

# **An Ex Ante Model To Estimate Issue Costs**

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## **Abstract**

Research of common stock offerings finds that the negative impact of issuance expenses can account for over three-fifths of the fall in the announcement period returns. Given the importance of issue costs, we extend the research by offering a model to estimate expected values for issue costs. This model can be used to generate the expected fall in stock value resulting from issue costs. We also perform correlation analysis detailing the significant relationship between issue costs and size variables. Lastly, we do regression analysis and find issue costs to be a key explanatory variable when accounting for stock returns.

*Keywords:* flotation costs model, underwriting expenses, stock offerings, firm size

*JEL classifications:* D82/G10/G14/G30

## **I. Introduction**

Masulis and Eckbo (1992) develop an analytical framework to explain the firm's choice of equity flotation methods. Despite the higher issuance costs associated with an "underwritten" offering, firms typically choose this form over others (e.g., "best efforts" or "rights"). Hull and Kerchner (1996) describe the costs of an underwritten primary offering as either "cash" or "noncash." These categories are similar to "direct" and "indirect" costs that are also used by the research. Cash costs cause an immediate cash

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compensation for underwriters as they are paid directly out of the cash proceeds received from the security offering. These costs consist of the underwriting spread as well as administration, registration, and legal expenses. Noncash costs are not paid directly out of the cash proceeds and include costs that can be difficult to estimate (such as underpricing and warrants). When documenting the negative impact of flotation costs, researchers offer different proxies for issue costs. For example, while Eckbo (1986) only uses the cash cost of the underwriting spread, Hull and Fortin (1993/1994) attempt to consider all cash and noncash costs.

In their seminal work, Mikkelson and Partch (1986) use cash costs in studying the influence of issue costs on stock value. Their work assumes that cash costs proxy for total issue costs and also that issue costs affect the firm's stock price when the primary offering is first announced. In agreement with Mikkelson and Partch (1986), Asquith and Mullins (1986) express the belief that current common shareholders bear the costs of the offering at the time of the announcement.<sup>(1)</sup>

Most recently, Hull and Kerchner (1996) focus on cash costs and the noncash cost of underpricing. They find that the negative effect of these costs, as a percentage of common stock value, averages -1.59 percent. This negative effect is over three-fifths of the negative mean announcement period stock return of -2.62 percent. They point out that regression tests are inconclusive when trying to decide if issue costs can explain announcement period returns. This is because issue costs variables are highly correlated with size variables (for example, firm size and relative offering size) causing interpretation problems.

While not neglecting the interpretation problems, this study centers much of its attention on the practical problem of gathering reliable data for the expected issue costs. Prior research has relied totally on *ex post* data as a proxy for expected issue costs. While this reliance is a starting point for analyzing issue costs, it has difficulties. For example, the market response to the costs of a new issue reflects

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expectations about costs and not necessarily what *ex post* values tell us about costs. The trouble is compounded when unexpected outliers occur for *ex post* values. Perhaps most important, a sample can be substantially reduced due to the unavailability of *ex post* data.

To answer the above concerns, we develop a regression model to estimate expected values for issue costs. Our model considers the correlation between issue costs and characteristics such as firm size, underwriter reputation, riskiness of the offering, and listing. Our model explains over 50 percent of the variation in *ex post* issue costs values. We use coefficients from the explanatory variables in our regression model to generate expected issue costs values for each sample observation. Expected values are created even for those observations without *ex post* issue costs data.

Using our model values, we conduct empirical tests. First, we perform correlation analysis detailing the significant relationship between issue costs and size variables. Second, regression tests examine whether issue costs can account for the negative announcement period returns when firms issue common stock. We show that an issue costs variable generally outperforms information, agency, and tax variables previously documented by the research as accounting for stock returns.<sup>(2)</sup>

We organize the remainder of our paper as follows. In the second section, we review the issue costs model of Hull and Fortin (1993/1994). In the third section, we describe our sample of 737 stock offerings, present our methodology for estimating expected issue costs, and report descriptive statistics. The fourth section offers correlation and regression results. In the final section, we give summary statements.

## **II. An issuance expenses model**

### **A. Two equations**

Hull and Fortin (1993/1994) develop an issuance expenses model that quantifies the influence of flotation costs on stock value. In presenting their model, they derive a flotation costs adjusted variable

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that captures the magnitude of the expected impact of issuance expenses on the stock's actual return for day 0. This variable (ADJ) is:

$$ADJ = -1 \times (IES/P_b) \times (dN/N) \quad (1)$$

where  $ADJ > 0$ , IES is the expected issuance expenses per new share ( $IES < 0$  to express the negative cash outflow),  $P_b$  is the stock price,  $dN$  is the planned new shares, and  $N$  is the number of outstanding shares on the announcement day.

Equation 1 can be expressed as

$$ADJ = -1 \times COS \times SHR \quad (2)$$

where  $COS$  is  $IES/P_b$ , and  $SHR$  is  $dN/N$ . Defining  $IE$  as equal to  $(IES) \times (dN)$  (where  $IE$  is simply the total expected costs of the offering), then  $ADJ$  can be expressed as  $-(IE/N)/P_b$ . This expression focuses on  $ADJ$  as a measure of the impact of issuance expenses per outstanding share as a fraction of the stock price.<sup>(3)</sup>

### B. Estimating COS

From Equation 2, we can see that the influence of issue costs on stock value becomes more negative as values for  $COS$  become more negative or values for  $SHR$  become more positive. Because values for  $SHR$  are given at the time of the announcement, the major task is estimating values for  $COS$ . Prior research uses *ex post* data when estimating  $COS$  values. However, using *ex post* data can lead to potential problems. Below we describe three problems.

First, to weigh the effect of issue costs at the time of the announcement, we must know the expected impact of issue costs as estimated at the time of the announcement and not the *ex post* data given later. Second, the outliers found in *ex post* data are most likely not expected by the market at the time of initial announcement. Third, *ex post* data may not be available. While the biggest problem is the availability of noncash costs, even cash data may be unavailable.

In the next section, we present our methodology for estimating COS. This methodology attempts to alleviate problems associated with *ex post* data.

### III. Sample, Methodology, and Descriptive Statistics

#### A. Sample

In this study, the major sources for the descriptive statistics, information necessary to estimate issuance expenses variables (COS and ADJ), and data needed for regression tests are: the *Investment Dealers' Digest (IDD)* and *The Wall Street Journal (WSJ)*, Compustat Annual Files, Moody's Industrial Manual, proxy statements, investment banking companies, and CRSP Price and Return Files. *IDD* is the primary source for both issue costs data and common stock offering announcements.

Our sample consists of 737 observations covering the years from 1970 through 1989. These observations must survive the following screens.

1. Each must be listed on the CRSP Price and Return Files and have trading data to calculate its announcement period stock return.
2. Each must not be identified as a utility because announcements by utilities are often known in advance.
3. Except for *ex post* issue costs data, each must have available data from the sources to compute values for variables used in empirical tests.
4. Each must have a percentage change in outstanding common stock that lies between 0.5% and 100%.
5. Each must be a common stock offering where the stated purpose is to reduce debt or preferred stock.

