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Information Asymmetry and the Cost of Going Public for Equity Carve Outs

Steven D. Dolvin
Butler University, sdolvin@butler.edu

Karen M. Hogan

Gerad T. Olson

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Steven D. Dolvin
Butler University

Karen M. Hogan
Saint Joseph's University

Gerard T. Olson
Villanova University

We examine the relationship between asymmetric information and the cost of going public for equity carve-outs (ECOs) as compared to ordinary initial public offerings (IPOs). We decompose underpricing into the opportunity cost of issuance (OCI) and a measure of share retention. Compared to an average IPO, we find that ECOs have lower OCI and price revisions, but higher share retention and long-term returns. Compared to a matched sample of IPOs, however, we observe similar OCI and long-term returns, but still find ECOs have higher share retention. Our analysis suggests that documented pricing differences between ECOs and IPOs likely are attributable to the characteristics of ECO firms and not necessarily to status as a carve-out.

Introduction

Existing studies examine the pricing of subsidiaries that are spun off from a parent firm via an initial public offering, i.e., an equity carve-out (ECO). The results of these studies generally indicate that ECOs are easier to price (possibly a function of reduced information asymmetry) and therefore exhibit a lower degree of initial return (or underpricing). Unfortunately, these studies generally exhibit two potential flaws. First, they typically fail to properly control for unique characteristics of ECOs that also may impact pricing differences. For example, ECOs are generally much larger in terms of offering proceeds, which also may reduce pricing volatility.

Second, most, if not all, existing studies concentrate on underpricing; however, recent evidence suggests that this measure may be biased as a measure of comparing issuance costs, particularly when existing shareholders retain a large portion of the stock. If parent firms of ECOs generally retain more (or fewer) shares, a comparison

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of underpricing to other IPOs may be problematic. The goal of this study is to address these two deficiencies.

To control for characteristics of ECO firms, we extend existing work by creating a sample of traditional (i.e., non-ECO) IPOs that are matched by issue date, SIC code, and offer size to 358 ECOs over the 1990-2000 period. In addition, rather than concentrating explicitly on underpricing, we also examine the opportunity cost of issuance (OCI), which effectively controls for differences in the level of share retention by preexisting owners. We also study the difference in offer price revisions and long-run returns, which may give us further evidence of potential differences between ECOs and ordinary IPOs.

We find in univariate tests that ECOs have lower underpricing, lower opportunity costs of issuance, smaller price revisions prior to the offering, and higher long-run market-adjusted returns compared to a broad based sample of IPOs. In addition, we find that ECOs have lower underpricing, less price revision, and higher share retention compared to our matched sample. The univariate results highlight the importance of the measure of the cost of going public and also underscore the importance of the selection of a control sample to evaluate the similarities and differences between ECOs and other IPOs. For example, we find that ECOs are much larger, older, and less likely to be backed by venture capitalists compared to both the broad-based and matched samples.

After controlling for a broad array of issue characteristics in multivariate tests, we find that the level of underpricing is not further explained by the designation of the offering as an ECO for either the broad-based or matched samples. Because the matching procedure eliminates many of the differences in potential proxies for information asymmetry, we also observe similar opportunity costs of issuance for ECOs and the matched sample. We still find, however, that ECOs have higher share retention compared to the matched sample.

Our results broaden the understanding of ECOs, illustrating that reduced asymmetry does reduce the cost of going public, as measured by both OCI and underpricing, at least as compared to an average IPO. This finding lends support to existing studies. Our matching analysis illustrates that most of these differences are attributable to the characteristics of ECO firms (e.g., size and industry) and not necessarily to status as a carve-out.

Equity Carve-Outs and Issue Costs

An equity carve-out (ECO) is a special type of initial public offering (IPO) in which a parent company sells a portion of a subsidiary, or a division, to public shareholders. Although objectives of the offerings may differ, ECOs and IPOs are generally similar in that both incur direct and indirect issuance costs. Direct issuance costs include the gross underwriting spread, auditing fees, lawyer fees, road show expenses, and printing expenses. Indirect issuance costs include lost management

time resulting from time spent dealing with regulatory compliance, answering brokers' and analysts' calls, preparing shareholder reports, and so on.

Another indirect issuance cost is the money left on the table (MLOT), which can be defined as the dollar change in the first-day price (price at end of day 1 minus offer price) multiplied by the number of shares issued. Typically, the money left on the table is the largest component of the total cost of going public. For example, Loughran and Ritter (2004) find that firms, on average, leave approximately $9.1 million on the table, which is roughly twice the amount of direct fees paid. Hogan and Olson (2004) find that ECOs, whose average size is usually four times that of the typical IPO, leave an average of $19.35 million on the table.

An ECO is generally different from other IPOs in terms of firm age, size, information asymmetry, and managerial experience in dealing with investment bankers, analysts, and securities regulators. The parent companies of ECOs tend to be older and much larger than other IPO firms. Because the ECO was once part of a publicly traded firm that is required to continually supply the capital markets with information, there may be less information asymmetry associated with ECOs relative to other IPOs, especially smaller ones and those with no public debt.

Information Asymmetry and the Cost of Going Public

Information asymmetry between the issuing firm and investors forms the basis of multiple theoretical models that have been posited to explain the large amount of money left on the table by issuing firms (e.g., Rock, 1986; Slovin, Sushka, and Ferraro, 1995; Ofek and Richardson, 2003; Hogan and Olson, 2004 and 2006; and Gleason, Madura, and Pennathur, 2005). Although the cause(s) of underpricing is (are) hotly debated, in theory the existence of asymmetric information may force issuers to offer shares at a discount as compensation for added pricing risk. This implies a positive relation between information asymmetry and the money left on the table and, consequently, the cost of going public. Prior studies generally address this relation by examining the level of underpricing, or initial return, on the first day of trading. The implication is that characteristics that reduce (increase) information asymmetry should be associated with lower (higher) underpricing.

Underpricing, however, is only indirectly relevant as a measure of issuance cost. Possibly of more importance is the actual wealth lost by preexisting shareholders, which underpricing does not explicitly measure. Specifically, underpricing implicitly assumes that all preexisting shares are sold in the offering; however, the number of secondary shares retained (i.e., share overhang, defined as the number of shares retained by existing shareholders relative to the number of shares offered) may be large for certain issue types and/or in certain time periods, making underpricing particularly problematic for comparison purposes.

Stated differently, only shares sold in the offering experience underpricing; retained shares do not. In fact, retained shares are valued at market and only

experience the dilution associated with the primary shares issued, typically a small amount relative to total firm equity value (particularly in more recent periods). For example, consider an extreme case in which a firm goes public by offering a single share. Obviously, any underpricing is economically irrelevant. More generally, firm owners typically retain a large portion of existing shares, implying that underpricing may, on average, substantially overstate the actual cost of issuance (wealth loss) to preexisting owners of the issuing firm.

Barry (1989) addresses this relation, showing that the true wealth effect of an offering, in percent, (i.e., the opportunity cost of issuance, OCI) is given by:

$$OCI = \frac{N_{o,s}}{N_B}\left[\frac{P_B - OP}{P_B}\right] + \frac{N_{B,r}}{N_B}\left[\frac{P_B - P_1}{P_B}\right] \quad (1)$$

The first term in brackets represents the percentage loss per share for preexisting shareholders that sell shares in the IPO. This loss is the difference between the per share pre-issuance value (P_B) and the offer price (OP) as a percentage of the pre-issuance value. As Barry (1989) illustrates, however, this measure is the OCI only if all original secondary shares are sold in the offering. The second term in brackets recognizes that for those shares retained, the loss is relative to the aftermarket price (P_1), not the offer price. Thus, the total issuance opportunity cost is a weighted average of these two underpricing measures, where the weights are equal to the percentage of preexisting shares offered (i.e., secondary shares offered relative to the number of preexisting shares, $N_{o,s}/N_B$) and the percentage of preexisting shares retained (i.e., the number of preexisting shares retained relative to the number of total preexisting shares, $N_{B,r}/N_B$), respectively.

