and lockup agreements, however, are shown to have no effect on the initial excess returns of ECOs. We also find that the size of the offer is more important to IPOs than to ECOs in explaining the excess returns earned by shareholders in early trading.

1. Introduction

A well documented anomaly concerning the pricing of a growth firm's initial public offering (IPO) is that investors earn significant market adjusted returns in early trading (e.g., Ritter and Welch (2002) and Ljungqvist and Wilhelm (2003)). One special class of IPOs that has not received as much attention is Equity Carve-Outs (ECOs). An ECO refers to the firm created when a parent company sells a portion of a subsidiary or a division to public shareholders through the IPO market. Although classified as initial public offerings, ECOs are fundamentally different from other IPOs with respect to the stage of the firms' life cycle, the level of information available to investors (especially compared to IPOs without public debt), and managerial experience in dealing with investment bankers. As a result, shares of ECOs should exhibit different price behavior in early trading relative to other IPOs.

The issuance of an ECO may signal the parent firm's expectations concerning the future prospects of the parent's and carve-out's respective industries. Schipper and Smith (1986);

Nanda (1991); Lang, Poulsen, and Stulz (1995); Allen and McConnell (1998); Hulburt, Miles, and Woolridge (2002); and Vijh (1999 and 2002) have examined returns from the perspective of both the parent and carved out firm's industries.

ECOs differ from other IPOs in the amount of information available to investors in the period prior to the IPO. Since they involve firms that were once part of publicly traded firms, which were required to continually supply the capital markets with information, there exists less information asymmetry with ECOs than with other IPOs. The information asymmetry hypothesis implies that the level of underpricing during early trading is less with ECOs than for IPOs. Prezas, Tarimcilar and Vasudevan (2000) examine excess initial day returns for carved out companies from 1986 to 1995. They find that short-term excess returns exist, however these returns are smaller than those of other IPOs. Hogan and Olson (2004) find initial returns of 8.75% for a sample of 414 ECOs from 1990 to 1998 and 47.76% for a sample of 44 ECOs from 1999 to 2000. This contrasts to the results of Loughran and Ritter (2004) who find an initial return of 14.8% for a sample of 3,384 IPOs from 1990 to 1998 and 65.0% for a sample of 803 IPOs from 1999 to 2000.

It is hypothesized that differences in the characteristics of ECOs and other IPOs leads to differences in the level of underpricing in early trading and the variables affecting early returns. The purpose of this study is three-fold. First, we compare the level of underpricing of ECOs with that of a control sample of IPOs matched by industry, issue date, and size of the offering. Second, we compare the variables affecting market-adjusted returns of ECOs and other IPOs during the first day of trading. No study to date has identified the specific differences in the variables explaining the initial pricing of ECOs and IPOs. Third, we document the differential impact of these variables on the underpricing of ECOs and other IPOs.

Some background information on ECOs is presented in Section 2. The existing literature, which supports the variables to use and the specification of the model in functional form, is included in Section 3. Section 4 discusses the data sample used in testing the relations among the variables. Section 5 discusses the model results and Section 6 offers some concluding remarks.

2. Background information on equity carve-out research

Most prior studies on ECOs focus on returns from the parent company's perspective at the time the carve-out is announced. Two competing hypotheses, the asymmetric information and divestiture gains hypotheses, have been postulated to predict the effect of an ECO on the parent company's stock price. The asymmetric information hypothesis suggests positive announcement effects on the stock price of the parent and the parent's industry around the announcement of an ECO and negative announcement effects on the stock price of firms in the ECO's industry. Nanda (1991) contends that ECOs can be viewed as a signal that the managers of the parent company believe the parent is undervalued compared to the ECO. By extension, Nanda also proposes that the parent's industry is undervalued compared to the ECO's industry. For a sample of 36 ECOs during the 1980 to 1991 period, Slovin, Sushka, and Ferraro (1995) provide some empirical support for the asymmetric information hypothesis. Their study finds share prices of ECO rival firms react negatively to ECO announcements.

The divestiture gains hypothesis consists of a collection of related hypotheses that contend that the parent and the ECO will become more competitive in their respective industries resulting in positive announcement effects on the price for the parent and negative price effects for firms in the parent and subsidiary's industries. Schipper and Smith (1986) contend that the gain in value is a result of a more efficient set of contracts between shareholders and managers. Their research examines 76 equity carve-outs and reports an average excess return for the parent company of 1.8% over a five-day period. Lang, Poulsen, and Stulz (1995) and Allen and McConnell (1998) examine the use of proceeds associated with an ECO. Allen and McConnell find that ECOs, where funds raised are used to pay down debt, have an average excess stock return of 6.63%. This return is significantly greater than the average excess stock return of -.01% for ECOs where funds are retained for investment purposes. Vijh (1999) finds returns are related to the number of business segments before the ECO, which is used as a proxy of divestiture gains arising from the refocusing of parent and subsidiary operations. For a sample of 628 ECOs from 1981 to 1995, Vijh finds a positive relationship between returns and the number of business segments over a three-year period following the carve-out. Hulburt, Miles, and Woolridge (2002) analyze the effects of an ECO announcement on the stock prices of firms in the parent's industry to test the divestiture gains hypothesis versus the asymmetric information hypothesis. For a sample of 183 ECOs from 1980 to 1991, Hulburt, Miles, and Woolridge show firms in the parent's industry exhibit negative stock price reactions to ECO announcements, a finding consistent with the divestiture gains hypothesis. Vijh (2002) also tests whether the positive announcement period returns on ECOs are due to asymmetric information or divestiture gains. Consistent with the divestiture gains hypothesis, Vijh finds that announcement period returns increase with the ratio of subsidiary to non-subsidiary assets for a sample of 336 ECOs from 1980 to 1997.

