Firm Size and the Information Content of Over-the-Counter Common Stock Offerings

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We examine the announcement period of stock returns for 179 over-the-counter (OTC) firms that issue common stock to reduce nonconvertible debt. We find that small OTC firms experience returns that are significantly more negative than large OTC firms. Regression tests reveal that firm size is a significant factor in accounting for stock returns. Other tests establish as firm size a dominant effect. Our support for a firm size effect is consistent with a differential information effect given that firm size is positively related to the amount of information available about firms.

I. INTRODUCTION

A "pure" leverage decrease (e.g., a stock offering that reduces debt) alters the mix of the firm's securities without directly modifying the asset structure. Consequently, a pure leverage decrease announcement should be relatively free from valuation effects that can occur when a security offering raises proceeds for asset structure changes. Prior research (Copeland & Lee, 1991; Cornett & Travlos, 1989; Hull, 1994; Hull & Fortin, 1993; Hull & Moellenberndt, 1994; Israel, Ofer, & Siegel, 1989; Masulis, 1983) documents significant negative announcement period stock returns for pure leverage decreases. This research generally concludes that the negative returns are caused by negative valuation effects consistent with signaling-models (Fama, 1985; Leland & Pyle, 1977; Ross, 1977) premised on information asymmetry between insiders and outsiders.

The pure leverage decrease research (and stock offering research in general) offers no evidence that firm size accounts for the negative announcement period stock returns. The possibility that firm size can explain stock returns should be explored given that a number of studies

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(Atiase, 1985; Banz, 1981; Chari, Jaganathan, & Ofer, 1988, Chandy, Peavy, & Reichenstein, 1993) show firm size to be a determinant of returns for situations other than security offerings. To the extent firm size proxies for the amount of information activities (e.g., information gathering, processing, reporting, and interpreting), the findings of these studies are consistent with models predicated on differential information (Atiase, 1980; Klein & Bawa, 1977; Wilson, 1975).

In this study, we examine 179 pure leverage decreases consisting of over-the-counter (OTC) common stock offerings that retire nonconvertible debt. We find that small OTC firms experience announcement period stock returns that are significantly more negative than the returns found for large OTC firms. The difference is consistent with the notion that less is known about small firms. This causes a negative announcement (such as a pure leverage decrease announcement) to be more informative, and thus more negative, for small firms.

We perform regression tests on the total sample and find that variables representing firm size best account for stock returns. For regression tests on that half of the sample with the smallest firm sizes, we discover signaling effects based on changes in insider holdings and banker actions. Regression tests for the large firm size half offer support for signaling effects caused by the relative change in the debt level.

We conduct additional tests on samples designed so that signaling effects (namely, those resulting from changes in insider ownerships, banker actions, and debt levels) are not expected to impact the outcome. A differential information effect stemming from firm size is still evident. Finally, we offer evidence that the negative effect resulting from firm size may be at least partially explained by the fact issuance expenses are more costly for smaller OTC firms.

The remainder of the paper is organized as follows. The next section reviews theories that predict stock price behavior for pure leverage decreases. In the third section, we present the data, methodology, and primary tests. The fourth section contains the empirical results, while the final section offers summary statements.

II. COMPETING MODELS

In this section, we first discuss differential information theory. This theory can link stock price reaction to firm size. We then review signaling theory, in particular, those models that are cited as explaining the announcement period returns for stock offerings that reduce debt. The predictions of these

models are not based on firm size, but on information asymmetries between insiders and outsiders.

Arguments for a Differential Information Effect

Models premised on differential information (Atiase, 1980; Klein & Bawa, 1977; Wilson, 1975) suggest that announcements by small firms can disseminate greater information, for example, in regards to identifying mispriced securities. Misvaluation occurs when the current market value of securities does not reflect the true value of the firm's future estimated cash flows. As argued by Klein and Bawa (1977), investors will find it more difficult to estimate future cash flows if there is less information about a firm. Thus, greater misvaluation can exist for small firms given that less is known about their future cash flows.

Several arguments exist to support the premise that small firm announcements convey greater information about security misvaluation. First, privately developed information regarding small firms is costly. Atiase (1980) asserts that the information search for small firms is more expensive compared to large firms. Thus, private information gathering for small firms will be limited making their announcements more revealing. This limited information gathering notion is consistent with Collins, Kothari, and Rayburn (1987) who suggest that firm size proxies for the number of professional analysts and traders processing the available information about a firm.

Second, there is less available public news on small firms. In particular, studies (Atiase, 1980; Atiase, Bamber, & Freeman, 1988; Grant, 1980) find that the financial press publishes fewer items on small firms than on large firms. As discussed by Atiase, Bamber, and Freeman (1988), the SEC and FASB have differential disclosure requirements that typically exempt small firms from certain disclosures.