The last screen *ceteris paribus* eliminates the valuation influence associated with a change in productive assets. However, this screen cannot eradicate any agency and signaling effects that might be common to all stock offerings (whatever the purpose of the offering). This screen can also not eliminate any impact (such as a lost tax shield effect) that might arise from the valuation effect of losing debt. However, the direction of the valuation effect from the change in a firm's debt level cannot be known with

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certainty. For example, many theorists (and for various reasons) argue that an increasing debt ratio leads to ever increasing leverage-related costs such that positive debt-related effects will eventually stop increasing (e.g., DeAngelo and Masulis, 1980; Kim, 1982; Leland, 1994). Thus, decreasing debt can either increase firm value by reducing leverage-related costs or decrease firm value by reducing positive debt-related effects.

Included in our 737 observations are 504 stock offerings that raise cash to retired debt and 233 offerings where the new stock is traded for senior holdings. Of the 233 offerings, the financial press describes 28 as "exchange offers" and 205 as "private swaps."<sup>(4)</sup> In our sample, we find 174 OTC, 188 AMEX, and 375 NYSE firms. There are 127 combination offerings.<sup>(5)</sup> In addition, 41 offerings retire senior securities other than nonconvertible debt. Finally, there are seven investment banking firms who are the head underwriters for a little over half of our sample's offerings (n=387). The following seven firms and their respective number of offerings are: Goldman Sachs, 90; Salomon Brothers, 71; Merrill Lynch, 53; Kidder Peabody, 50; Lehman Brothers, 49; Morgan Stanley, 41; and, First Boston, 33. These firms are all identified by Johnson and Miller (1988) as either bulge or major bracket firms.<sup>(6)</sup>

#### **B. Calculating *ex post* issue costs values**

To calculate *ex post* values for issue costs, we need to ideally get cash and noncash costs. The *ex post* cash values are typically obtainable because firms are required to report them. However, obtaining *ex post* noncash costs is difficult. A few researchers have attempted this task that involves estimation procedures.

For example, Hull and Kerchner (1996) examine OTC, AMEX, and NYSE stock offerings (n=323) and estimate the noncash cost of underpricing. They compute underpricing as the percentage below the market price at which the offering price is set. Expressing the percentage as a negative number to represent the negative cash flow to the company, they estimate that the average percentage is nearly

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-3%. Smith (1977) documents that one-third of the observations in his NYSE/AMEX stock offering sample involve warrants. These warrants are given to investment bankers at a price well below their true value. Smith (1977) estimates that the costs from warrants range from over -3% to -6% of the offering price. Thus, for any single offering with a one-third probability of having warrants, we can expect a range from -1% to -2%. However, Ng and Smith (1996) note that the actual percentage becomes more negative as the size of the issue decreases. For our sample with OTC firms, we estimate the costs from warrants to be -2%. Thus, even without considering costs for debt reduction and miscellaneous expenses such as postage and employees' time, we estimate the noncash costs for underpricing and warrants to be -5% (-3% + -2%) of the offering price.

In this paper, we calculate *ex post* values for COS (or IES/P<sub>b</sub>) by dividing *ex post* cash costs per new share by the offering price.<sup>(7)</sup> Like prior research (e.g., Masulis, 1980; Rogers and Owers, 1985; Mikkelson and Partch, 1986; Hand, 1989), we assume that cash costs proxy for total costs. While this assumption may seem heroic, it is not without merit for several reasons. First, only cash costs are readily available and known with certitude. Researchers (e.g., Smith, 1977; Hull and Kerchner, 1996) acknowledge the difficulties of estimating noncash costs. Second, cash costs is a workable representative of the total costs because firms with large cash costs also have large noncash costs. For example, Hull and Kerchner (1996) find that underpricing is greatest for firms for which cash costs are greatest. They also discuss the negative relationship between both underpricing and warrants with firm size. They point out that a warrant's exercise price is generally believed to be tied to the offering price reinforcing the underwriter's incentive to underprice when warrants are used.<sup>(8)</sup>

In conclusion, firms with greater cash costs tend to have greater noncash costs causing cash costs to plausibly proxy for total costs. This is important because data for noncash costs is not readily available. Thus, by using cash costs as a proxy, our sample size will not be severely reduced.

### C. "Model" method for estimating COS values

We now describe our method for estimating COS values. We refer to this method as the "model" method because it relies on a regression model. Using *ex post* cash costs as the dependent variable, we generate coefficients for explanatory variables. These coefficients can be used to estimate "model" values for COS for all observations including those without *ex post* data.

#### 1. Observations with unavailable or problematic data

Of our 737, there are 582 observations without available *ex post* cash data.<sup>(9)</sup> As noted earlier, we are trying to generate a model with expected values (because this is what market participants will consider when buying and selling outstanding shares of firms that announce a stock offering). Thus, before we regress *ex post* values for COS values against independent variables, we need to come up with some sort of filter to delete those observations with unexpected *ex post* COS values. This will allow us to filter out observations with "noisy" elements that may result from unusual circumstances or simply errors in reporting. This filter is necessary because of the sensitivity of the model to extreme values.

A filter can be achieved by deleting outliers with extreme values for issue costs. For this study, we define an outlier as any observation that has *ex post* cash costs that are over two standard deviations removed from its mean value. An examination reveals 16 observations with extreme values satisfying out definition and thus judged to be unexpected.<sup>(10)</sup> After adding these 16 deletions to those 155 observations without available data, we have 171 observations that we classify as not having *ex post* issue costs data.

#### 2. Fifteen independent variables

The "model" method requires the existence of independent variables capable of estimating COS values. For those 566 observations classified as having *ex post* data, we test 15 independent variables to determine their capacity to explain *ex post* COS values. These variables are described below.

LFS = the logarithm of firm size expressed in millions of dollars with firm size proxied by the market value

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of common stock.<sup>(11)</sup>

WRI = 1 if the lead underwriter is one of those seven underwriters (described earlier) who head 387 of the 737 offerings, else WRI = 0.

SHE = 1 if shelf offering, else SHE = 0.

EXC = 1 if exchange offer, else EXC = 0.

SWA = 1 if private swap, else SWA = 0.

LIS = 1 if stock listed on NYSE or AMEX, else LIS = 0.

PER = 1 if offering occurs during the 1980s, else PER = 0.

TYP = 1 if common stock retires convertible debt or preferred stock, else TYP = 0.

OFF = the expected market value of the common stock offering.

SHR = the planned new (or primary) common shares divided by outstanding shares.

REL = the face value of the retired fixed obligation divided by equity value (which includes the market value of common stock and the liquidation value of preferred stock). Values are negative to represent the decrease in leverage.

SR1 = a firm's stock price performance preceding the announcement period as measured by the cumulative return for days -220 to -21 before the announcement.

MR1 = the market's stock price performance preceding the announcement period as measured by the cumulative return for days -220 to -21. We use the equal-weighted CRSP OTC market index for OTC firms and CRSP NYSE/AMEX market index for NYSE/AMEX firms.

CE1 = a firm's stock price performance preceding the announcement period as measured by the cumulative excess return for the period from days -220 to -2. We compute values adjusting stock returns for market returns given by the equal-weighted CRSP OTC market index for OTC firms and CRSP NYSE/AMEX market index for NYSE/AMEX firms.

SD1 = the stock price risk as measured by the standard deviation of the stock's return for days -220 to -21.