Prezas, Tarimcilar and Vasudevan (2000) focus on the performance of ECOs instead of the parent firm. They provide evidence on the initial-day and long-term pricing of 251 equity carve-outs during the period 1986 to 1995. The results show that when compared to a sample of other IPOs matched by size and book to market ratio, ECOs exhibit significantly lower initial-day returns. They find no significant difference for the six-month and one-year buy and hold strategies. In addition, the authors find that initial underpricing is lower for issues represented by prestigious investment bankers.

Hogan and Olson (2004) also focus on the performance of ECOs instead of the parent firm. Their results indicate that ECOs have been more willing to accept underpricing through time. They attribute the increased underpricing due to an increased importance of analyst coverage and the increased use of spinning, the practice where investment bankers allocate IPOs to high profile customers to garner future business.

This paper extends the literature to determine the effect, if any, the variables, which have been shown to impact returns of IPOs, have on the special class of IPOs called ECOs. In addition, it also documents the differential impact that these variables have on underpricing.

3. Model specification

3.1. Variables affecting early returns on initial public offerings

A review of prior literature dealing with IPOs is helpful in identifying variables that have been shown to affect the returns earned by investors on the first day of trading and could potentially also impact the returns on ECOs. Prior research on IPOs has identified several variables affecting the market adjusted returns in early trading. The variables include the over-allotment option (i.e., the "greenshoe"), gross spread, percent sold to the public, size of the offer, number of managers, lead underwriting manager, the existence of a lockup agreement, and exchange listing.

An over-allotment option in an underwriting agreement provides that, in the case of excess demand, the issuer will authorize additional shares to be sold through the existing syndicate at the initial offering price. Hansen, Fuller and Janjigian (1987) advocate the inclusion of the over-allotment option, measured as the percentage of over-allotment shares sold as a percent of the total amount of shares sold, as a method to manage potential investors from reneging on tentative offers. Hogan, Olson, and Kish (2001) find a positive relationship between the overallotment option and the level of underpricing of reverse leverage buyouts. It is hypothesized that as the over-allotment percentage utilized (OVERPCT) increases, the level of underpricing of ECO firms increases.

Gross spread is defined as total expenses (underwriting fees, management fees, and selling concessions) as a percentage of total proceeds. The expenses include the total manager's fee, which is shared among the lead manager (underwriter), any co-managers (underwriters), and syndicates.[1] An increase in the gross spread indicates that expenses are increasing on a relative basis. Since expenses are related to the uncertainty of selling an issue, gross spread can be used as a proxy for underwriter uncertainty. Higher underwriter uncertainty should put pressure on reducing the offering price and in turn increase the probability of generating excess returns, a position supported by Carter and Dark (1990).

An outcome of an IPO is that the percentage of insider ownership is expected to decrease. Several hypotheses have been postulated to explain the relationship between first day returns and share retention for IPOs. Ljungqvist and Wilhelm (2003) argue that the opportunity cost of underpricing to issuers is less if the relative number of shares issued is small and is greater for pre-issue shareholders who sell shares than for those who retain their shares. The asymmetric information hypothesis contends that the relative number of shares issued can be viewed as a signal of firm value. Managers with positive information about the prospects of the firm will signal this value by selling only a small fraction of the firm. Loughran and Ritter (2004) find for a sample of 4,187 IPOs from 1990 to 2000 a positive relationship between share overhang, the ratio of retained shares to the shares issued in the IPO, and first day returns for IPOs. Zheng, Ogden, and Jen (2005) find a positive relationship between the proportion of shares retained and the level of underpricing and that this relationship becomes stronger for IPOs with a lockup restriction.

---

[1] Direct costs can be captured in the gross spread as a percentage of total proceeds, including management fees, underwriting fees, and selling concessions. In addition to the direct costs of the IPO, there are also indirect costs that could account for another 10 to 15% of the proceeds. Indirect costs are associated with the underpricing of the IPO shares as shown by the dramatic initial day price run-ups of the majority of new issues brought to market. See for example Chen and Ritter (2000).

Robinson, Robinson, and Peng (2004) discuss the possible effects of share retention on the level of underpricing. They note that, at low levels of share retention, equity values may be depressed due to fears of managerial shirking, and, at high levels, equity values may be depressed due to fears of managerial entrenchment. Robinson, Robinson, and Peng find a curvilinear relationship between the level of underpricing and share retention for a sample of 3,075 IPOs issued between 1988 and 1999. They estimate a peak level of underpricing at a retention rate of 45%. As retention rates increase to 50%, 68.23%, and 85.35%, Robinson, Robinson, and Peng find mean levels of underpricing, defined as the price at the end of day one minus the offer price, of $33.64, $18.64, and $16.59 respectively. The results suggest that high retention rates are associated with low levels of underpricing for IPOs.