Extant research supports the assertion that firm size is a determinant of stock returns. Most of this research (Atiase, 1985; Chari, Jaganathan, & Ofer, 1988; Zeghal, 1984) centers on earnings announcements. These studies show that small firms (relative to large firms) experience greater positive returns around earnings announcement dates.[1] These findings are consistent with the notion that the earnings announcements for small firms contain more information. More recently, the research by Chandy, Peavy, and Reichenstein (1993) finds that the strength of the market response to stocks highlighted in *Value Line* depends on firm size. They state that the response is more positive for small firms because less information exists for small firms than for large firms.

Finally, the firm size research calls attention to the fact that differential stock price reaction is not confined to *NYSE/AMEX* firms. For example, Atiase (1985) finds a differential reaction to quarterly earnings announcements between small and large firm announcements equally within the *NYSE/AMEX* and *OTC* markets. Thus, there is reason to believe that a differential information effect may exist for other events involving the *OTC* market (e.g., *OTC* stock offering announcements).

Arguments for Signaling Effects

Signaling or information asymmetry models (Fama, 1985; Leland & Pyle, 1977; Ross, 1977) are predicated on the notion that insider actions can convey to market participants security misvaluation. Based on their estimates about future expected cash flows, insiders may feel the stock price is not representative of the true value. One major means of communicating this misvaluation is through leverage changes where firms issue and retire security types.

In regards to pure leverage decreases, signaling models predict that stock for debt transactions can convey security overvaluation. For example, the Leland and Pyle (1977) signaling model predicts that stock offerings signal unfavorable information about security value if the market suspects insiders are lowering their ownership proportions. Insiders attain lower relative holdings by concurrently selling shares through a secondary offering (or by not purchasing the new issue). The debt level signaling model of Ross (1977) suggests that stock for debt transactions convey security overvaluation because market participants will perceive that the firm's future cash flows may not be sufficient to service current debt levels. The extent of the negative news increases as the relative amount of debt retired increases. Bank debt signaling models (Bernanke, 1983; Fame, 1985) argue that bankers signal inside information by their decisions concerning bank loans. These models suggest bank debt reductions will signal greater negative news than nonbank debt reductions. This is because the market fears bank debt reductions are caused by bankers who want to unfavorably revise loans, or who refuse to extend loans.[2]

The pure leverage decrease research (Copeland & Lee, 1991; Cornett & Travlos, 1989; Hull, 1994; Hull & Moellenberndt, 1994; Israel, Ofer, & Siegel, 1989; Masulis, 1983) suggests that signaling models best explain announcement period returns. For example, a debt level signaling effect as hypothesized by Ross (1977) is suggested by Masulis (1983) and Hull (1994). A change in ownership signaling effect consistent with Leland and Pyle (1977) is mentioned by Cornett and Travlos (1989) and Hull (1994). A

bank debt signaling effect in support of Fama (1985) is found by Hull and Moellenberndt (1994). For some of their tests, the latter study also finds support for Ross (1977) and Leland and Pyle (1977).[3]

III. DATA, METHODOLOGY, AND PRIMARY TESTS

This section describes the data, methodology, and tests. The primary sources of common stock offering announcements are the *Investment Dealers' Digest* and *The Wall Street Journal.*[4] Sources for the descriptive data are (in addition to the two above sources): *Compustat* Annual Files, *Moody's* Industrial Manuals, and *CRSP NASDAQ* Price Files. The time period covered by these sources is from 1973 to 1989.

Data

The sample consists of 179 common stock offerings that survive the following four screens.

1. Each must be identified as a pure leverage decrease where a common stock offering is undertaken to retire non-convertible debt.
2. Each must have available data from the sources to calculate values for firm size (described later) and the planned reduction in debt.
3. Each must be listed on the *CRSP NASDAQ* Return File and be traded during the announcement and estimation periods (described later).
4. The planned percentage change in outstanding common stock must lie between a half percent and one hundred percent.

Table 1 reports descriptive data for the total sample and two halves ("small" and "large") formed according to firm size. Observations in the small half consist of the 89 observations with the smallest values for firm size. The remaining 90 observations have the largest firm size values and form the large half. Firm size includes equity value and debt value. Equity value consists of the market value of common stock and the liquidation value of preferred stock (if applicable). Debt value is comprised of the book value of all long-term debt obligations and current liabilities.[5]

Since firm size is measured in dollars and a dollar can decline substantially in real value (e.g., purchasing power) over two decades, values for firm size are adjusted before observations are classified intoeither the small or

Table 1
**Descriptive Data for 179 Over-the-Counter Common Stock
Offerings that Reduce Nonconvertible Debt, 1973-1989**