Following Barry (1989), Dolvin and Jordan (2006) extend the above result, illustrating that OCI can be simplified to the following equation that eliminates the unobservable pre-issuance price (P_B) and allows OCI to be directly calculated:

$$OCI = \frac{N_o(P_1 - OP)}{P_1 N_A - N_{o,p} OP} \quad (2)$$

N_o is the number of shares offered in the IPO; P_1 is the market price at the end of the first trading day; OP is the offer price; N_A is the number of shares after the offer; and $N_{o,p}$ is the number of primary shares offered. The numerator is money left on the table, and the denominator is the value of preexisting equity immediately prior to the IPO.

The difference between underpricing and OCI is determined by the level of share retention by preexisting owners, with higher share overhang leading to a smaller OCI relative to the level of underpricing. If the level of share overhang were constant across time and firms, then analyzing underpricing in the cross section would provide equivalent results to OCI. As illustrated by Loughran and Ritter

(2004) and Dolvin and Jordan (2006), however, share overhang varies significantly over time and across firms. Thus, OCI is likely a more accurate measure of the indirect cost of equity issuance and, therefore, may be more appropriate for testing theories of information asymmetry than is underpricing.

This difference may be particularly relevant for our analysis of equity carve-outs. For example, parent firms may be encouraged to retain certain portions of carved-out firms in order to take advantage of favorable tax issues or for reporting purposes. (We briefly discuss this issue in a subsequent section.) Thus, it is possible that share overhang may be systematically different for equity carve-outs as opposed to traditional IPOs. If so, then analyzing underpricing to determine if the cost of going public differs between these two types of firms may be problematic, whereas OCI would not present such a difficulty. Moreover, because our sample period spans the bubble of 1999 to 2000, during which overhang values deviated significantly from historical averages, OCI likely will provide more accurate comparisons. As a result, we examine both underpricing and OCI in studying the relation between information asymmetry and the cost of going public for the special class of IPOs called ECOs. All studies on ECOs prior to this study focus only on underpricing, making this research a significant contribution to the literature.

Comparison to Prior ECO Research

Most prior studies on ECOs focus on returns from either the parent company's or rival firm's perspective at the time the carve-out is announced. Specifically, studies typically evaluate announcement returns in light of either the asymmetric information hypothesis (e.g., Nanda, 1991; Slovin, Sushka, and Ferraro, 1995) or the divestiture gains hypotheses (e.g., Schipper and Smith, 1986; Lang, Poulsen, and Stulz, 1995; Allen and McConnell, 1998; Vijh, 1999; Hulbert, Miles, and Woolridge, 2001; Vijh, 2002). These studies generally find evidence consistent with both hypotheses, concluding that gains occur as a result of revealing information to the market and/or by increased business focus, respectively.

More recently, some studies have broadened the focus to include the performance of the carved-out firm. For example, Prezas, Tarimcilar, and Vasudevan (2000) compare the initial-day and long-term pricing performance of ECOs to a sample of other IPOs matched by size and book-to-market ratio for the period 1986 to 1995. The results show that ECOs exhibit significantly lower initial-day returns, but show no significant difference for the six-month and one-year buy-and-hold strategies. Prezas, Tarimcilar, and Vasudevan also find that initial underpricing is lower for issues represented by prestigious investment bankers.

Hogan and Olson (2004, 2006) 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 higher underpricing 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.

Although we follow Prezas, Tarimcilar, and Vasudevan (2000) and Hogan and Olson (2004, 2006) in examining the performance of the ECO rather than the parent firm, the present study differs in significant ways. As mentioned above, we give primary consideration to the true underlying opportunity cost of issuance (i.e., OCI) rather than focusing exclusively on underpricing, thereby controlling for any underlying relations associated with differential share retention decisions. Moreover, we explicitly compare ECOs to IPOs by selecting a sample of control firms that are similar with respect to industry, size, and issue date, using a six-month window rather than an entire issuance year as in Prezas, Tarimcilar, and Vasudevan. Our approach enables us to address the accuracy of the conclusions of previous studies, as well as to deepen the understanding of the differences between ECOs and more traditional IPOs.

Definition Comparison

As illustrated by the studies referenced above, the majority of the finance literature defines an equity carve-out as a sale of a subsidiary's shares to the general public, and it is this definition that we follow. Unfortunately, many practitioners strictly define equity carve-outs as a partial spin-off in which the parent firm retains at least 80 percent of the outstanding stock, with the remaining shares sold to the general public.[1]

Additionally, the finance literature generally considers a spin-off to be defined as a distribution of subsidiary shares to existing shareholders of the parent firm. Practitioners, however, consider spin-offs to be either from the distribution of shares to current shareholders or from a sale of the majority of the shares to the general public. Thus, from this perspective, our study encompasses both equity carve-outs and spin-offs; however, we retain the terminology employed by previous research studies by simply referring to these offering as equity carve-outs. Thus, our sample covers units carved-out by parent firms that sell any percentage (above or below 80 percent) of the subsidiary to the general public by way of a public offering.

The Decomposition of Underpricing

Following Barry (1989), Dolvin and Jordan (2006) decompose the traditional definition of underpricing into the product of two components: the opportunity cost of issuance (OCI) and a measure of share retention called *economic overhang*. The model can be described as:

[1]This 80 percent is a significant ownership level in that it allows for continued consolidation of parent and carve-out for financial reporting purposes. It also creates tax advantages for subsequent spin-offs (divesting of shares to existing shareholders) of the subsidiary.

$$\text{Underpricing} = (P_1 - P_0) / P_0 = \text{OCI} * \text{EconomicOverhang}$$

$$\text{Underpricing} = (\text{MLOT} / E) * [(P_b * N_b) / (No * P_0)]$$

where:

P_1 = Market price at the end of the first day of trading;
P_0 = Offer price;
OCI = Opportunity cost of issuance = (MLOT)/E;
MLOT = Money left on the table = $N_o*(P_1-P_0)$;
E = Preissuance total equity value = P_b*N_b;
P_b = Equity value per share immediately prior to the offering;
N_b = Number of shares prior to the offering; and
N_o = Number of shares offered in the IPO.