One of the reasons a parent company may carve out a subsidiary is that the market value of the combined firm may be less than if the firms were valued separately. This may occur for many reasons, one of which could be a lack of perceived synergy between the firm and its subsidiary. ECOs can create an environment where the parent company can keep a majority stake in the subsidiary, but at the same time relinquish managerial control to allow the new subsidiary to achieve faster growth. With faster growth the value of the ECO should be larger than it would have been as part of the original company. The original company then benefits from the increased value of the carved out firm. The larger the percentage the parent company owns in the ECO the larger the value of the remaining shares. Parent companies who believe in the potential value of the ECO will hold onto a larger percentage of the subsidiary. The more control the parent company keeps over the subsidiary the more it is signaling to the market that it believes the value of the carved out firm will rise. It is hypothesized that as the percent of the company sold to the public decreases the excess returns associated with the ECO will increase.

The size of the offer (LNSIZE) could also have an effect on excess returns during early trading. Aggarwal and Rivoli (1990) contend that excess returns are the result of overvaluation of investors in early trading due to investment fads. A fad investment is defined as a temporary overvaluation caused by the over optimism of investors. Large issues, especially those of ECOs, can have more name recognition and thus are more likely to be subject to investment fads. It is hypothesized the ECO firms will be subject to investment fads and thus the size of the offer will have a positive effect on initial returns.

As the number of managers (NMGR) increases there is the potential for more information to be conveyed to potential investors. When the number of firms participating in the underwriting process of the issue increases then information increases. With more information available, the issue should be scrutinized to a greater degree and there would be less need for underpricing. For a sample of 3,001 IPOs issued from 1986 to 1997, Kish, Hogan, and Olson (2000) find an inverse relationship between the number of managers and first day excess returns. For a sample of 1,638 IPOs from 1997 to 2002, Corwin and Shultz (2005) find offer prices are more likely to be revised when the syndicate has more underwriters and especially more co-managers. Since ECOs have lower levels of information asymmetry than IPOs, the role of the number of managers (NMGR) in providing information to the equity markets is hypothesized to have a lesser role, if any, than with IPOs.

Another method that can be used to reduce the information asymmetry of IPOs is the choice of underwriter. The choice of an underwriter (LEADMGR) affects the level of underpricing of an IPO since there is a large amount of uncertainty with these issues. The reputation of those handling the issue should dispel some of the uncertainty since the investment can have an influence on the banking firm's reputation. Many studies develop proxies for underwriter reputation and examine their relation to initial and long run performance of IPO firms (for example, see Carter and Manaster (1990); Carter, Dark and Singh (1998); and Loughran and Ritter (2004)). In the current study we use the discrete variable ranking (0 to 9) presented in Carter and Manaster and Carter, Dark and Singh. IPOs that are associated with more prestigious underwriters are perceived by the market as less risky. Since there is less information asymmetry with ECOs and since ECOs use mostly prestigious underwriters, it is hypothesized that the level of underpricing of ECO firms is not related to the choice of underwriter (LEADMGR).

A lockup agreement (LOCKUP) is in effect when an agreement exists between managers of the issue and existing shareholders, including directors and officers, in which shareholders agree not to sell their holdings for a prescribed period after the date of the offer without prior written consent of the managers. For a sample of 3001 IPOs during the 1986 to 1997 period, Kish, Hogan, and Olson (2000) find lockup agreements to be a significant factor in explaining excess returns in early trading. They argue that since lockups artificially restrict the number of shares in the active market for an IPO, initial day trading should have a higher probability of a run up in price. Since ECOs are significantly larger than IPOs, the relative number of restricted shares emanating from the lockup agreement is much smaller for ECOs. We hypothesize that the lockup provision will have no effect on ECOs excess returns.

The choice of exchange listing (EXCHANGE) is dependent upon several variables, but a new issue can be listed on any exchange as long as the listing requirements are met. Listing requirements focus on variables such as minimum past earnings levels, tangible asset levels, market value of common stock, shares outstanding, and number of different shareholders. Howton, Howton, and Olson (2002) find significantly higher levels of underpricing for IPOs listed on the Nasdaq system than IPOs listed on the NYSE and AMEX exchanges. It is hypothesized that ECO firms listing on the NYSE or AMEX have lower initial excess returns than ECO firms listing on the NASDAQ.

3.2. Functional form of the model

The model to be tested can be described by the following equation:

$$EXCESS = \alpha + \beta 1 OVERPCT + \beta 2 GSPREAD + \beta 3 PERCENT$$
$$+ \beta 4 LNSIZE + \beta 5 NMGRS + \beta 6 LEADMGR + \beta 7 LOCKUP \quad (1)$$
$$+ \beta 8 EXCHANGE + \varepsilon$$

where,

EXCESS	=	The return on the IPO during the first day of trading less the return on the Nasdaq average for the same day
OVERPCT	=	over-allotment amount sold as a percentage of the deal value
GSPREAD	=	total managers' fees as a percent of total proceeds
PERCENT	=	percent of the company sold to the public
LNSIZE	=	the natural logarithm of size of the offer in the IPO market
NMGRS	=	the number of managers[2]
LEADMGR	=	is a discrete underwriter reputation variable 0-9 where a 9 is the most prestigious and a 0 is the least prestigious, which is consistent with reputation rankings from Carter and Manaster (1990) and Carter, Dark, and Singh (1998)
LOCKUP	=	a binary variable equal to 1 if a lockup agreement exists between the managers of the issue and the existing shareholders and 0 otherwise
EXCHANGE	=	a binary variable equal to 1 if the issue is listed on the NYSE or AMEX and 0 otherwise

4. Data

In this section, we describe the sample selection and present some descriptive statistics of the sample firms.