The selection of LFS is based upon the well-documented correlation between issuance expenses

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per new share and firm size. Lower negative values for COS for large firms stem from economies of scale factors and lower selling risk due to many potential buyers.<sup>(12)</sup> The variable WRI is chosen since those underwriters, who do greater volumes, may be more established with a superior reputation.<sup>(13)</sup> On one hand, these firms may take advantage of their superior reputations by charging higher fees. However, they may have a more diversified clientele (and a clientele with whom they have an ongoing relationship). This factor leads to significant risk reduction and, along with economies of scale, should cause lower issue costs. Consistent with this notion, Carter and Dark (1990) find those more prestigious underwriters have smaller spreads and thus lower issue costs. We use SHE since shelf offerings typically have lower issuance expenses. Researchers (e.g., Allen, Lamy, and Thompson, 1990; Denis, 1991) show that firms choosing shelf registration may enjoy a cost advantage over other firms despite the registration procedure used.

EXC and SWA are selected because exchange offers and private swaps are associated with smaller issuance expenses. LIS is chosen because OTC firms have less frequently traded shares and more volatile stock prices. These factors involve more selling risk for investment bankers leading to greater issuance expenses. Both SWA and LIS are also relevant explanatory variables because greater issue costs are linked to small firms (private swaps consist of larger firms and OTC firms compose smaller firms).

We test PER because flotation costs for our observations become less negative over time. This is because shelf offerings and private swaps (both of which have lower issue costs) are more prominent in the 1980s. TYP is a possible explanatory variable if flotation costs are influenced by risk factors that may be correlated with the form of borrowing retired. A more junior-for-senior transaction should be viewed with more negativity (and thus more risk). For instance, adverse selection theorists (e.g., Myers, 1984; Myers and Majluf, 1984) argue that the market penalizes a firm to the extent a more junior form of borrowing is chosen over a more senior form of borrowing.

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We include OFF since issue expenses become less as the size of the offering increases. This is because fixed costs are similar no matter what the offering size. Also, larger offerings are undertaken by larger firms. This reinforces the prediction that issue expenses will become less as the size of the offering increases. SHR and REL are chosen to detect if the relative size of the offering or the leverage change is important. According to signaling proponents (e.g., Leland and Pyle, 1977; Ross, 1977), there can be greater negative news (and thus more issuance risk) for larger junior-for-senior transactions. Also, more positive values for SHR and more negative values for REL occur for smaller firms for which issue costs are greater.

SR1, MR1, and CE1 test if prior stock price performance influences issuance expenses. We expect superior prior stock prices to produce lower costs if investment bankers feel there is less risk in selling (for example, due to investor optimism stemming from more favorable stock prices). Also, higher stock prices make fixed costs less on a per dollar basis. Finally, we include SD1 because firms with greater risk (as represented by greater SD1 values) are expected to have greater issuance expenses.

### **3. Stepwise tests**

Although not perfect, one helpful preliminary tool (in choosing a regression model to explain a dependent variable) is the stepwise regression procedure. We assume linearity for this regression test (and subsequent regression tests). Although details are omitted, we cannot improve the explanatory capacity of our model by conducting nonlinear tests. Using the above 15 variables, the stepwise test indicates that the following regression model does the best job of estimating COS values:

$$EX\ POST = b_0 + b_1LFS + b_2WRI + b_3MR1 + b_4SD1 + b_5LIS + b_6EXC$$

where *EX POST* refers to the *ex post* values for COS computed by dividing *ex post* cash costs per new share by the offering price. LFS, WRI, MR1, SD1, LIS, and EXC are not only the first six variables that

**Table I. OLS regression results when the dependent variable is *ex post* COS values for 566 common stock offerings that reduce outstanding senior obligations, 1970-1989**

The regression model is:  $EX\ POST = b_0 + b_1LFS + b_2WRI + b_3MR1 + b_4SD1 + b_5LIS + b_6EXC$ .

*EX POST* = the *ex post* values for COS calculated by dividing *ex post* issuances expenses per new share by the offering price. Issuance expenses include *ex post* cash costs, e.g., those standard underwriting expenses (spread, administration, registration, and legal) that are routinely reported by the financial press around the time of the offering. *EX POST* values are negative to reflect the cash outflow incurred by the issuing firm. Values for *EX POST* are in decimal form.

LFS = the logarithm of firm size expressed in millions of dollars with firm size proxied by the market value of common stock.

WRI = 1 if the lead underwriter is one of those seven underwriters who head 387 of the 737 offerings, else WRI = 0.

MR1 = the market's stock price performance preceding the announcement period as measured by the cumulative return for days -220 to -21. We use the equal-weighted CRSP OTC market index for OTC firms and CRSP NYSE/AMEX market index for NYSE/AMEX firms. Values for MR1 are in decimal form.

SD1 = the stock price risk as measured by the standard deviation of the stock's return for days -220 to -21. Values for SD1 are in decimal form.

LIS = 1 if stock listed on NYSE or AMEX, else LIS = 0.

EXC = 1 if exchange offer, else EXC = 0.

Variable	Coefficient or Parameter Estimate	Standard Error	t Statistic	One-Tail Test Prob> t	Variance Inflation Factor
INTERCEPT	-0.0687	0.0048	-14.258	0.0001	0.000
LFS	0.0051	0.0004	14.041	0.0001	1.635
WRI	0.0034	0.0009	3.584	0.0002	1.274
MR1	0.0098	0.0025	3.905	0.0001	1.076
SD1	-0.2288	0.0546	-4.190	0.0001	1.258
LIS	0.0040	0.0011	3.603	0.0002	1.344
EXC	0.0086	0.0041	2.110	0.0177	1.002

F Value: 97.11

R-Square Value: 0.510

Adjusted R-Square: 0.505

enter the stepwise regression test, but the  $C_p$  selection statistic of Mallows (1973) suggests that these variables produce a model with unbiased parameter estimates (Daniel and Wood, 1980). This is because the  $C_p$  value first approaches the number of the variables when these six variables enter the model.

Table I reports ordinary least squares (OLS) regression results. It reveals an intercept of -0.0687 or -6.87%.<sup>(14)</sup> The coefficients for the six variables have their expected signs and are significant at near

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the 1% level or better (for one-tailed tests). The table reveals that the model is statistically significant ( $F = 97.11$ ) with an adjusted *r-square* value close to 0.51. Although the variance inflation factors (VIFs) are not high enough to imply there is multicollinearity (see Kennedy, 1998), the VIFs for LFS and LIS indicate some concern about potential collinearity between these two variables. Deleting LIS does not materially alter the regression results while lowering the VIF for LFS to 1.35 (from 1.65). When any of the other nine variables enter the model they have their expected coefficient signs but are not significant at the 0.05 level (only one variable, SHR, is significant at the 0.1 level with  $t = -1.33$ ). Adding any of these nine variables does not affect the statistics for the six model variables. Also, the coefficients and  $t$  statistics for the remaining explanatory variables tend to change very little when slight variations in the model are made in terms of omitting any of the six model variables.

#### **D. Descriptive statistics for COS estimates using both methods**

Because each of our 737 observations have values for the six explanatory variables in our model, we can now use the intercept and six coefficients given in Table I to compute an estimate of COS for each of our 737 observations. We do this for each observation by taking each of its six values times the corresponding coefficient, summing these multiplications, and adding this sum to the intercept. We refer to this COS estimate as a "model" value (as opposed to an "*ex post*" value).

Table II reports descriptive statistics for COS when using both the "*ex post*" and "model" methods to estimate the expected cash costs stemming from the stock offering. The table gives statistics for five time periods and the total period. We see that 336 of the 737 observations occur between 1982 and 1985. This disparity results because most of the 205 private swaps occur during this period (in response to tax legislation that was in effect between August 1981 and July 1984).