Although economic overhang (EconOver) is the theoretically correct measure of share retention in the OCI derivation, prior studies primarily concentrate on share overhang in empirical tests. This choice is a function of two principal issues. First, share overhang is the variable that is selected explicitly by preexisting managers (i.e., the choice variable), whereas economic overhang reflects the number of shares retained scaled by the price placed on the shares by the market, which is beyond the control of issuing firms. Second, the correlation between EconOver and ShareOver is significantly positive (0.77 in our sample), implying that results are generally consistent. Therefore, we report both measures in Table 1; however, we follow the

Table 1—Summary Statistics

	ECOs	Matched	All IPOs	t-statistics	
	(1)	(2)	(3)	(1) v (2)	(1) v (3)
N	358	358	3,570		
Initial	14.54	20.96	27.07	-2.19	-6.08
OCI	4.13	5.03	5.27	-1.38	-2.45
EconOver	4.14	3.95	4.73	0.52	-1.90
ShareOver	2.87	2.57	2.92	1.83	-0.36
Revision	0.48	0.68	0.69	-1.79	-2.36
BHRet3	-21.33	-39.67	-45.28	0.93	1.70

Note: This table reports descriptive statistics for ECOs and IPOs (matched sample and full sample) for the 1990 to 2000 period. Columns 1 through 3 report means, and the final two columns report t-statistics from difference tests assuming unequal variances. Initial is initial return, or underpricing, defined as the percentage change from the offer price to the closing price on the first trading day. OCI is the opportunity cost of issuance, defined as money left on the table divided by preexisting equity value. EconOver is economic overhang, defined as preissuance equity value divided by the offering proceeds. ShareOver is share overhang, defined as the number of shares retained relative to the total number of shares issued. Revision is a measure of the price revision, defined as the offer price less the initial low filing price, divided by the difference between the initial high and low filing prices. BHRet3 is the cumulative buy-and-hold, market adjusted abnormal return calculated from the end of the first trading day to three years later. Data are from the SDC New Issues and CRSP databases

typical convention and concentrate specifically on share overhang in our subsequent empirical tests, although we find in unreported results that our findings are consistent in either case.

Functional Form of the Model

A review of prior studies dealing with IPOs is helpful in identifying variables that have been shown to affect ECOs. Specifically, prior research on IPOs has identified several variables that can be used as proxies for information asymmetry and have been shown to explain returns in early trading. The variables include the proceeds of the offer, if the offer was backed by a venture capitalist, company age, if the offer is priced as an integer, if the company is high tech, if the company is an internet firm, if the company used a prestigious ranked underwriter, if there are only primary shares being offered, market movements prior to the offering, price revisions on the offer, and if the offer occurred during the bubble period (1999 to 2000).

To examine the potential relationship that exists between asymmetric information and the cost of going public for ECOs as compared to other IPOs, we regress five different dependent variables that are thought to reflect the level of information asymmetry on the above independent variables.[2] The dependent variables include initial or first day return, the opportunity cost of issuance, share overhang, price revisions before the offering, and the three year cumulative market-adjusted buy-and-hold abnormal return. By specifying different dependent variables, we are able to better understand the potential relationship between asymmetric information and the cost of going public for ECOs relative to other IPOs.

The functional form of the model can be specified as follows:

$$\begin{aligned} Dep_i = \; & \alpha + \beta_1 ECO + \beta_2 LnProceeds + \beta_3 VC + \beta_4 LnAge \\ & + \beta_5 Integer + \beta_6 HT + \beta_7 Internet + \beta_8 Rank \\ & + \beta_9 Primary + \beta_{10} NasLag + \beta_{11} PartialU \\ & + \beta_{12} PartialD + \beta_{13} Bubble + \varepsilon_I \end{aligned} \tag{3}$$

where:

Dep_i = Dependent variable i;

i = $Dep_{Initial}$, Dep_{OCI}, $Dep_{ShareOver}$, $Dep_{Revision}$, or Dep_{BHRet3};

$Dep_{Initial}$ = Initial return, or underpricing, defined as the percentage change from the offer price to the closing price on the first trading day;

[2]In unreported results, we also examined gross spread as a dependent variable as it also may reflect the degree of information asymmetry. We find that status as a carve-out is unrelated to spread, which would suggest that there is no difference in information asymmetry relative to a typical IPO. As a pricing variable (similar to a commission or fee based investment account), however, it is possible that spread is indirectly related to information asymmetry via offer size, as larger accounts typically pay a smaller relative percentage. To examine this issue, we repeat the regression without the proceeds variable, finding that carve-out status is highly significant.

Dep_{OCI} = The opportunity cost of issuance, defined as money left on the table divided by preexisting equity value;

$Dep_{ShareOver}$ = Share overhang, defined as the number of shares retained relative to the total number of shares issued;

$Dep_{Revision}$ = A measure of the price revision, defined as the offer price less the initial low filing price, divided by the difference between the initial high and low filing prices;

Dep_{BHRet3} = The cumulative buy-and-hold, market adjusted abnormal return calculated from the end of the first trading day to three years later;

ECO = A dummy variable equal to one if the issue is an equity carve-out, zero otherwise;

LnProceeds = Natural logarithm of the gross proceeds of the issue in millions of dollars;

VC = A dummy variable equal to one if the issue is backed by a venture capitalist, zero otherwise;

LnAge = Natural logarithm of one plus the age of the issuing firm in years at the time of the offering;

Integer = A dummy variable equal to one if the offer price is an integer, zero otherwise;

HT = A dummy variable equal to one if the issue is a high-technology (but non-internet) firm, zero otherwise;

Internet = A dummy variable equal to one if the firm is an internet firm, zero otherwise;

Rank = The quality rank of the lead underwriter as given by Carter and Manaster (1990) and updated by Loughran and Ritter (2004);

Primary = A dummy variable equal to one if the offering is a pure primary offering (i.e., no secondary shares), zero otherwise;

NasLag = The return on the Nasdaq composite index for the 15 trading days prior to the issue;

PartialU = The percentage change from the original midfile price to the offer price if the adjustment is positive, zero otherwise;

PartialD = The percentage change from the original midfile price to the offer price if the adjustment is negative, zero otherwise; and

Bubble = A dummy variable equal to one if the offer takes place in the 1999 to 2000 period.[3]

[3]Although market returns rose prior to 1999 and peaked in March 2000, falling thereafter, we follow the majority of previous IPO studies with our definition of *bubble*. Although we analyze alternative definitions (finding no significant changes to our results), we maintain this definition for consistency and also to reflect the timing lag associated with IPO issues relative to actual market returns.

Data

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

- Information on all public corporate initial public offerings (IPOs) flagged as spin-offs to public shareholders are obtained from Thomson's SDC Platinum New Issues database during the period January 1, 1990 through December 31, 2000.[4] In addition, we use the CRSP database for the same period to obtain data for shares outstanding on the issue date as well as pricing information.[5]
- Information on all other IPOs is also generated for the same time period from SDC.
- Common stock issues only; no multiple securities issues such as stocks with warrants, or stocks and bonds issued together.
- Public issues only, i.e., no private offerings.

Our working sample contains 358 ECOs entering the IPO market over the time period of our study. These data are matched with a working sample of 3,570 IPOs to create an additional sample of 358 IPOs matched by industry, issue date, and size.[6] Specifically, for each ECO, an IPO is chosen that is within the same two-digit SIC code, issued in a six month period around the ECO and is as close to the offering size of the ECO as possible.

Summary Statistics

Table 1 presents summary statistics for firms undertaking ECOs, a matched sample of IPOs, and the full sample of IPOs for the 1990 to 2000 period. Columns one through three report means, and the final two columns report t-statistics from difference tests assuming unequal variances for the variables. According to the information asymmetry hypothesis, the initial returns for ECOs should be less than those of IPOs. Table 1 depicts an average initial return for ECOs of 14.54 percent compared to 20.96 percent for the matched sample IPOs and 27.07 percent for the full sample IPOs. These initial returns are significantly different at the five percent and one percent levels, respectively. The returns for ECOs are also less than the IPO returns reported by Loughran and Ritter (2004) who find an average first day return

[4]Note that SDC's terminology of spin-off is consistent with the research definition of equity carve-outs that we employ in this study. Specifically, SDC defines spin-offs as shares sold to the public by a parent firm who holds between 50 percent and 100 percent of the outstanding shares prior to the offering, giving no weight to the percentage of shares actually being sold.