4.1. Sample selection

The sample of ECOs for the study is chosen based upon the following criteria:

1. Information on all public corporate initial public offerings (IPOs) flagged as previous spin-offs to public shareholders are obtained from Thomson's SDC database during the period January 1, 1987 through December 31, 2000.
2. Information on all IPOs is also generated for the same time period.
3. Common stock issues only; no multiple securities issues such as stocks with warrants, or stocks and bonds issued together.
4. Public issues only, i.e., no private offerings.
5. Stock issues included within the sample must also include data for all the variables being tested.
6. Financial information for both samples are taken from research insight.

---

[2] It can be argued that the number of managers in a deal is a function of issue size. We also adjust NMGR for issue size, but find no significant differences between the models.

4.2. Sample description

Our working sample contains 219 ECOs entering the IPO market over the sample period.[3] This sample is matched with a working sample of 3,454 IPOs to create a sample of 219 IPOs matched by industry, issue date, and size. Specifically, for each ECO an IPO is chosen that is within the same 2 digit SIC code, issued around a six month period of the ECO, and is as close to the size of the ECO as possible. Panel A of Table 1 lists the frequency and relative frequency of the 219 ECOs by year. As shown in Panel A, approximately 58% of the sample ECOs take place between 1991 and 1995, while about 42% of those ECOs sampled are represented between the years 1996 through 2000.

Panel B of Table 1 lists some descriptive statistics on ECOs including the size in millions, total assets in millions, total debt to total assets, and sales in millions. The mean and median size of ECOs are $153.61 and $44 million, respectively. The financial and asset characteristics of the ECOs indicate a mean asset size of $1.14 billion, mean sales of $714.46 million, and a mean total debt to total asset ratio of 54.55%.

Table 1
Descriptive statistics

Panel A: Year of equity carve-outs
Distribution of carve outs effective dates by calendar year for the 219 firms engaging in carve outs over the period 1991 through 2000.

Year	Number of Carve outs	Percent of Total
1991	2	0.91%
1992	34	15.53%
1993	50	22.83%
1994	29	13.24%
1995	13	5.94%
1996	37	16.89%
1997	21	9.59%
1998	14	6.39%
1999	14	6.39%
2000	5	2.28%
Total	219	100.00%

---

[3] The original working sample contained 242 ECOs. We eliminated 23 ECOs in the technology sector which were issued during 1999 and 2000 as outliers.

Table 1, Continued
Descriptive statistics

Panel B: Summary statistics for 219 equity carve-outs during the period 1991 to 2000
Size of the ECO in millions is collected from Thompson's SDC platinum data base and news releases. Total Assets levels in millions, Total Debt to Total Asset levels, and Revenues in millions are collected from are collected from research insight.

	Offer Size ($M)	Total Assets ($M)	Debt/Assets (%)	Revenues ($M)
Mean	$153.62	$1,138.81	54.55%	714.46
Median	44.00	110.92	56.36%	134.02
Standard Deviation	414.35	3,239.31	29.13%	2064.41
Number of Obs.	219	172	172	172

5. Model results

5.1. Summary statistics

Table 2 presents summary statistics for firms undertaking ECOs and IPOs. Excess return is defined as the average of the difference between the return on ECOs, or IPOs, over the first day of trading and the return on the NASDAQ index over the same day.   According to the information asymmetry hypothesis, the excess returns for ECOs should be less than those of IPOs. Table 2 depicts an average excess return for ECOs of 11.42% compared to 16.53% for IPOs. These excess returns are significantly different at the five percent level. The returns for ECOs are also less than the returns reported by Loughran and Ritter (2004) who find an average first day return for a sample of 6,169 IPOs during the period 1980 to 2000 of 18.9%. The results support the asymmetric information hypothesis and the results of Prezas, Tarimcilar, and Vasudevan (2000) and Hogan and Olson (2004) that show that IPOs of ECOs are significantly less underpriced than typical IPOs.

Investment bankers use the over-allotment option to reduce the risk of not selling the entire issue. The mean percent overalloted for ECOs, 8.27%, is not significantly different from the 9.03% for the matched sample of IPOs over the same time period. Investment bankers do not distinguish between ECOs and IPOs in their use of the over-allotment option despite the significantly lower excess returns and the significantly higher offer size of ECOs relative to IPOs. Consistent with Hansen, Fuller, and Janjigian (1987), investment bankers use the over-allotment option as a method to manage potential investors from reneging on tentative offers.

The average gross spread for ECOs is 6.89% while the average gross spread for IPOs is 6.98%. The average gross spread for the ECOs is not significantly different from the average gross spread for the matched sample of IPOs. Although not shown in the table, we also test whether the gross spreads are significantly different from 7%. We find that for both the ECO and IPO samples, the gross spreads are not significantly different from 7%. The results support the

Table 2
Summary statistics for firms undertaking equity carve-outs and initial public offerings

The sample consists of 219 equity carve-outs (ECOs) over the period 1991 to 2000. Characteristics of Date, Industry, and Size of the ECOs are used to create a control sample of 219 initial public offerings (IPOs) from a possible sample size of 3,454. Panel A looks at non-binomial variables. A difference of the means is calculated using a t-test for matched samples. Excess returns are by measured as the difference between the return on the ECO, or the IPO, over the first day of trading and the return on the NASDAQ index over the same day. Over-allotment is the over-allotment amount sold as a percentage of the deal value. The gross spread is measured as total managers' fees as a percent of total proceeds. The number of managers on the deal is identified. Number of managers includes the number of lead and co-managers associated with the offering. Percent sold to public refers to the number of shares sold to the public divided by the total number of shares outstanding. Offer size ($M) is the size of the offering to the public in millions. Panel B looks at binomial variables. A difference of proportions is calculated using z test of two proportions. Lockup is a binary variable equal to 1 if a lockup agreement exists between the managers of the issue and the existing shareholders and 0 otherwise; Exchange equals 1 if the issue was listed on either the NYSE or AMEX and 0 otherwise.