The results in Table II suggest that COS values become less negative over time. However, this is

**Table II. Descriptive statistics by time periods for COS (expected issuance expenses per new share divided by the offering price) for common stock offerings that reduce outstanding senior obligations, 1970-1989**

"Ex post" values for COS are obtained by dividing the issuance expenses per new share by the offering price. Issuance expenses include the *ex post* cash costs, e.g., those standard underwriting expenses (spread, administration, registration, and legal) that are routinely reported by the financial press around the time of the offering. "Model" values for COS are calculated by using the intercept and six coefficients given in Table I. For each observation, we take its values for each of the six variables and multiply each of these values times its corresponding coefficient, then sum these multiplications, and add this sum to the intercept.

Period	COS	N	Mean	Median	Standard Deviation	Minimum	Maximum
1970-73:							
	<i>Ex Post</i>	69	-0.0497	-0.0480	0.0131	-0.0791	-0.0205
	Model	93	-0.0526	-0.0538	0.0090	-0.0697	-0.0221
1974-77:							
	<i>Ex Post</i>	53	-0.0557	-0.0561	0.0127	-0.0818	-0.0267
	Model	70	-0.0554	-0.0575	0.0110	-0.0753	-0.0302
1978-81:							
	<i>Ex Post</i>	183	-0.0540	-0.0515	0.0145	-0.0848	-0.0170
	Model	202	-0.0527	-0.0534	0.0105	-0.0895	-0.0294
1982-85:							
	<i>Ex Post</i>	232	-0.0456	-0.0419	0.0129	-0.0801	-0.0174
	Model	336	-0.0458	-0.0445	0.0101	-0.0791	-0.0238
1986-89:							
	<i>Ex Post</i>	29	-0.0420	-0.0400	0.0114	-0.0629	-0.0197
	Model	36	-0.0451	-0.0467	0.0098	-0.0661	-0.0258
1970-89:							
	<i>Ex Post</i>	566	-0.0496	-0.0480	0.0141	-0.0848	-0.0170
	Model	737	-0.0494	-0.0490	0.0108	-0.0895	-0.0221

not necessarily indicative of a changing COS function since the sample's larger firms are more prevalent during later years (e.g., private swaps, which are undertaken by large firms, occur exclusively in the 1980s). Although details of our tests are omitted, we do not find differences in mean and median COS values when observations with similar firm size values are compared across time.

Table II reveals that the "model" method generates lower standard deviations (than the "*ex post*")

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**Table III. Mean (median) descriptive statistics for key variables**

Key Variables	Total Sample (n=737)	With Costs Data (n=566)	Without Costs Data (n=171)
<sup>a</sup> Market Value of Common Stock	\$683M (\$193M)	\$612M (\$194M)	\$918M (\$192M)
<sup>b</sup> Expected Value of Planned New (or Primary) Shares	\$40M (\$17M)	\$38M (\$18M)	\$45M (\$15M)
<sup>c</sup> Planned New Common Shares / Outstanding Common Shares	0.1416 (0.1105)	0.1420 (0.1137)	0.1400 (0.0893)
<sup>d</sup> Ex Post Issuance Expenses Per New Share / Market Price	not applicable	-0.0496 (-0.0480)	not applicable
<sup>e</sup> "Model" Issuance Expenses Per New Share / Market Price	-0.0494 (-0.0490)	-0.0496 (-0.0493)	-0.0489 (-0.0482)
<sup>f</sup> Ex Post Issuance Expenses / Market Value of Common Stock	not applicable	-0.0079 (-0.0053)	not applicable
<sup>g</sup> "Model" Issuance Expenses / Market Value of Common Stock	-0.0078 (-0.0053)	-0.0079 (-0.0055)	-0.0079 (-0.0044)
<sup>h</sup> Two-Day Cumulative Abnormal Return (CAR)	-0.0224 (-0.0196)	-0.0245 (-0.0217)	-0.0157 (-0.0119)

<sup>a</sup> Closing market price the day before the announcement times the number of shares outstanding as given by the source that is the closest, yet prior, to the announcement.

<sup>b</sup> Closing market price the day before the announcement times the planned new (or primary) common shares.

<sup>c</sup> This is SHR as given in Equation 2.

<sup>d</sup> This is COS as given in Equation 2. *Ex post* issuance expenses include cash costs, e.g., those standard underwriting expenses (spread, administration, registration, and legal) routinely reported by the financial press around the time of the offering. The offering price proxies for the market price (see endnote 7).

<sup>e</sup> COS using the "model" method described in Section III.C.

<sup>f</sup> COSxSHR using *ex post* cash costs. (If we multiply by -1, we get the value for ADJ given by Equation 2.)

<sup>g</sup> COSxSHR using the "model" method to generate values for COS.

<sup>h</sup> See Section III.E for details on how two-day CARs are calculated.

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method). One might argue that this suggests the values produced by the "model" method are more consistent with expected values. Although not shown in Table II, we find that those 171 observations--classified as not having *ex post* data--have model values that are similar to those 566 observations classified as having *ex post* data.

#### **E. Descriptive statistics for key variables**

We use the *OLS* market model procedure described by Brown and Warner (1985) for calculating two-day CARs used in Table III (and subsequent tables). When computing CARs, we utilize the equal-weighted CRSP NYSE/AMEX (CRSP OTC) index for NYSE/AMEX (OTC) listed firms, and the alpha and beta parameters suggested by Scholes and Williams (1977). These parameters are computed using an estimation period of days +41 to +240 after the announcement date (event day 0). Although not reported, similar CARs are found when using standard *OLS* alphas and betas, value-weighted indices, other comparison periods, or other event period models.

Table III reports mean and median descriptive statistics for the total sample and two groups: those 566 observations classified as having *ex post* issuance expenses data and those 171 observations classified as not having issuance expenses data. The groups generally have similar statistics for firm size, the relative size of the offering, and issuance expenses variables. However, differences in several mean and median values suggest that the two groups display some heterogeneity.<sup>(15)</sup>

The "total sample" column in Table III reveals that the mean for cash costs, divided by the market value of common stock, is about 35% of the mean two-day CAR ( $-0.0078 / -0.0224 = 0.35$ ). This percentage is similar to that reported by Hull and Kerchner (1996) when they use cash costs.

## IV. Empirical results

### A. Correlation results

We now perform correlation analysis to explore the relationship between issue costs and size variables (such as firm size and the relative size of the offering). As suggested by prior research (e.g., Hull and Pinches, 1994/1995; Hull and Kerchner, 1996), this analysis will make us aware of the interpretation problems when conducting regression tests. Table IV records correlation results for two issuance expenses variables given by the Hull and Fortin (1993/1994) flotation costs model (COS and ADJ), five relative size variables, and a firm size variable (LFS).<sup>(16)</sup> Two of the relative size variables (SHR and REL) were given earlier and the other three are given below.

LEV = the face value of the planned reduction in fixed obligations divided by firm value. We define firm value to include the market value of common stock, the liquidation value of preferred stock, the book value of all long-term debt obligations, and current liabilities. Values for LEV are negative to represent the decrease in leverage.

PCE = the expected value of the planned offering divided by equity value. We define equity value to include the market value of common stock and the liquidation value of preferred stock.

PCH = the percentage of total shares owned by managers after the common stock offering divided by their percentage of total shares owned before the offering. Values are computed under the assumption that managers do not participate in the offering.