[5]SDC is known to contain data errors, so we correct our information using data provided by Jay Ritter (http://bear.cba.ufl.edu/ritter/ipodata.htm).

[6]The three most widely studied factors for examining long-run returns are market conditions, size, and book-to-market. Our approach indirectly covers each of these factors. Specifically, in examining long-run returns, we do so on a market-adjusted basis. Moreover, our matching criteria are based on both size and industry, the latter of which is highly correlated to book-to-market ratios.

of 18.9 percent for a sample of 6,169 IPOs during the period 1980 to 2000. The results support the asymmetric information hypothesis and the results of Prezas, Tarimcilar, and Vasudevan (2000) and Hogan and Olson (2004, 2006) that show ECOs are significantly less underpriced than typical IPOs. As discussed previously, however, these findings may be biased by a failure to control for the share retention decision.

OCI can be viewed as the true opportunity cost (i.e., wealth loss) of going public to the pre-issue shareholders of the firm because it accounts for the number (and value) of shares retained. ECOs have a mean OCI of 4.13 percent, which is significantly less at the five percent level than the full IPO sample with OCI costs averaging 5.27 percent. These results imply that whether costs are being measured by the difference in underpricing or by using the opportunity cost of issuance, the costs of going public for ECOs are significantly less than the costs of going public for an average IPO. The results for the matched sample IPOs also show larger OCI of 5.03 percent, but it is not significantly different from the ECOs' 4.13 percent. Thus, while underpricing is shown to be statistically different for the ECOs and the matched sample, the opportunity costs of issuance are not. Shareholders of ECOs and the matched sample leave comparable amounts of money on the table. The results highlight the importance of the measure of the cost of going public and the selection of a control sample, two factors existing ECO research typically ignores.

An outcome of an IPO is that the percentage of insider ownership is expected to decrease. A measure of ownership dilution developed by Bradley and Jordan (2002) is share overhang, the ratio of retained shares to the public float (the shares issued in the IPO). Several hypotheses have been postulated to explain the relationship between first day returns and share overhang for IPOs. Ljungqvist and Wilhelm (2003) argue that the opportunity cost of underpricing to issuers is less if the relative float 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 float 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 a positive relationship between share overhang and first day returns for IPOs. These theories really relate to OCI, however, not underpricing. In fact, testing the theories could be problematic. For example, the signaling model mentioned above suggests that increased retention would be a positive sign to potential shareholders, thereby resulting in a reduced cost of going public. But this decision also increases overhang. Thus, the effect on underpricing could be positive or negative. This again illustrates the importance of decomposing underpricing.

In Table 1, we find share overhang values of 2.87, 2.57, and 2.92 for ECOs, the matched sample, and the full sample, respectively. The share overhang value for ECOs is significantly larger at the ten percent level when compared to the matched

sample but not significantly different when compared to the full sample. These results imply that IPOs when matched for industry, issue date, and size have insiders selling off more of the firm than do the parents of ECOs. These findings are consistent with the differences in OCI and Initial observed above.

In Table 1, price revision is defined as the offer price less the initial low filing price, divided by the difference between the initial high and low filing prices. Ljungqvist and Wilhelm (2003) and Loughran and Ritter (2004) find a positive relationship between price revisions and the level of underpricing as measured by initial return. Hogan and Olson (2004) find a similar relationship over time for initial returns for ECOs and conclude that their results suggest an increasing importance of price revisions before the offering as a signal of the initial demand and performance of ECOs.

We find price revision values of 0.48, 0.68, and 0.69 for ECOs, the matched sample, and the full sample, respectively. The price revision value for ECOs is significantly less at the ten percent level when compared to the matched sample and at the five percent level when compared to the full sample. The lower price revisions for ECOs are consistent with lower information asymmetry, as well as the lower underpricing of the offer.

We measure long-run return in Table 1 as the cumulative buy-and-hold, market-adjusted abnormal return calculated from the end of the first trading day to three years later.[7] The summary results show that all IPOs, including ECOs, have negative long-run returns, which is consistent with the findings of Ritter (1991). We find three-year cumulative buy-and-hold, market-adjusted returns of -21.33 percent, -39.67 percent, and -45.28 percent for the ECOs, matched sample, and full sample, respectively. The negative returns are consistent with the view of IPOs as fad investments. The long-run return for ECOs shows a significantly smaller loss at the ten percent level when compared to the full sample but not significantly different when compared to the matched sample. The results suggest that ECOs have the economic advantage when looking at long-run performance; when adjusting for firm-specific characteristics, however, there does not appear to be any long-run performance differences between ECOs and IPOs. These results support those of Prezas, Tarimcilar, and Vasudevan (2000) who find no significant difference between their sample of ECOs and an IPO match for six-month to a one-year holding period.

Table 2 looks at firm and issue characteristics for ECOs, the matched sample, and full sample of IPOs over the 1990 to 2000 period. We find mean size of the offering as measured by gross proceeds as $210.25, $98.43, and $52.26 million for the ECOs, matched sample, and full sample, respectively. The ECOs are significantly larger at the one percent level than the full and matched samples. Although one of the categories we use to match samples of ECOs and IPOs is size, our

[7]For the market return we use the CRSP value-weighted index.

matched sample is less than half the size of ECOs.[8] The results highlight an important distinction between ECOs and IPOs in that ECOs are fundamentally larger than other IPOs. To the extent that size can be used as a proxy for information asymmetry, ECOs will have less information asymmetry than other IPOs and should have less underpricing; however, a larger size implies a higher OCI, which is a result of the firm representing a larger economic risk to the market. Our results are consistent with Hogan and Olson (2000) who find an inverse relationship between the size of the offering and first-day excess returns.

In Table 2, we find that 13 percent, 38 percent, and 47 percent of the ECOs, matched sample, and full sample, respectively, are backed by venture capitalists. The ECOs use significantly fewer venture capitalists at the one percent level than the matched and full samples. Given the size and experience of the parent firm in dealing with the capital markets, ECOs become much less reliant on venture capitalists relative to other IPOs. In addition, ECOs do not have a great need for external seed capital, as the parent firm can most likely provide the needed financing.

We find an average age of 17.68, 13.11, and 10.48 years for the ECOs, matched sample, and full sample, respectively. The ECOs are significantly older at the one percent level than the matched and full samples. To the extent that the length of time that a firm is in existence can be used as a proxy for information asymmetry, our results suggest that ECOs have lower asymmetry.

We also find in Table 2 a significant difference between ECOs and the full sample of IPOs with regard to whether the offer price is an integer, whether the deal involves a high technology or Internet firm, the rank of the underwriter, whether the issue is a pure primary offering, market movements for the 15-day period prior to the offering, whether there is positive price adjustment prior to the offering, and whether the issue occurred during the 1999 to 2000 bubble period. It is interesting to note that once we match by industry, date, and size, these variables are no longer significantly different. To the extent that these variables can be used as proxies for information asymmetry, it will be possible to explain some of the differences in underpricing and the costs of going public between ECOs and IPOs. Also interesting is the significant difference between the negative price adjustment of -7.35 percent for ECOs and -5.57 percent for the matched sample of IPOs. The results imply that with less information asymmetry bad news will hit the ECO harder than the matched sample IPO.

[8]As a robustness check, we match in a different order, starting with size. The reason for the matching scheme reported is the relatively large scale of carve-outs. Specifically, over our sample period seven of the largest ten (and 15 of the largest 25) IPOs are carve-outs. So, matching by size potentially may create a time bias, as finding a similar-sized IPO within a given time period is difficult. Further, determining the exact size difference to allow is also subjective. Thus, we choose to match in the order presented, as we believe this is the most objective, particularly considering that the size difference is present in either approach.