Panel A: Non-Binomial

	ECOs		IPOs		
	Mean	Median	Mean	Median	t-statistic
Excess Return (%)	11.42	5.23	16.53	8.24	-2.19**
Over allotment (%)	8.27	10.89	9.03	15.00	-1.22
Gross Spread (%)	6.89	7.00	6.98	7.00	-0.90
Number of Managers	6.58	3.00	6.05	2.00	1.04
Percent Sold to Public	0.32	0.32	0.29	0.29	2.43***
Offer Size ($M)	153.62	44	51.64	35	3.67***

Panel B: Binomial

	ECOs	IPOs	
	Proportion	Proportion	Z-statistic
Exchange	.324	.178	7.05***
Lockup	0.963	0.949	1.41

** Indicates statistical significance at the .05 level.
*** Indicates statistical significance at the .01 level.

finding of Chen and Ritter (2000) who find investment banker fees for IPOs approaching a 7% gross spread through time.

Similar to the results from over-allotment option and gross spread, when evaluating the number of managers used in the offering, we find no significant difference between ECOs and IPOs. The mean number of managers is 6.58 for ECOs and 6.05 for the matched sample of IPOs. The median number of managers is 3 for ECOs and 2 for the IPO samples. Further inspection of the data shows that the number of managers used by both the ECOs and IPOs has increased over time during our sample period.

The mean percent of the ECO sold to the public is 32% and is significantly different at the one percent level when compared to the 29% percent sold for the IPOs. The results for the ECOs can be contrasted to those reported by Prezas, Tarimcilar, and Vasudevan (2000) who find the mean percentage held by the parent to be 57.05% during the 1986 to 1995 period. The decline in percentage sold coincides with an increase in the ratio of market value to annual sales. With the firm value higher, the insiders of the firm do not need to carve-out as high of a percentage of the firm to receive the same proceeds. Although not shown in the table, we also test for differences in excess returns for ECOs above and below the mean percent sold to the public. ECOs who sell a higher percentage of the firm to the public average an excess return of 8.6% compared with a significantly higher 15.02% for those firms with less than the mean percent sold to the public. These findings could be the result of two things. First, the insiders selling off less of the firm could be taken as a signal to the market that the insiders feel the firm is a good investment. This asymmetric information argument was first put forth by Leland and Pyle (1977) and extended by Grinblatt and Hwang (1989). Second, with a smaller supply of shares the excess demand for those shares would in turn drive the price of the shares up in the market.

The mean size of $153.62 million for ECOs is significantly larger at the .01 level than the mean size of $51.64 million for IPOs. While we attempt to control for differences in size of the two samples through the sample selection process, the nature of the size and variability of ECOs compared to that of IPOs makes it impossible to eliminate the difference in the mean size of the samples. While the medians for the two samples are much closer with a median size of $44 million for the ECOs compared to a median size of $35 million for the IPOs, a non-parametric Wilcoxian signed rank test still rejects the null hypothesis of no difference between the median size of the samples.

Panel B of Table 2 shows the proportion of ECOs and IPOs that are listed on either the NYSE or AMEX exchanges. Our sample shows that 32.4% of the ECOs are listed on the larger exchanges. This percentage is significantly larger than the 17.8% of the matched IPOs found on these exchanges. Since ECOs are byproducts of larger more established firms and can more readily meet the more stringent filing requirements of the NYSE and AMEX exchanges, they are more likely to trade on the larger exchanges.

Panel B also looks at the lockup characteristics of both ECOs and IPOs. At least 95% of both ECOs and IPOs have lockups associated with the issue and the means are not significantly different. The vast majority of all offerings in the new issues market have lockup agreements attached to them.

5.2 Regression results for equity carve-outs

Table 3 presents the results of the regression analysis for the sample of 219 ECOs.[4] The results of the multivariate analysis support most of the hypothesized relations with a comparatively high degree of reliability (adjusted R^2 = 23%). The variable OVERPCT, representing the over-allotment option, is positive and highly significant (p-value = 0.00). The results are consistent with the hypothesis that investment bankers attempt to manage the reneging problem (see Hansen, Fuller, and Janjigian (1987)) and the hypothesis that investment bankers use the over-allotment option to put upward pressure on initial returns to build and maintain good relationships with investors (see Carter and Dark (1991)). Similar to the findings reported by Kish, Hogan and Olson (2000) for IPOs and Hogan, Olson, and Kish (2001) for reverse leverage buyouts, the over allotment option used by investment bankers is associated with significant underpricing in early trading for ECOs.