We examine the COS variable to detect if correlation exists between it and the five relative size variables. Significant correlation is suspected since firms undergoing greater relative size changes tend to be smaller firms with greater issuance expenses. From Equation 2, we know that the flotation costs adjustment variable (ADJ) will be correlated with COS and SHR (or other relative size variables similar to SHR). We investigate LFS because of its significant correlation with COS.

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**Table IV. Correlation analysis results for issuance expenses and relative size variables**

COS = the expected issuance expenses per new share divided by the offering price using either the "ex post" or "model" method (see the NOTE below). Issuance expenses include cash costs, e.g., those standard underwriting expenses (spread, administration, registration, and legal) routinely reported by the financial press around the time of the offering. As before, values for COS are negative to reflect the cash outflow caused by the new issue.

ADJ = the chosen estimated COS value multiplied by SHR (as defined below).

REL = the face value of the retired fixed obligation divided by equity value (which includes the market value of common stock and the liquidation value of preferred stock). Values are negative to represent the decrease in leverage.

LEV = the face value of the planned reduction in fixed obligations divided by firm value (which includes the market value of common stock, the liquidation value of preferred stock, the book value of all long-term debt obligations, and current liabilities). Values are negative to represent the decrease in leverage.

PCE = expected value of the planned offering divided by equity value (which includes the market value of common stock and the liquidation value of preferred stock).

SHR = planned common shares divided by outstanding common shares.

PCH = the percentage of total shares owned by managers after the common stock offering divided by their percentage of total shares owned before the offering (computed under the assumption that managers do not participate in offering).

LFS = the logarithm of firm size expressed in millions of dollars with firm size proxied by the market value of common stock.

NOTE. The lower left (upper right) portion of the table reports Pearson (Spearman) correlation coefficients. The first line gives correlation coefficients when COS and ADJ are given by the "model" method (n=737). The results for the second line use the "ex post" method (n=566). Each coefficient is significant at the 0.0001 level.

	COS	ADJ	REL	LEV	PCE	SHR	PCH	LFS
COS		-0.76	0.70	0.68	-0.67	-0.66	0.66	0.95
		-0.64	0.46	0.43	-0.46	-0.46	0.46	0.70
ADJ	-0.66		-0.94	-0.86	0.99	0.99	-0.99	-0.78
	-0.58		-0.92	-0.84	0.97	0.97	-0.97	-0.79
REL	0.55	-0.79		0.91	-0.94	-0.94	0.94	0.73
	0.40	-0.89		0.91	-0.94	-0.94	0.94	0.73
LEV	0.58	-0.75	0.89		-0.86	-0.85	0.85	0.69
	0.35	-0.74	0.86		-0.86	-0.85	0.85	0.69
PCE	-0.56	0.97	-0.79	-0.76		0.99	-0.99	-0.70
	-0.35	0.92	-0.90	-0.77		0.99	-0.99	-0.71
SHR	-0.56	0.98	-0.79	-0.74	0.99		-1.00	-0.70
	-0.35	0.93	-0.90	-0.76	0.99		-1.00	-0.71
PCH	0.61	-0.96	0.79	0.76	-0.98	-0.98		0.70
	0.40	-0.93	0.90	0.78	-0.97	-0.98		0.71
LFS	0.94	-0.67	0.57	0.59	-0.60	-0.60	0.65	
	0.68	-0.67	0.64	0.58	-0.59	-0.59	0.65	

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The lower left-hand portion of Table IV reports Pearson correlation coefficients, while the upper right-hand portion of each panel reports Spearman coefficients. The top row for each portion gives results for the total sample (n=737) with coefficients for COS and ADJ generated by "model" values. The bottom row reports results for those 566 observations classified as having *ex post* issuance expenses data. For this row, *ex post* values for COS and ADJ are used in the correlation tests.<sup>(17)</sup>

Table IV reveals that correlation coefficients between COS and the five relative size variables range in absolute magnitude from 0.35 to 0.70. In comparison, the coefficients between ADJ and the five relative size variables are greater ranging from 0.74 to 0.99 in absolute magnitude. This comparison is important because it reveals that ADJ is more likely than COS to capture any valuation effects attributable to the relative size of the leverage change. For example, the relative size of the leverage decrease may proxy for the amount of the positive effects caused by lowering bankruptcy and agency costs. A positive agency effect occurs when reducing fixed obligations remove restrictions that prevent managers from pursuing wealth maximizing choices. We conclude that an error-in-variables problem can exist when ADJ is used in regression tests because a "missing variable" (e.g., a relative size variable that captures bankruptcy and agency effect) is highly correlated with an included variable (e.g., an issuance expenses variable such as ADJ).

Whereas ADJ may capture wealth effects other than those stemming from issue costs, the results in Table IV also suggest a similar situation for COS. For example, the significant correlation between COS and LFS implies that COS can capture the effect of firm size if LFS is missing from the regression test (Pearson and Spearman correlation coefficients using "model" values are 0.95 and 0.96, respectively). Finally, Table IV reveals that LFS, like COS and ADJ, is highly correlated with relative size variables (coefficients range from 0.57 to 0.73 in absolute magnitude). Thus, collinearity will also be suspected if LFS is used with any of the five relative size variables. In conclusion, one must be cautious when

interpreting regression results for the eight variables in Table IV.

## B. Regression findings

### 1. Stepwise regression results

We now do regression analysis to explain two-day CARs. Our tests consider 30 explanatory variables. While not inclusive of the total universe of variables from extant research, they represent a diversified subset that can capture the valuation impact of signaling, agency, tax, and flotation costs models. We omit the detailed discussion of their predicted influence because prior researchers have discussed the predicted effects for most of these variables (e.g., see Asquith and Mullins, 1986; Masulis and Korwar, 1986; Hull and Pinches, 1994/1995; Hull, Mazachek, and Ockree, 1998; Hull, 1999).

Included in the 30 variables are 20 variables described previously. Two of these 20 variables, COS and ADJ, examine for an issuance expenses effect. In order to test all 737 observations, we use the "model" method to compute values for these two variables. Also, Hull and Pinches (1994/1995) and Hull and Kerchner (1996) have already reported findings when *ex post* values for COS are used in regression tests.<sup>(18)</sup> The other 18 previously described variables are included to help detect if the factors expected to influence issue costs also affect announcement period returns. The final ten variables are described below.

BUD = 1 if debt reduction identified as reducing nonbank debt, else BUD = 0.

BAN = 1 if debt reduction identified as reducing either nonbank debt or unspecified debt, else BAN = 0.

COM = 1 if combination offering, else COM = 0.

SR2 = a firm's stock price performance after the announcement period as measured by the cumulative return for days +41 to +240.

MR2 = the market's stock price performance after the announcement period as measured by the cumulative return for days +41 to +240. We use the equal-weighted CRSP OTC market index for OTC firms and CRSP NYSE/AMEX market index for NYSE/AMEX firms.

CE2 = a firm's stock price performance after the announcement period as measured by the cumulative

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excess return for days +41 to +240. We compute values for CE2 by adjusting stock returns for market returns given by the equal-weighted CRSP OTC market index for OTC firms and CRSP NYSE/AMEX market index for NYSE/AMEX firms.

STD = the shift in risk as measured by the standard deviation of the stock's return for days +41 to +240 minus the standard deviation for days -220 to -21.

BE1 = the stock's systematic risk as measured by the *OLS* stock beta for days -220 to -21.

SIR = the shift in systematic risk as measured by the *OLS* stock beta for days +41 to +240 minus the beta for days -220 to -21.