Table 2—Firm and Issue Characteristics

	ECOs	Matched	All IPOs	t-statistics	
	(1)	(2)	(3)	(1) v (2)	(1) v (3)
n	358	358	3,570		
Proceeds	210.25	98.43	52.26	3.03	12.65
VC	0.13	0.38	0.47	-7.86	-17.28
Age	17.68	13.11	10.48	2.78	5.55
Integer	0.74	0.75	0.80	-0.26	-2.51
HT	0.18	0.21	0.33	-0.95	-6.75
Internet	0.06	0.07	0.12	-0.30	-4.48
Rank	7.71	7.59	6.91	0.84	7.14
Primary	0.56	0.54	0.63	0.68	-2.43
NasLag	0.77	1.15	1.19	-1.13	-1.67
PartialU	7.78	9.08	9.96	-1.06	-2.50
PartialD	-7.35	-5.57	-6.97	-2.25	-0.61
Bubble	0.14	0.15	0.21	-0.64	-3.84

Note: This table reports firm and offer characteristics for ECOs and IPOs (matched sample and full sample) for the 1990 to 2000 period. Columns 1 through 3 report means, and the final two columns report t-statistics from difference tests assuming unequal variances. Proceeds is the gross proceeds of the issue in millions of dollars. VC is a dummy variable equal to one if the issue is backed by a venture capitalist, zero otherwise. Age is the age of the issuing firm in years at the time of the offering. Integer is a dummy variable equal to one if the offer price is an integer, zero otherwise. HT is a dummy variable equal to one if the issue is a high-technology (but non-internet) firm, zero otherwise. Internet is a dummy variable equal to one if the firm is an internet firm, zero otherwise. Rank is the quality rank of the lead underwriter as given by Carter and Manaster (1990) and updated by Loughran and Ritter (2004). Primary is a dummy variable equal to one if the offering is a pure primary offering (i.e., no secondary shares), zero otherwise. NasLag is the return on the Nasdaq composite index for the 15 trading days prior to the issue. PartialU is the percentage change from the original midfile price to the offer price if the adjustment is positive, zero otherwise. PartialD is the percentage change from the original midfile price to the offer price if the adjustment is negative, zero otherwise. Bubble is a dummy variable equal to one if the offer takes place in the 1999 to 2000 period. Data are from the SDC New Issues and CRSP databases

Regression Results Full Sample

Table 3 presents the results of the regressions using the model specified by equation (3) on the full sample of ECOs and IPOs. By specifying five different dependent variables we are able to gain better insight into the level of information asymmetry and the cost of going public for ECOs relative to other IPOs. There are 3,826 observations for the Initial, OCI, share overhang, and three year buy-hold return models and 3,486 observations for the price revision model. We find adjusted R^2 values of 47.54 percent, 9.54 percent, 28.32 percent, 23.05 percent, and 4.68 percent for the initial, OCI, share overhang, price revision, and three year buy-hold return full sample models, respectively.

Regression Results for the First Day Return (Initial) Model

The initial column in Table 3 reports the regression results for the full sample when the dependent model specified by equation (3) is measured as the initial

return.[9] We find that initial returns are significantly negatively related at the one percent level to the size of the offer and significantly positively related at the one percent level to the offer price being an integer, the deal being an internet company, the 15-day return on the Nasdaq prior to the offering, the price revisions up and down prior to the offering, and if the offer is undertaken during the bubble period. The coefficients for whether the deal is high tech and the underwriter's ranking are positive and significant at the five percent level, and the coefficient for whether the deal includes only primary shares is positive and significant at the ten percent level. Whether the issue is backed by a venture capitalist and the age of the firm are not significant variables in explaining initial returns. These results are consistent with the results of Loughran and Ritter (2004) for IPOs and Hogan and Olson (2004, 2006) for ECOs.

Table 3—Regression Results (Full Sample)

	Initial		OCI		ShareOver		Revision		BHRet3	
	Coef.	t-stat	Coef.	t-stat	Coef.	t-stat	Coef.	t-stat	Coef.	t-stat
Intercept	10.65	3.34	6.58	9.86	1.12	7.47	-1.33	-9.64	-34.94	-1.34
ECO	-1.88	-0.85	-0.86	-1.88	0.20	1.97	-0.40	-4.52	42.67	2.38
LnProceeds	-4.06	-4.37	0.35	1.78	-0.18	-4.14	0.61	16.56	-26.59	-3.51
VC	0.77	0.56	-0.66	-2.31	-0.07	-1.04	0.19	3.43	79.38	7.16
LnAge	-0.91	-1.36	-0.34	-2.44	-0.07	-2.33	-0.06	-2.30	16.26	3.01
Integer	3.98	2.60	0.58	1.80	-0.06	-0.81	0.07	1.11	17.88	1.44
HT	2.47	1.75	0.31	1.06	0.52	7.91	0.42	7.41	-22.89	-1.99
Internet	19.09	7.76	-0.28	-0.55	1.13	9.83	1.27	13.22	84.43	4.22
Rank	0.96	2.39	-0.32	-3.75	0.23	11.99	-0.07	-4.40	8.31	2.54
Primary	2.40	1.82	-0.13	-0.47	0.67	10.90	0.15	-2.88	-19.89	-1.85
NasLag	0.90	7.31	0.13	4.97	-0.03	-5.77	0.05	10.32	-2.35	-2.35
PartialU	1.37	36.46	0.07	8.32	0.02	12.17			-0.07	-0.21
PartialD	0.26	4.70	0.12	10.57	-0.00	-1.42			0.24	0.51
Bubble	22.47	11.58	0.38	0.93	0.87	9.59	0.04	0.48	-140.64	-8.91
N	3,826		3,826		3,826		3,486		3,826	
Adj R^2	.4754		.0954		.2832		.2305		.0468	

Note: This table presents regression results from estimating the following model on the full sample of ECOs and IPOs:

$$Dep_i = \alpha + \beta_1 ECO + \beta_2 LnProceeds + \beta_3 VC + \beta_4 LnAge + \beta_5 Integer + \beta_6 HT + \beta_7 Internet + \beta_8 Rank + \beta_9 Primary + \beta_{10} NasLag + \beta_{11} PartialU + \beta_{12} PartialD + \beta_{13} Bubble + \varepsilon_i$$

where Dep is the dependent variable and is either Initial, OCI, ShareOver, Revision, or BHRet3. These dependent variables are defined in Table 1. ECO is a dummy variable equal to one if the issue is a carve-out, zero otherwise, and all independent variables are defined in Table 2. Data are from the SDC New Issues and CRSP databases for the 1990 to 2000 period

[9]To check for multicollinearity we ran a simple correlation matrix, finding that the highest correlation (0.20) was between the carve-out dummy and the size (lnproceeds) of the offering. All others were even smaller. Consistent with this, the VIF value was largest (2.61) for the size variable in the initial return regression. With the exception of underwriter rank, all others were well below 2.0. Thus, all variable passed the test for multicollinearity between the variables.

The coefficient for ECOs is negative but not significant in this regression, implying that when control variables are introduced the designation of whether the issue is an ECO does not further explain underpricing, which is in contrast to the results of previous studies. From Table 2, we find that ECOs are significantly larger than the full sample of IPOs and have significantly fewer offering prices that are integers, fewer high technology firms, fewer internet firms, use more prestigious investment bankers, less upward price revisions, and fewer offerings during the bubble period. These variables, which can be viewed as proxies for information asymmetry, appear to capture the differences between ECOs and other IPOs.