The coefficient of the gross spread variable (GSPREAD) is positive and significant at .01. Higher underwriting uncertainty as proxied by gross spread is associated with higher levels of underpricing for ECOs. The results are consistent with the hypothesis developed by Carter and Dark (1990) for IPOs that higher underwriter uncertainty results in higher fees and higher underpricing. Underwriters offset higher uncertainty for both ECOs and IPOs by increasing gross spread and the level of underpricing.

The PERCENT variable is negative and highly significant (p-value = 0.00). The results support the hypothesis that as the parent company increases the percentage sold to the public (carved out) the excess returns are reduced. The amount of the firm that the parent company carves out to the public is a signal of the parent's expectations concerning the future prospects of the ECO. The more control the parent company keeps, the more it is signaling to the market that it believes the value of the carved out firm will rise.

The variable for size of the offering (LNSIZE) is positive and highly significant (p-value = 0.00) for the ECO sample. The results are consistent with the hypothesis that ECO firms are subject to investment fads. Large issues, especially those of ECOs, can have more name recognition and thus are more likely to be subject to investment fads. The results are consistent with Aggarwal and Rivoli (1990) for IPOs who contend that excess returns are the result of overvaluation of investors in early trading due to investment fads.

---

[4] Due to the close relationship of the data variables, we first test for possible multicollinearity of the explanatory variables prior to running any regression analysis. The presence of multicollinearity causes the partial regression coefficients to become both statistically unreliable and difficult to interpret. One test of multicollinearity is to look at the Variance Inflationary Factor (VIF) for each variable of interest. The VIF is used as a measure of collinearity and is defined as $VIF_J = 1/(1 - R_J^{\,2})$ where R^2_j represents the coefficient of multiple determination of explanatory variable X_j with all other X variables. If any explanatory variable has a VIF of greater than 5, there is too much correlation between the variable X_j and the other explanatory variables. None of the variables used in this study show signs of multicollinearity problems. The authors would be happy to provide the appropriate results for these tests upon request.

Consistent with the information asymmetry hypothesis, the coefficients for the number of managers (NMGRS) and choice of underwriter (LEADMGR) are not significantly different from zero. With more information available about ECOs prior to the offering relative to IPOs, the choice of the number of managers and lead underwriter are not important in explaining excess returns in early trading for ECOs.

Table 3
Regression results

A regression analysis is performed for 219 Equity Carve Outs (ECOs) over the period 1991 through December 2000. In functional form the model can be described as EXCESS = f(OVERPCT, GSPREAD, PERCENT, LNSIZE, NMGRS, LEADMGR, LOCKUP, EXCHANGE) where EXCESS is return on the IPO during the first day of trading less the return on the NASDAQ average for the same day; OVERPCT is defined as the over-allotment amount sold as a percentage of the deal value; GSPREAD is the total manager's fee in dollars as a percent of price; PERCENT is the number of shares sold to the public divided by the total number of shares outstanding; LNSIZE is the natural logarithm of size of the offer in the primary market; NMGRS is the number of lead and co-managers; LEADMGR is a discrete underwriter reputation variable 0-9 where a 9 is the most prestigious and a 0 is the least prestigious as defined in Carter and Manaster (1990) and Carter, Dark, and Singh (1998); LOCKUP is a binary variable equal to 1 if a lockup agreement exists between the managers of the issue and the existing shareholders and 0 otherwise; and EXCHANGE is a binary variable equal to 1 if the issue was listed on either the NYSE or AMEX and 0 otherwise.

	Coefficients	t statistic	p-value	Adjusted R^2	F statistic	p-value	Observations
Intercept	-41.62	-2.06	0.04	0.23	9.08	0.00	219
Over allotment	1.19	6.03	0.00				
Gross spread	5.09	2.57	0.01				
Percent sold to public	-0.38	-3.67	0.00				
Size (natural log)	6.10	2.84	0.00				
Number of managers	-0.05	-0.26	0.79				
Lead manger	0.70	0.22	0.83				
Lockup	-0.25	-0.03	0.97				
Exchange	-11.04	-3.13	0.00				

In contrast to prior research on IPOs, the coefficient for the lockup agreement is not significantly different from zero. Although the proportion of lockup agreements used for ECOs and IPOs, as shown Table 2, are not significantly different, the pricing implications of lockup agreements are different for the two types of offerings. ECOs are shown to be much larger in size relative to

IPOs despite a selection procedure that includes matching by size of the offering. Since ECOs are significantly larger than IPOs, the relative supply of shares not restricted by the lockup agreement is much larger for ECOs. With more supply of unrestricted shares in the new issues market, the existence of a lockup agreement does not affect excess returns of ECOs.

The parameter estimate for the choice of exchange listing (EXCHANGE) is negative and highly significant (p-value = 0.00). The EXCHANGE variable, a 1 if the issue is listed on the NYSE or AMEX and 0 otherwise, indicates less underpricing for ECOs that are listed on NYSE and AMEX exchanges relative to those listed on the NASDAQ. The results are consistent with Howton, Howton and Olson (2002) who find that IPOs listed on the NASDAQ are associated with more underpricing than those listed on the NYSE or AMEX exchanges. The more restrictive listing requirements of the NYSE and AMEX exchanges has a positive role in reducing the level of underpricing for both ECO and IPO offerings.