MIS = 1 if classified as not having *ex post* issue costs data; else MIS = 0.

In an attempt to identify the best model for accounting for two-day CARs, we use the stepwise regression procedure. Our first stepwise examination seeks to learn if any of the variables that explain issue costs can account for two-day CARs. For this analysis, we delete COS and ADJ and use the same 566 observations used to explain *ex post* cash cost. We find that four variables (out of the 28 variables tested) give the best model. The order from most to least significant is: LFS, CE2, BAN, and TYP. LFS is the only variable that is significant at the 0.01 level. Thus, the same variable that is largely responsible for explaining variability in *ex post* cash costs also plays the most significant role in explaining two-day CARs. This finding is consistent with the flotation costs model of Hull and Fortin (1993/1994) that predicts firms with larger issue costs (such as small firms) will also have larger CARs.

We next test the total sample of 737 observations and examine all 30 variables. Eight variables enter the model from the stepwise test. In order of significance, they are: COS, CE2, TYP, WRI, COM, MR2, BAN, and CE1. However, a correlation analysis of these variables reveals that the significance for WRI is caused by collinearity between COS and WRI (Pearson and Spearman correlation coefficients are 0.58 and 0.59). Thus, we repeat the test with WRI deleted. In order of significance, we have: COS, CE2, TYP, COM, and BAN. The  $C_p$  statistic indicates that the best model contains all five variables.

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Additionally, all variables are significant at the 0.05 level or better. Most noticeable, LFS does not enter the model. Thus, the linear combination of those variables that best explain issue costs does a better job of accounting for CARs than does LFS itself.

The findings for CE2 are consistent with prior research. For example, Hull and Moellenberndt (1994) find a significant negative coefficient for CE2 when testing their nonbank debt reduction sample. We attempt to explain the negative coefficient with the following story. Myers and Majluf (1984) note that firms with good projects may not issue stock due to fears about the negative market response. Assume managers go ahead and issue the stock for reasons they can only reveal later. As these reasons become known over time, then one might expect that the negative CAR would be offset by a proportional positive response. If so, then a negative coefficient for CE2 would result. Like CE2, the findings for TYP, COM, and BAN are also consistent with prior research. Hull and Kerchner (1997) report results for TYP similar to those that we give. They interpret their results as supporting adverse selection signaling. The significant support for COM and BAN is well documented and consistent with signaling theory predicated on changes in insider ownership proportions and bankers' actions.

Although the findings for COS offer evidence for the role of issue costs, the same cannot be said for ADJ (or  $-1 \times \text{COS} \times \text{SHR}$ ) which does not enter the model for the stepwise tests. This suggests the possibility that any negative valuation effects (including those attributed to issuance expenses) are offset by positive effects captured by SHR. As noted previously, positive effects can include the lowering of bankruptcy or agency costs. If so, then ADJ may capture more than just an issue costs effect.

One noteworthy result is that none of our five relative size variables are statistically significant. As discovered by Hull and Kerchner (1997), relative size variables exhibit significance when other explanatory variables (especially COM and BAN) are deleted from tests. They conclude that a significant coefficient for a relative size variable appears to hinge upon its capacity to proxy for effects captured by

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other variables. We explore this conclusion by conducting additional stepwise tests on our total sample. For these tests, we now delete BUD and BAN in addition to WRI. There are six variables (out of the 27 variables now tested) that now enter the model. The order of significance is: COS, CE2, TYP, COM, MIS, and MR2. The  $C_p$  statistic suggests that the first five variables form the best model.

Unlike Hull and Kerchner (1997), our tests do not yield a significant statistic for a relative size variable when a bank debt signaling variable is deleted. The reason may be explained by the capacity of the relative size variable to pick up a wealth effect now being captured by COS or LFS. Thus, we repeat our test but with COS and LFS deleted in addition to BUD, BAN, and WRI. To avoid additional collinearity problems (that can result from variables entering the model), we also need to delete OFF, SR2, and MR2 from the stepwise test. When the above eight variables are not included in the stepwise test, there are six variables (out of the 22 variables now tested) that enter the model. In order of significance, we have: COM, CE2, REL, TYP, MIS, and LIS. The first four variables are all significant at the 0.05 level or better for the  $F$  test. MIS and LIS are significant at the 0.06 and 0.07 levels, respectively. We conclude that relative size variables appear to capture wealth effects stemming from issue costs or firm size. Finally, the  $C_p$  statistic implies that the first four variables (COM, CE2, REL, and TYP) form the best model.

## **2. Multiple OLS regression results**

Panel A in Table V reports the multiple *OLS* regression results for three tests. The first test uses the six variables (COM, CE2, REL, TYP, MIS, and LIS) given from our last stepwise test. The second test uses these six variables and COS. The third test uses COS with those four variables (COM, CE2, REL, and TYP) that the  $C_p$  statistic suggests form the best model.

**Table V. Event period ordinary least squares regression results for 737 common stock offerings that reduce outstanding senior obligations, 1970-1989**

The regression model is:  $CAR = b_0 + b_1COS + b_2CE2 + b_3TYP + b_4COM$ .

CAR = the two-day CAR. Values for CAR are in decimal form.

COS = the expected issuance expenses per new share divided by the offering price using the "model" method. Issuance expenses include cash costs, e.g., those standard underwriting expenses (spread, administration, registration, and legal) routinely reported by the financial press around the time of the offering. As before, values are negative to represent the cash outflow. Values for COS are in decimal form.

CE2 = a firm's stock price performance after the announcement period as measured by the cumulative excess return for days +41 to +240. We compute values for CE2 by adjusting stock returns for market returns given by the equal-weighted CRSP OTC market index for OTC firms and CRSP NYSE/AMEX market index for NYSE/AMEX firms. Values for CE2 are in decimal form.

TYP = 1 if common stock retires convertible debt or preferred stock, else TYP = 0.

COM = 1 if combination offering, else COM = 0.

The results in Panel A include:

REL = the face value of the retired fixed obligation divided by equity value (which includes the market value of common stock and the liquidation value of preferred stock). Values are negative to represent the decrease in leverage. Values for REL are in decimal form.

MIS = 1 if classified as not having *ex post* issue costs data; else MIS = 0.

LIS = 1 if stock listed on NYSE or AMEX, else LIS = 0.

The results in Panel B include: ADJ and the five relative size variables as defined in Table IV.

NOTE. Except for the last column which reports *r-square*, adjusted *r-square*, and *F* values, the columns record coefficients, one-tailed *t* statistics, and variance inflation factor values for rows 1, 2, and 3, respectively. Three asterisks (\*\*\*), two asterisks (\*\*), and one asterisk (\*) indicate significance at the 0.01, 0.05, and 0.10 levels, respectively.