Regression Results for Opportunity Cost of Issuance (OCI) Model

The OCI column in Table 3 reports the regression results for the full sample when the dependent model specified by equation (3) is measured as the opportunity cost of issuance. We find that OCI is significantly negatively related at the five percent level to whether the issue is backed by a venture capitalist, the age of the firm, and the prestige of the investment banker. OCI is significantly positively related at the one percent level to the 15-day return on the Nasdaq prior to the offering, and up and down price revisions and at the ten percent level for the size of the offering and whether the offer price is an integer. OCI is not explained by the deal being high tech, an internet deal, primary shares only, or if it was issued during the bubble period.

If ECOs have less information asymmetry, it is expected that they would have a lower opportunity cost of issuance because firms, relative to their size, would need to leave less money on the table. The coefficient for the ECO variable is negative and significant at the seven percent level, implying that ECOs have a lower opportunity cost of issuance compared to the full sample of IPOs. The results suggest that even after controlling for firm characteristics, ECOs leave less money on the table. As shown in Table 2, ECOs are usually older and are more likely to have been through the IPO process before and thus are more likely to use a high ranking investment banker and also more likely to exert their market power to control costs and leave less money on the table.

Regression Results for Share Overhang (ShareOver) Model

The ShareOver column in Table 3 reports the regression results for the full sample when the dependent model specified by equation (3) is measured as share overhang. We find that share overhang is significantly negatively related at the one percent level to the size of the offering and the 15-day return on the Nasdaq prior to the offering and at the five percent level to the age of the firm. Share overhang is significantly positively related at the one percent level to whether the deal is high tech, whether it's an internet deal, the ranking of the investment banker, when the

issue includes only primary shares, positive price revisions prior to the offering, and if the issuance date occurred during the bubble period. Share overhang is not explained by whether the issue is backed by a venture capitalist, downward price revisions, or whether the offer price is an integer.

The coefficient for ECOs is positive and significant at the five percent level, thus implying that ECOs are related to higher levels of share overhang and thus less ownership dilution, which may be a function of the desire to maintain a sufficient ownership level to capture tax and reporting advantages. The combination of reduced asymmetric information and the firm's insiders selling-off a smaller percentage of the firm may be seen by the market as a signal that the insiders feel the firm is a good investment. The insignificant coefficient for ECOs in the initial model can be explained by the offsetting effects of the significantly lower OCI and significantly higher share overhang for ECOs that are observed in the OCI and ShareOver models.

Regression Results for the Price Revision (Revision) Model

The revision column in Table 3 reports the regression results for the full sample when the dependent model specified by equation (3) is measured as price revision. We find price revision is negatively related at the one percent level to the rank of the investment banker and whether the issue includes only primary shares and at the five percent level to the age of the firm. We find price revision is positively related at the one percent level to the size of the offering, the 15-day return on the Nasdaq prior to the date of issuance, and whether the deal is high tech, internet, or backed by a venture capitalist. Except for the size variable, the results are consistent with the information asymmetry hypothesis and the expected cost of going public. Price revision is not explained by whether the offer price is an integer or if the issue occurred during the bubble period.

The coefficient for the ECO variable is negative and significant at the one percent level, implying that deals labeled as ECOs will see less price revision associated with its offer price prior to the date of issuance. The result is consistent with lower information asymmetry and a reduced cost of going public for ECOs relative to the full sample of IPOs.

Regression Results for Long-Run Buy-and-Hold Strategy (BHRet3) Model

The BHRet3 column in Table 3 reports the regression results for the full sample when the dependent model specified by equation (3) is measured by the long-run, market-adjusted return, defined as the cumulative buy-and-hold, market-adjusted return calculated from the end of the first trading day to three years later. We find that long-run, market-adjusted returns are positively related at the one percent level to the age of the firm, whether the issue is backed by venture capitalists, and whether the deal involves an internet firm and related at the five percent level to the prestige

of the investment banker. We find long-run, market-adjusted returns are negatively related at the one percent level to the size of the firm and if the deal occurred during the bubble period, at the five percent level to the 15-day return on the Nasdaq prior to the date of issuance, and at the ten percent level to deals involving only primary shares. Long-run returns are not explained by whether the offer price is an integer or by up and down price revisions prior to the offering.

The coefficient for ECOs is positive and significant at the five percent level, suggesting that ECOs do significantly better in the long run compared to the full sample of IPOs. The results could be a function of ECOs having lower indirect issuance costs that are incurred after a firm becomes public. These indirect costs include management time devoted to regulatory compliance, answering brokers' and analysts' calls, preparing shareholder meetings and reports, and so on. Through the parent company, ECOs have more experienced management in dealing with these indirect costs relative to other IPOs, and as a result, more time can be devoted to the operations of the firm.

The higher long-run returns for ECOs also could be a function of the lower initial returns that ECOs have been shown to exhibit. With the significantly lower initial return, as shown in Table 1, there would be less overreaction in price and thus fewer swings in price in the long run. In unreported results, however, we include Initial in the regression and find that ECO remains positive and significant in predicting long-run returns.

Regression Results for Matched Sample

Table 4 presents the results of the regressions using the model specified by equation (3) on the matched sample of ECOs and IPOs. All columns and variables are comparable for the full sample results reported in Table 3. There are 706 observations for the Initial, OCI, share overhang, and three year buy-and-hold return models and 668 observations for the price revision model. We find adjusted R^2 values of 46.78 percent, 7.98 percent, 23.46 percent, 18.33 percent, and 1.78 percent for the Initial, OCI, share overhang, price revision, and three year buy-and-hold return matched-sample models, respectively.

Regression Results for the Matched Sample First Day Return (Initial) Model

For the Initial model, the results for the matched sample are comparable to those for the full sample except that deals when the offer price is an integer and when the issue includes only primary shares are no longer significant. First day returns continue to be negatively related to size and positively related to the deal being an internet company, the 15-day return on the Nasdaq prior to the offering, the price revisions up and down prior to the offering, if the offer is undertaken during the bub-

ble period, whether the deal is high tech, and the prestige of the underwriter. Consistent with the results of Table 3, the coefficient for ECOs is not significant.

Table 4—Regression Results (Matched Sample)

	Initial		OCI		ShareOver		Revision		BHRet3	
	Coef.	t-stat	Coef.	t-stat	Coef.	t-stat	Coef.	t-stat	Coef.	t-stat
Intercept	11.81	2.09	4.77	3.21	0.53	1.39	-0.54	-1.95	-58.62	-1.18
ECO	-1.09	-0.47	-0.26	-0.43	0.27	1.72	-0.25	-2.41	13.91	0.68
LnProceeds	-5.54	-4.28	0.45	1.33	-0.15	-1.69	0.32	5.34	12.90	1.13
VC	1.94	0.72	0.31	0.44	-0.39	-2.09	0.08	0.67	60.22	2.53
LnAge	-0.16	-0.16	-0.21	-0.81	-0.00	-0.00	-0.07	-1.46	12.43	1.43
Integer	4.21	1.65	-0.47	-0.71	0.12	0.70	0.06	0.55	44.61	1.99
HT	5.68	1.98	0.93	1.23	1.03	5.30	0.38	2.86	-5.48	-0.22
Internet	33.91	6.06	-1.06	-0.72	1.11	2.91	1.35	5.38	58.32	1.18
Rank	1.77	2.35	-0.20	-0.99	0.21	4.07	-0.05	-1.29	-10.57	-1.59
Primary	-0.76	-0.34	0.39	0.66	0.97	6.34	0.18	1.68	-0.26	-0.01
NasLag	0.67	2.57	0.13	1.89	-0.03	-1.89	0.05	4.11	-2.40	-1.05
PartialU	1.04	13.12	0.06	2.68	0.03	4.96			-1.18	-1.69
PartialD	0.27	2.44	0.15	5.13	0.00	0.27			0.15	0.16
Bubble	19.41	5.05	0.93	0.93	0.89	3.40	0.25	1.43	-85.85	-2.54
N	706		706		706		668		706	
Adj R^2	.4678		.0798		0.2346		.1833		.0178	