5.3. *Pooled regression of equity carve-outs and initial public offers*

In order to document the differential impact of the related variables on underpricing we conduct a pooled regression analysis for the significant variables in the multivariate analysis. The regression pools both the ECOs and the control sample of IPOs and uses interaction terms to capture the differential impact of the independent variables on the two subsamples. We define a set of interaction terms DOVERPCT, DGSPREAD, DPERCENT, DLNSIZE, and DEXCHANGE that capture a difference in the effect of the variable on ECOs and IPOs. For example, DOVERPCT is defined as OVERPCT * D where D = 1 for ECOs and zero otherwise. If the coefficient of DOVERPCT is significantly negative in the pooled regression, this indicates that the over allotment option is more positively related to IPOs than to ECOs.

Table 4 presents the results of the pooled regression. The coefficient of the DOVERPCT variable is negative but not significant. While the over allotment option is important in explaining excess returns of ECOs in early trading, it is not significantly more or less important for ECOs than for IPOs. Investment bankers use the over allotment option in a similar fashion for both ECOs and IPOs, i.e., a method to manage investors from reneging on tentative offers and building and maintaining good underwriter/investor relationships.

The coefficients of the DGSPREAD and DPERCENT variables are positive but not significant. The results indicate that the excess returns of ECOs and IPOs are both positively related to gross spread and negatively related to the percentage sold, but neither variable is more important in explaining excess returns of ECOs or IPOs in early trading.

Table 4
Pooled regression results

A pooled regression analysis is performed for 219 Equity Carve Outs (ECOs) over the period 1991 through December 2000. Characteristics of Date, Industry and Size of the ECOs are used to create a matched sample of 219 initial public offerings (IPOs) from a possible sample size of 3,454 IPOs. In

functional form the model can be described as EXCESS = f(OVERPCT, GSPREAD, PERCENT, LNSIZE, EXCHANGE, DOVERPCT, DGSPREAD, DPERCENT, DLNSIZE, DEXCHANGE) where EXCESS is return on the IPO during the first day of trading less the return on the NASDAQ average for the same day; OVERPCT is defined as the over-allotment amount sold as a percentage of the deal value; GSPREAD is the total manager's fee in dollars as a percent of price; PERCENT is the number of shares sold to the public divided by the total number of shares outstanding; LNSIZE is the natural logarithm of size of the offer in the IPO market; EXCHANGE equals 1 if the issue was listed on either the NYSE or AMEX and 0 otherwise; DOVERPCT is defined as OVERPCT * D where D = 1 for ECOs and zero otherwise; DGSPREAD is defined as GSPREAD * D where D = 1 for ECOs and zero otherwise; DLNSIZE is defined as LNSIZE * D where D = 1 for ECOs and zero otherwise; DPERCENT is defined as PERCENT * D where D = 1 for ECOs and zero otherwise and DEXCHANGE is defined as EXCHANGE * D where D = 1 for ECOs and zero otherwise.

	Coefficients	t statistic	p-value	Adjusted R^2	F statistic	p-value	Observations
Intercept	-67.03	-3.78	0.00	0.25	15.62	0.00	438
Over allotment	1.36	5.60	0.00				
Gross spread	5.82	3.00	0.00				
Percent Sold to Public	-0.55	-4.31	0.00				
Size (natural log)	13.93	6.34	0.00				
Exchange	-15.54	-3.22	0.00				
Doverpct	-0.20	-0.59	0.56				
Dgspread	1.67	1.44	0.15				
Dpercent	0.17	0.96	0.34				
Dlnsize	-5.57	-2.79	0.01				
Dexchange	4.40	0.68	0.50				

As noted in Table 2, the average size of ECOs, $153.62 million, is significantly larger than the average size of IPOs, $51.64 million, despite a selection procedure that matches by industry and size. The parameter estimate for the DLNSIZE variable in Table 4 is negative and significant at the .01 level. Consistent with the information asymmetry hypothesis, the size of the offering is less important for ECOs than for IPOs. Equity carve-outs are by definition previous entities of publicly traded companies that continuously supply investors with updated financial information. In contrast, IPO firms only supply the capital markets with financial information prior to the offering if they have publicly traded debt. As a result, while offering size is important for both ECOs and IPOs, its role in explaining excess returns in early trading is greater for IPOs.

The coefficient for the DEXCHANGE variable is not significant indicating no difference in the role of the listing exchange on the level of underpricing for ECOs and IPOs. While the exchange listing is important in explaining excess returns of ECOs in early trading, it is not significantly more or less important for ECOs than for IPOs. The role of exchange listing as a signal of firm quality is the same for both ECOs and IPOs. Lower levels of underpricing by investment bankers are associated with issues offered on the NYSE and AMEX exchanges relative to offerings on NASDAQ.

6. Conclusions

Although both are classified as initial public offerings, IPO firms and ECO firms are fundamentally different with respect to the level of information available to investors and the stage of the firm life cycle. The information asymmetry hypothesis implies that the level of underpricing during early trading is less with ECOs than for IPOs. Our results support Prezas, Tarimcilar and Vasudevan (2000) and Hogan and Olson (2004); we find significantly less underpricing with ECOs than a sample of IPOs matched by industry, issue date, and size of the offering. The mean excess returns for a sample of 219 ECOs during the period 1991 to 2000 is 11.42%. Consistent with the information asymmetry hypothesis, the mean excess returns for the ECOs are significantly less than the 16.53% mean excess returns for the matched sample of IPOs.