**Panel A: Includes REL, MIS, and LIS**

$b_0$	$b_1$	$b_2$	$b_3$	$b_4$	$b_5$	$b_6$	$b_7$	R-Sq (Adj)
INTER'T	COS	CE2	TYP	COM	REL	MIS	LIS	F-Value
-0.025		-0.017	0.012	-0.012	0.018	0.006	0.007	0.053
-6.34***		-3.21***	1.74**	-2.75***	2.18***	1.60**	1.63**	(0.045)
0.00		1.01	1.03	1.07	1.04	1.05	1.10	6.93***
-0.003	0.408	-0.016	0.014	-0.010	0.011	0.006	0.002	0.058
-0.25	2.00**	-3.08***	1.99**	-2.10**	1.21	1.57*	0.37	(0.049)
0.00	1.92	1.01	1.05	1.16	1.24	1.05	1.53	6.44***
0.003	0.531	-0.016	0.015	-0.009		0.006		0.056
0.36	3.37***	-3.10***	2.14**	-2.01**		1.48*		(0.050)
0.00	1.14	1.01	1.03	1.15		1.03		8.72***

(Table V continued on next page)

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<b>Panel B: Includes ADJ and five relative size variables</b>								
b <sub>0</sub>	b <sub>1</sub>	b <sub>2</sub>	b <sub>3</sub>	b <sub>4</sub>	b <sub>5</sub>	b <sub>6</sub>	b <sub>7</sub>	R-Sq Adj)
INTER'T	COS	CE2	TYP	COM	REL	MIS	LIS	F-Value
0.004	0.533	-0.017	0.017	-0.009				0.054
0.54	3.37***	-3.23***	2.37***	-2.10**				(0.048)
0.00	1.14	1.01	1.01	1.15				10.34***
<b>(ADJ)</b>								
-0.002	0.428	-0.013	0.014	-0.005	-0.099			0.034
-0.21	1.70**	-2.16**	1.48*	-0.93	-0.33			(0.025)
0.00	1.98	1.03	1.01	1.18	1.74			3.93***
-0.020		-0.014	0.014	-0.008	-0.426			0.029
-7.65***		-2.37***	1.41*	-1.67**	-1.84**			(0.022)
0.00		1.01	1.01	1.02	1.03			4.17***
<b>(REL)</b>								
0.002	0.517	-0.012	0.017	-0.010	0.009			0.055
0.22	2.63***	-3.22***	2.30***	-2.19**	1.04			(0.048)
0.00	1.66	1.06	1.01	1.38	1.22			8.49***
-0.018		-0.018	0.015	-0.014	0.019			0.046
-8.76***		-3.38***	2.07**	-3.32***	2.34***			(0.041)
0.00		1.00	1.01	1.01	1.01			8.80***
<b>(LEV)</b>								
0.004	0.537	-0.017	0.017	-0.009	-0.001			0.0540
0.51	2.79***	-3.22***	2.36***	-2.09**	-0.04			(0.047)
0.00	1.69	1.01	1.03	1.15	1.53			8.26***
-0.018		-0.018	0.014	-0.014	0.038			0.043
-7.50***		-3.33***	2.05**	-3.15***	1.88**			(0.038)
0.00		1.01	1.01	1.30	1.03			8.29***
<b>(PCE)</b>								
0.004	0.513	-0.017	0.017	-0.010	-0.003			0.054
0.43	2.68***	-3.23***	2.36***	-2.10**	-0.18			(0.047)
0.00	1.67	1.01	1.02	1.16	1.49			8.26***
-0.018		-0.018	0.015	-0.014	-0.026			0.044
-7.20***		-3.42***	2.11**	-3.21***	-2.04**			(0.039)
0.00		1.00	1.01	1.02	1.01			8.46***
<b>(SHR)</b>								
0.004	0.523	-0.017	0.017	-0.010	-0.001			0.054
0.46	2.73***	-3.23***	2.36***	-2.09**	-0.09			(0.047)
0.00	1.67	1.01	1.02	1.16	1.48			8.36***
-0.018		-0.018	0.015	-0.014	-0.024			0.044
-7.22		-3.42***	2.14**	-3.23***	-1.97**			(0.039)
0.00		1.00	1.01	1.02	1.01			8.38***
<b>(PCH)</b>								
-0.000	0.512	-0.017	0.017	-0.010	0.004			0.054
-0.001	2.56***	-3.23***	2.35***	-2.10**	0.17			(0.047)
0.00	1.82	1.01	1.02	1.16	1.62			8.36***
-0.057		-0.018	0.015	-0.014	0.041			0.045
-3.45		-3.41***	2.12**	-3.17***	-2.19**			(0.040)
0.00		1.00	1.01	1.02	1.02			8.62***

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Panel A reveals that the largest VIFs occur when COS, REL, and LIS are used together. This suggests that multicollinearity between these variables may bias their results. Correlation analysis confirms this as Pearson and Spearman correlation coefficients are 0.55 and 0.70 between COS and REL and 0.57 and 0.56 between COS and LIS. These correlation results explain the different findings for these three variables given in Panel A. For example, coefficients for REL and LIS are only significant when COS is missing from the test. When REL and LIS are omitted, the coefficient for COS rises in magnitude with its *t* statistic increasing from 2.00 to 3.37.<sup>(19)</sup> Also, with REL and LIS deleted, the VIF for COS falls from 1.92 to 1.14, while the model's *F* values increase (the adjusted *r-square* value also increases, albeit slightly).

From Panel A, we find that CE2, TYP, and COM are significant at the 0.05 level or better with or without COS included in the test. Panel B reports regression results for these three variables when used with our issuance expenses variables (COS and ADJ) and our five relative size variables. ADJ and the five relative size variables are not used jointly because (as was seen in Table IV) correlation coefficients for these variables range in absolute magnitude from 0.74 to 0.99. Due to additional collinearity, tests in this panel using ADJ or one of the five relative size variables, are conducted with and without COS present.

The results in Panel B demonstrate that the findings for ADJ are difficult to distinguish from those for the five relative size variables. For example, all six variables are significant at the 0.05 level or better when COS is not used, but insignificant when COS is used. These results indicate the possibility that ADJ may be an improper proxy for issue costs as it behaves similarly to all five relative size variables.

When COS is not used, we find that the significant results for the five relative size variables agree with prior research (e.g., Asquith and Mullins, 1986; Masulis and Korwar, 1986). The traditional

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interpretation is that the results support price pressure, tax, and signaling hypotheses. However, given the overall results in Panel B, this interpretation requires modification, namely that issuance expenses should be considered as a plausible explanation. Future research should be aware of the possible error-in-variables problem where a "missing variable" (e.g., an issuance expenses variable such as COS or ADJ) is highly correlated with an included variable (e.g., a relative size variable).

We offer several explanations to account for the significant findings for COS. First, COS seems to successfully capture an issuance expenses effect. If so, the significance of ADJ and the five relative size variables, when used without COS, are attributed to their proxying for issuance expenses. Second, COS simply represents firm size in which case greater values for COS proxy for smaller firms. Because less is known about smaller firms, their stock offering announcements are more revealing and thus more negative. Although explaining the significance of COS may not be clear at this time, nonetheless, it is capable of accounting for stock price behavior.

## **V. Summary**

We develop a regression model to estimate values for issue costs variables. Our model considers the correlation between issue costs and characteristics such as firm size, underwriter reputation, risk of the offering, and listing. Our model explains over 50 percent of the variation in *ex post* issue costs. We use coefficients from our regression tests to generate expected (e.g., "model") values for issue costs. There are several advantages "model" values have over "*ex post*" values. For example, model values are arguably more consistent with expected values (and thus should be less likely to produce outliers). Additionally, model values can be created for observations with missing *ex post* data.

We perform correlation tests to understand the relationship between issue costs variables and size variables. These tests point out the difficulties when interpreting regression results. Next, we do regression tests to examine whether issue costs can account for the negative announcement period returns

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when firms issue common stock. These tests show that issue costs are important in explaining returns. Most noteworthy, an issue costs variable (issuance expenses per new share divided by the price of common stock) generally outperforms information, agency, and tax variables previously documented by the research as accounting for stock returns. However, our support for the role of issue costs is not definitive as it is highly correlated with firm size. The possibility exists that an issue costs variable may simply be capturing a firm size effect.