Note: This table presents regression results from estimating the following model on the full sample of Carve-outs and the matched sample of IPOs:

$$Dep_i = \alpha + \beta_1 ECO + \beta_2 LnProceeds + \beta_3 VC + \beta_4 LnAge + \beta_5 Integer + \beta_6 HT + \beta_7 Internet + \beta_8 Rank + \beta_9 Primary + \beta_{10} NasLag + \beta_{11} PartialU + \beta_{12} PartialD + \beta_{13} Bubble + \varepsilon_i$$

where Dep is the dependent variable and is either Initial, OCI, ShareOver, Revision, or BHRet3. These dependent variables are defined in Table 1. ECO is a dummy variable equal to one if the issue is a carve-out, zero otherwise, and all independent variables are defined in Table 2. Data are from the SDC New Issues and CRSP databases for the 1990 to 2000 period

Regression Results for the Matched Sample Opportunity Cost of Issuance (OCI) Model

For the OCI model, the results for the matched sample are much different than those for the full sample. We find that OCI is no longer significantly negatively related to whether the issue is backed by a venture capitalist, the age of the firm, and the prestige of the investment banker and no longer significantly positively related to the size of the offering and whether the offer price is an integer. Of greatest importance to this study, we also find the coefficient for ECOs is no longer significant. These results suggest that the opportunity cost of issuance for ECOs is similar to IPOs of similar size, in the same industry, and issued around the same time. Only the 15-day return on the Nasdaq prior to the offering (10 percent level), and up and down price revisions remain positive and significantly related to the opportunity cost of issuance for the matched sample. [10]

[10]An alternative hypothesis as to any differences in issue costs relates to the goals of each issue type. For example, issuing firms of ECOs may be primarily interested in divesting ownership control, and, in con-

Regression Results for the Matched Sample Share Overhang (ShareOver) Model

The results for the matched sample for the ShareOver model are comparable to those for the full sample, except that the coefficient for the venture capitalist variable is now significantly negative at the five percent level and the age of the firm is no longer significant. We find that share overhang is negatively related to the size of the offering and the 15-day return on the Nasdaq prior to the offering and significantly positively related to whether the deal is high tech, whether it's an internet deal, the ranking of the investment banker, when the issue includes only primary shares, positive price revisions prior to the offering, and if the issuance date occurred during the bubble period.

The coefficient for ECOs is positive and significant at the ten percent level, implying that the insiders for ECOs tend to retain more shares than do IPOs of firms in the same industry issuing around the same time. Thus, even though the OCI is similar for ECOs and matched firms, there still exists a difference in the share retention for ECOs. Shareholders of ECOs experience less share dilution relative to IPOs in the same industry. These results imply that the determinants of share overhang do not change much, even when the sample is matched with like firms.

Regression Results for the Matched Sample Price Revision (Revision) Model

The results for the matched sample for the Revision model are comparable to those for the full sample, except that coefficients for the venture capitalist, the age of the firm, and the ranking of the underwriter variables are no longer significant in explaining price revisions prior to the offering. We find price revision is positively related to the size of the offering, the 15-day return on the Nasdaq prior to the date of issuance, whether the deal is high tech or internet, and when the issue includes only primary shares. Price revisions for ECOs still appear to be lower than for similar IPOs. This supports the hypothesis that with less information asymmetry, there is less overreaction in price for the ECOs prior to the offering even when compared to IPOs in the same industry issuing securities around the same time.

Regression Results for the Matched Sample Long-Run Buy-and-Hold Strategy (BHRet3) Model

For the long-run return model, the results for the matched sample are much different than those for the full sample. We find that long-run, market-adjusted returns

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trast, IPO issuers may be most concerned about liquidity creation and maintaining control. The lack of significance, however, suggests that these differences have little, if any, effect. Moreover, considering our matching criteria and the reduction in significance from the whole sample to the matched samples, it appears that any difference is driven by asymmetry.

are no longer significantly positively related to the age of the firm, whether the deal involves an internet firm, and the prestige of the investment banker and no longer negatively related to the size of the firm, if the deal occurred during the bubble period, the 15-day return on the Nasdaq prior to the date of issuance, and to deals involving only primary shares. Long-run returns continue to be positively explained by whether the issue is backed by venture capitalists and negatively related to the bubble period. We also find that the coefficient for whether the offer price is an integer is now significant and positive at the five percent level, whereas it was not significant for the full sample.

The long term results do not support any difference in returns for carve-outs when matched with IPO firms having the same characteristics, suggesting that larger IPO firms do better than smaller ones. These results support those of Prezas, Tarimcilar, and Vasudevan (2000) who find no significant difference between a set of ECOs and a matched IPO sample after one year of issuance. The results also support Gleason, Madura, and Pennathur (2005), who find ECO firms that are reacquired by the parent firm due to poor performance in the long run tend to be smaller than the carve-out firms that are not reacquired.

Robustness Tests

To this point, we have found that ECOs are systematically different from typical IPOs in terms of size, age, and other factors. Failing to control for these factors, similar to prior studies, suggests that ECOs face lower issue costs as a result of reduced information asymmetry. Controlling for these factors via a matching approach eliminates much of this significance, suggesting that status as a carve-out is less significant than previously thought. Rather, it is the underlying characteristics of such firms that are important.

To provide additional confidence in our results, we conduct a series of robustness tests where we segment our sample by time period, as prior IPO studies generally find that results are often dependent on time period.[11] Although we attempt to control for this impact via our Bubble dummy, we formally address this issue by examining multiple subperiods of our matched sample within the 1990-2000 sample. For conciseness, we report results for Initial and OCI in Table 5, although our findings for the other dependent variables are generally consistent.

[11]To further address time period dependence, we considered extending the sample period; however, we found that there were relatively few carve-outs in the incremental surrounding years. For example, during 2001-2004 there were only 29 carve outs. Rather than complicating and lengthening the paper for what we feel is little marginal benefit, we have decided to exclude these from the analysis, as the lack of data may also make the results less meaningful. We do find, however, that inclusion of such issues does not materially affect our overall results.

Table 5—Regression Results (Matched Sample by Time Period)

Panel A—Bubble vs. Non-Bubble.