Similar to prior research on IPOs, we find the over-allotment option, gross spread, and size of the issue to positively affect the initial excess returns earned by investors in ECOs. Also consistent with prior research on IPOs, we find the percentage of the firm sold to the public and offerings listed on the NYSE and AMEX exchanges to negatively affect initial excess returns of ECOs. However, unlike prior research on IPOs we do not find the number of managers, lead manager, and the existence of a lockup provision to affect excess returns of ECOs.

We document the differential impact of the related variables on underpricing by conducting a pooled regression analysis for the significant variables in the multivariate analysis. We find no statistical difference in the relative importance of the over allotment option, gross spread, exchange listing, and percent sold to the public in explaining the initial excess returns of ECOs and IPOs.

Consistent with the overvaluation of investors in early trading due to investment fads, the size of the offer is positively related to the excess returns for ECOs and IPOs. However, consistent with the information asymmetry hypothesis, we find that the differential impact of the size of the offer is less important to ECOs than to IPOs in explaining the excess returns earned by shareholders in early trading.

References

Aggarwal, R. and P. Rivoli, 1990, Fads in the initial public offering market?, *Financial Management*, 45-57.

Allen, J.W. and J.J. McConnell, 1998, Equity carve-outs and managerial discretion, *Journal of Finance* 53, 163-186.

Carter, R. and F. Dark, 1990, The use of the over-allotment option in initial public offerings of equity: Risks and underwriter prestige, *Financial Management*, 55-64.

Carter, R. and S. Manaster, 1990, Initial public offerings and underwriter reputation, *The Journal of Finance* 45:4, 1045-1067.

Carter, R., F. Dark, and A. Singh, 1998, Underwriter reputation, initial returns, and the long-run performance of IPO stocks, *The Journal of Finance* 53, 285-312.

Chen, H. and J. Ritter, 2000, The seven percent solution, *Journal of Finance*, 55:3, 1105-1131.

Corwin, S. and P. Schultz, 2005, The role of IPO underwriting syndicates: pricing, information production, and underwriter competition, *The Journal of Finance*, 60, 443-486.

Grinblatt, M., and Chuan-Yuan Hwang, 1989, Signaling and the pricing of new issues, *Journal of Finance* 44, 393-420.

Hanson, R., B. Fuller, and V. Janjigian, 1987, The cross-allocation option and equity financing flotation costs: An empirical investigation, *Financial Management* 16:2, 24-32.

Hogan, K., and G. Olson, 2000, The impact of offering size on the initial and aftermarket performance of IPOs, *Advances in Investment Analysis and Portfolio Management* 7, 91-103.

Hogan, K., G. Olson, and R. Kish, 2001. A comparison of reverse leveraged buyouts and original public offers: variables impacting their issuance in the IPO market, *The Financial Review* 38, 1-18.

Hogan, K. and G. Olson, 2004. The pricing of equity carve-outs during the 1990s, *Journal of Financial Research*, 27, 521-537.

Howton, S, S. Howton, and G. Olson, 2002, The role of exchange listing in the initial and aftermarket performance of IPOs, *Financial Counseling and Planning* 13, 1-11.

Hulburt, H., J. Miles, and J.R. Woolridge, 2002, Value creation from equity carve-outs. *Financial Management* 31, 83-100.

Kish, R., K. Hogan, and G. Olson, 2000, The "green shoe" and other variables impacting the issuance of IPOs, *Advances in Financial Planning and Forecasting* 9, 131-160.

Lang, L., A. Poulsen, and R. Stulz, 1995, Asset sales, firm performance, and the agency costs of managerial discretion. *Journal of Financial Economics* 37, 3-37.

Leland, H., and D. Pyle, 1977, Informational asymmetries, financial structure, and financial intermediation, *Journal of Finance* 32, 371-387.

Ljungqvist, A., and W. Wilhelm, 2003, IPO pricing in the dot-com bubble, *Journal of Finance* 58, 723-752.

Loughran, T. and J. Ritter, 2004, Why has underpricing changed over time?, *Financial Management* 33, 5 – 38.

Nanda, V., 1991, On the good news in equity carve-outs, *Journal of Finance* 46, 1717-1737.

Prezas, A., M. Tarimcilar, and G. Vasudevan, 2000, The pricing of equity carve-outs, *The Financial Review* 35, 123-138.

Ritter, J., and I. Welch, 2002, A review of IPO activity, pricing, and allocations, *Journal of Finance* 57, 1795-1828.

Robinson, R., M. Robinson, and C. Peng, 2004, Underpricing and IPO ownership retention, *Journal of Economics and Finance*, 28, 132-146.

Schipper, K. and A. Smith, 1986, A comparison of equity carve-outs and seasoned equity offerings: share price effects and corporate restructuring, *Journal of Financial Economics* 15, 153-186.

Slovin, M., M. Sushka, and S. Ferraro, 1995, A comparison of the information conveyed by equity carve-outs, spin-offs, and asset sell-offs, *Journal of Financial Economics* 37, 89-104.

Vijh, A., 1999, Long term returns from equity carveouts, *Journal of Financial Economics* 51, 273-308.

Vijh, A., 2002, The positive announcement-period returns of equity carveouts: asymmetric information or divestiture gains, *Journal of Business* 75, 153-190.

Zheng, S., J. Ogden, and F. Jen, 2005, Pursuing value through liquidity in IPOs: underpricing, share retention, lock up, and trading volume relationships, *Review of Quantitative Finance and Accounting*, 25, 293-312.