## Endnotes

<sup>(1)</sup> As noted by Hull and Kerchner (1996) this assumption is compatible with researchers (e.g., Light and White, 1979; McDaniel, Madura, and Akhigbe, 1994) who find that primary equity offerings are rare events. Such rarity suggests uncertainty about the timing, e.g., will the offering occur this year, in 20 years, or ever? This uncertainty argues against assuming that issue costs are already largely impounded in stock prices. Furthermore, if issue costs are expected and already impounded in pre-announcement period stock value, then one could argue that all effects (e.g., signaling, agency, and tax effects) associated with equity offerings are expected and already impounded.

<sup>(2)</sup> Among those that discuss variables that can explain announcement period returns for security offerings are: Masulis, 1983; Masulis and Korwar, 1986; Cornett and Travlos, 1989; Dierkens, 1991; Choe, Masulis, and Nanda, 1993; Hull, Mazachek, and Ockree, 1998; Hull and Michelson, 1999; Hull, 1999.

<sup>(3)</sup> From the expression  $(IE/N)/P_b$ , it can be seen that adding the positive ADJ value to the closing share price on the day of the announcement (day 0) increases this share price by an amount determined by the impact of issue costs on each outstanding share. Using this adjusted closing price enables us to compute the actual return for day 0 when this daily actual return is adjusted for issue costs. Subtracting the expected daily return, from this adjusted actual daily return, gives an abnormal return for day 0 adjusted for issue costs. Adding this adjusted abnormal return for day 0, to the abnormal return for day +1, renders a two-day CAR adjusted for issue expenses. This adjusted two-day CAR is more positive, or less negative, than the traditional two-day CAR (or the adjustment process can even make a negative traditional CAR become a positive adjusted CAR).

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<sup>(4)</sup> Hull and Moellenberndt (1994) compare descriptive statistics between private swaps and other stock-for-debt transactions. They show some general similarities between private swaps and other stock offerings that raise cash to reduce nonbank debt.

<sup>(5)</sup> Like prior research (e.g., Hull, Mazachek, and Ockree, 1998; Hull, 1999), we define a combination offering as an offering where the secondary component is 10 percent or more of the combined primary and secondary components. For combination offerings, we only consider issuance expenses for the primary portion when estimating values for COS and ADJ. This is because sellers of secondary shares bear issue costs in terms of a lower value received (from investment bankers) for their shares.

<sup>(6)</sup> We find that there are 153 observations that have other events near the time of the initial announcement that may influence stock prices. These observations consist of 13 announcements where small amounts of cash are simultaneously used to reduce debt; 46 where sources disagree if all of the cash proceeds are used to reduce debt; and, 94 where the *WSJ Index* notes other firm-specific announcements for event days -3 through +3. Since deleting these observations does not materially alter our findings, we report results with these observations included.

<sup>(7)</sup> As noted by Hull and Kerchner (1996), if we use the *ex post* value for IES in computing COS or  $IES/P_b$ , then we should use the offering (or "*ex post*") price as a proxy for the stock price. This is because the absolute magnitude of the *ex post* IES value increases as the offering price increases.

<sup>(8)</sup> Though the use of warrants is more prevalent for firms with greater cash flotation costs and underpricing costs, Ng and Smith (1996) show that the use of warrants may still lower these costs below what might otherwise occur.

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<sup>(9)</sup> For the 155 observations without available data for issue costs, our sources reported an offering date for only about half of these. For observations for which an offering date is not reported, there is evidence (via cancellation announcements) that the planned offering did not materialize in half of these cases. It can be pointed out that an offering with a cancellation announcement can be eventually reinstated. For such offerings, issuance expenses data can be available and so they can be part of those observations classified as having available *ex post* data. See Hull (1994) for more information on the market response to cancellation announcements.

<sup>(10)</sup> There are four observations with low values (the range is from -0.75% to -1.23%) and twelve observations with large values (ranging from -8.76% to -16.43%). For those with smaller negative values, we can only speculate that other perks occur for investment bankers or that errors in reporting arise. Those observations with large negative values (while unexpected at the time of the offering) are not necessarily extraordinary.

<sup>(11)</sup> While we adjust firm size for constant dollars following Hull and Pinches (1994/1995), our results are virtually unchanged if we do not use constant dollars.

<sup>(12)</sup> Because LFS is in essence an interaction variable (e.g., the share price times the shares outstanding), we do not use the share price in our test although its inclusion would increase the explanatory power of our model. The Pearson and Spearman correlation coefficients between share price and LFS are both about 0.60.

<sup>(13)</sup> We find 18 offerings where the sources state there is "no underwriter" and 36 offerings where the underwriter is not named. These 54 observations are among the 350 observations classified as  $WRI = 0$ . For those offerings that do not mention an underwriter, it does not necessarily follow the offering was cancelled. This is because our sources can name an underwriter at the time the initial plans are announced.

<sup>(14)</sup> The popular financial press has written on occasion about price-setting by investment bankers on

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equity issuances. The intercept of -6.87% might indicate price-setting between -6.75% and -7.00%. However, an examination of the sample does not support this notion (at least for the time period we examine in this study). There are only 22 observations with a cost between -6.49% and -7.01%. To the nearest basis point, the following are the most common issuance costs: -4.12% (n=18); -5.15% (n=15); -5.00% (n=14); -6.00% (n=12); and, -3.60% (n=12). There are 85 observations between -5.26% and -4.74% (as can be seen in Table II the mean and medians are both near -5%). These 85 observations are only 15 percent of the 566 observations with available cash costs data.

<sup>(15)</sup> The most noticeable difference given in Table III is in two-day CARs. One-tailed parametric and nonparametric tests are significant at near the 1% level when comparing CARs between these two groups ( $t = 2.28$  and  $z = 2.52$ ). The lower CARs for firms without issuance expenses data may be at least partially explained by the fact these firms are less likely to be a cash offering, an OTC firm, or a combination offering.

<sup>(16)</sup> The five relative size variables represent those used by previous studies (e.g., Finnerty, 1985; Asquith and Mullins, 1986; Mikkelson and Partch, 1986; Masulis and Korwar, 1986; Cornett and Travlos, 1989; Dierkens, 1991; Hull and Moellenberndt, 1994; Hull and Kerchner, 1997).

<sup>(17)</sup> Although not reported in Table IV, the 171 observations, classified as not having *ex post* COS values, have (where applicable) correlation coefficients similar to the other 566 observations when the "model" method is used.

<sup>(18)</sup> Although neither study provides a detailed report, they do note collinearity problems when COS and LFS are simultaneously employed. In general, they find that the results for COS (using their *ex post* values) are similar to LFS.

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<sup>(19)</sup> Eckbo (1986) includes an issue costs variable in his tests when seeking to explain two-day CARs. This variable is defined as the underwriter spread divided by the market value of common stock. Eckbo (1986) finds negative coefficients for this issue costs variable for his test of debt offerings (n=390). It is significant at the 0.05 level when regressed with dummy variables representing the nondebt and debt reduction purposes. However, he says that the coefficient is too high to be picking up just issuance expenses. However, this is not necessarily the case for studies of stock offerings where the valuation effect of issuance expenses can account for significant portions of the fall in stock value. Also, unlike our coefficient for COS, his coefficient falls substantially in magnitude when other variables are included in the model.

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