	Initial				OCI			
	Non-Bubble		Bubble		Non-Bubble		Bubble	
	Coef.	t-stat	Coef.	t-stat	Coef.	t-stat	Coef.	t-stat
Intercept	10.15	3.15	45.33	0.91	4.59	3.29	15.67	1.98
ECO	-0.19	-0.14	-2.65	-0.17	-0.05	-0.09	2.73	1.10
LnProceeds	-3.27	-4.19	-14.35	-2.02	-0.00	-0.00	2.13	1.89
VC	-0.68	-0.43	16.66	0.88	0.14	0.21	4.97	1.66
LnAge	-0.05	-0.09	-0.60	-0.08	-0.12	-0.50	-1.66	-1.42
Integer	4.27	3.00	-5.96	-0.26	0.27	0.44	-11.99	-3.32
HT	4.97	2.99	12.15	0.65	-0.10	-0.14	9.61	3.25
Internet	33.73	6.34	14.90	0.80	-0.12	-0.08	3.19	1.08
Rank	1.34	3.10	6.91	1.09	-0.02	-0.11	-1.34	-1.33
Primary	-0.65	-0.50	-11.00	-0.69	-0.12	-0.21	0.28	0.11
NasLag	0.59	3.26	0.43	0.44	0.33	4.19	-0.34	-2.21
PartialU	0.42	6.86	1.55	5.85	0.07	2.51	0.04	0.92
PartialD	0.35	5.55	1.13	1.42	0.13	4.83	0.27	2.14
N	604		102		604		102	
Adj R^2	.2694		.4447		.0908		.2387	

Panel B—1990-1995 vs. 1996-2000

	Initial				OCI			
	1990-1995		1996-2000		1990-1995		1996-2000	
	Coef.	t-stat	Coef.	t-stat	Coef.	t-stat	Coef.	t-stat
Intercept	10.73	3.47	18.34	0.97	4.20	3.80	11.94	2.56
ECO	-0.33	-0.24	-2.10	-0.34	0.28	0.58	-0.78	-0.52
LnProceeds	-3.32	-4.15	-5.79	-1.91	-0.25	-0.87	1.25	1.68
VC	-1.58	-1.00	7.76	1.07	0.23	0.40	0.46	0.26
LnAge	0.18	0.32	-0.05	-0.02	-0.03	-0.14	-0.81	-1.24
Integer	3.42	2.41	4.97	0.69	0.31	0.62	-2.52	-1.42
HT	5.24	2.83	3.83	0.57	0.43	0.65	0.78	0.47
Internet	12.74	1.32	32.18	3.60	0.61	0.18	-1.63	-0.74
Rank	1.35	3.18	1.57	0.67	0.04	0.25	-0.98	-1.70
Primary	-1.61	-1.23	-0.74	-0.13	-0.49	-1.05	1.64	1.13
NasLag	0.34	1.71	0.43	0.86	0.19	2.71	0.06	0.51
PartialU	0.36	5.75	1.44	9.55	0.09	3.95	0.04	1.05
PartialD	0.34	5.23	0.38	1.31	0.12	4.95	0.23	3.25
N	450		256		450		256	
Adj R^2	.2081		.4719		.1277		.0531	

Note: This table presents regression results, segmented by time period, from estimating the following model on the full sample of Carve-outs and the matched sample of IPOs:

$$Dep_i = \alpha + \beta_1 ECO + \beta_2 LnProceeds + \beta_3 VC + \beta_4 LnAge + \beta_5 Integer + \beta_6 HT + \beta_7 Internet + \beta_8 Rank + \beta_9 Primary + \beta_{10} NasLag + \beta_{11} PartialU + \beta_{12} PartialD + \varepsilon_i$$

where Dep is the dependent variable and is either OCI, Revision, or BHRet3. Panel A examines the Bubble period (1999-2000) versus the non-bubble period (1990-1998), and Panel B examines 1990-1995 versus 1996-2000. These dependent variables are defined in Table 1. ECO is a dummy variable equal to one if the issue is a carve-out, zero otherwise, and all independent variables are defined in Table 2. Data are from the SDC New Issues and CRSP databases for the 1990 to 2000 period

Consistent with prior studies, we find that many of the variables exhibit a significant degree of time period dependence. For example, offer size is positively and

significantly related to OCI in the latter half of the decade (whether defined as 1996-2000 or the bubble period), but not prior. In addition, underwriter quality and high technology/internet status has a positive impact on underpricing in the non-bubble period, but not thereafter.

Of importance to our study, however, we find that status as a carve-out does not gain or lose significance across time. Particularly for underpricing, the significance levels remain relatively constant (e.g., -0.14 and -0.17, respectively, in the non-bubble and bubble periods). For OCI, the significance levels are not as consistent, but a difference test reveals that there is no significant difference between the impacts in either the non-bubble and bubble periods or the 1990-1995 and 1996-2000 periods. Thus, our results appear to be robust to varying time periods within our sample.

Conclusions

Similar to other IPOs, ECOs incur direct and indirect issuance costs. The largest component of the costs of going public typically has been the money left on the table (MLOT), defined as the dollar change in the first day price (price at end of day 1 minus offer price) times the number of shares offered. Information asymmetry forces issuers to offer shares at a discount, thus suggesting a positive relation between information asymmetry and MLOT. Prior research has examined the relation between information asymmetry and the cost of going public by examining the level of underpricing, defined as the initial return on the first day of trading.

Dolvin and Jordan (2006) decompose the level of underpricing into the product of two components: the opportunity cost of issuance (OCI), defined as the money left on the table (MLOT) divided by the pre-issue equity value, and a measure of share overhang or retention (called economic overhang), defined as the ratio of the pre-issue equity value divided by the gross proceeds of the offering. They demonstrate that the traditional measure of underpricing introduces a bias into our understanding of the pricing of IPOs in that it fails to consider the share retention decision. By failing to do so, they show that the true cost of going public to the pre-issue shareholders will be overstated when measured by initial returns.

In this paper, we examine the cost of going public for 358 ECOs during the 1990 to 2000 period and compare these results to a broad-based sample of 3,570 IPOs and to a matched sample of 358 IPOs. The matched sample is selected based upon industry, issue date, and size of the offering. We find in univariate tests that ECOs have lower underpricing, lower opportunity costs of issuance, fewer price revisions prior to the offering, and higher long-run market-adjusted returns compared to a broad-based sample of IPOs. In addition, we find that ECOs have lower underpricing, less price revision, and higher share retention compared to a matched sample. The univariate results highlight the importance of the measure of the cost of going public: the level of underpricing or the opportunity cost of issuance.

The results also highlight the importance of the selection of a control sample to evaluate the similarities and differences between ECOs and other IPOs. We find that ECOs are much larger, older, and less likely to be backed by venture capitalists compared to both the broad-based and matched samples. We note that, despite trying to match by size, ECOs are still more than twice the size of the matched sample. When compared to the broad-based sample, we find that ECOs have fewer issues that are priced as integers, fewer high technology firms, fewer internet firms, use a higher ranked investment banker, have fewer pure primary offerings, observe fewer market movements prior to the offering, have fewer upward price revisions, and fewer issues offered during the bubble period. When compared to the matched IPO sample, however, we find that these proxies for information asymmetry are no longer significantly different.

After controlling for the above proxies for information asymmetry in multivariate tests, we find that the level of underpricing is not further explained by the designation of the offering as an ECO for either the broad based or matched samples. Decomposing underpricing into the opportunity cost of issuance and share overhang, however, we find differences between ECOs and IPOs. Consistent with information asymmetry, we find that ECOs have lower opportunity costs of issuance and higher share retention compared to the broad-based sample. The insignificant role for ECOs in explaining underpricing using the broad-based sample can be explained by the lower opportunity costs of issuance offsetting the higher share retention. Because the matching procedure eliminates many of the differences in the proxies for information asymmetry, we observe similar opportunity costs of issuance for ECOs and the matched sample. We still find that ECOs have higher share retention compared to the matched sample.

Our results broaden the understanding of ECOs, illustrating that reduced asymmetry does reduce the cost of going public, as measured by both OCI and underpricing, at least as compared to an average IPO. This finding lends support to existing studies. Our matching analysis illustrates that most of these differences are attributable to the characteristics of ECO firms (e.g., size and industry) and not necessarily to status as a carve-out, however.

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