Descriptive Data	Total Sample (n=179)	Small Firm[a] Size Half (n=89)	Large Firm[b] Size Half (n=90)
Panel A: Time Profile			
Observations for 1973-1976	32 (18%)[c]	24 (27%)	8 (9%)
Observations for 1977-1979	31 (17%)	20 (22%)	11 (12%)
Observations for 1980-1982	74 (41%)	32 (36%)	42 (47%)
Observations for 1983-1985	34 (19%)	12 (14%)	22 (24%)
Observations for 1986-1989	8 (4%)	1 (1%)	7 (8%)
Panel B: Selected Characteristics			
Firm Size [d]	$142M [e] ($74M)	$40M ($38M)	$243M ($150M)
Planned Offering Size [f]	$15M ($9M)	$7M ($6M)	$22M ($15M)
Par Value of the Planned Debt Reduction Dividend by Firm Size	-13.9% (-12.1%)	-18.1% (-15.9%)	-9.5% (-9.6%)
Planned Percentage Change in Outstanding Common Shares	22.7% (18.7%)	27.6% (25.4%)	17.6% (14.2%)

Notes: [a] This half contains observations in the total sample with the smallest firm size values.
[b] This half contains observations in the total sample with the largest firm size values.
[c] The parenthesis gives the percentage of the column's total number of observations.
[d] Includes equity value and debt value. Equity value consists of the market value of common stock and
liquidation value of preferred stock (if applicable). Debt value is comprised of the book value of long-term debt obligations and current liabilities. Values are taken from sources nearest (yet prior) to announcement date and adjusted assuming a five percent compounded annual decrease in the value of a dollar over time. See the Appendix for details on the adjustment procedure.
[e] Means (medians) are reported. M represents millions.
[f] Price the day before the announcement times the planned number of new or primary shares.

large half. The adjustment procedure assumes that the value of a dollar declines at an annual compounded rate of five percent. The Appendix details the adjustment procedure.

The time profile given in Panel A of Table 1 reveals that 41 percent of the total sample occurs between the years 1980 and 1982. For these years, 36 percent of the small half and 47 percent of the large half are found. The panel also shows that observations for the small half are more likely to be found in the 1970s, while those for the large half are more apt to occur in the 1980s.

Panel B reports that mean values for "firm size" and "planned offering size" for the small half are less than one-sixth and one-third of the mean values for the large half. This panel also reveals that observations in the small half undergo relatively greater changes in levels of debt and common stock. For example, the small half's means for "par value of the planned debt reduction divided by firm size" and "planned percentage change in outstanding common shares" are about 90 percent and 55 percent greater in magnitude than the corresponding means for the large half.

The sample includes 60 combination offerings. An observation is classified as a combination offering when a primary offering is accompanied by a registered secondary offering that is at least 10 percent of the total offering (e.g., primary plus secondary components). Of the 60 combination offerings, there are 34 in the small half and 26 in the large half.

The sample is also characterized by the inclusion of 90 offerings where the debt being retired is identified as bank debt. Of these 90 offerings, there are 39 in the small half and 51 in the large half. The occurrence of a combination offering is as likely for a bank debt reductionas for a non-bank debt reduction.

Finally, of the 179 offerings, there are 12 that are non-cash offerings (e.g., cash is not raised for the debt reduction but the new shares are given in return for outstanding debt). The 12 non-cash offerings consist of eight private swaps and four exchange offers. The findings of this study are similar with or without these 12 observations included.[6]

Methodology and Primary Tests

The ordinary least squares (*OLS*) market model procedure described by Brown and Warner (1985) is used to test the hypothesis that a sample's mean daily excess stock return (ER) or cumulative excess stock return (CER) is equal to zero. The alphas and betas are calculated using the value-weighted *CRSP NASDAQ* index in conjunction with an estimation period of Days +40 to +240 after the announcement date (e.g., after Event Day 0). Although not reported, similar ERs and CERs are found when using Scholes and Williams (1977) *OLS* alphas and betas, a 200 day comparison period before the announcement dates, or the *CRSP NASDAQ* equal-weighted index.

To test the null hypothesis that the mean return for a small firm size group is less negative or equal to the mean return for a large firm size group, a standard parametric one-tailed *t* statistic for testing the equality of the means of two non-paired samples is calculated. The research hypothesis is that the small firm size group will have a greater negative return (e.g., the

test statistic will be negative). When calculating t statistics, variances are assumed unequal if F values reject the hypothesis that portfolio variances are equal. Non-parametric Wilcoxon rank-sum z statistics are also given.

For the OLS regression tests, we report robust t statistics, F values, and R^2 values. The White (1980) heteroskedasticity adjustmentprocedure is followed when calculating robust t-statistics. One-tailed t-statistics are given for explanatory variables since each has a definite prediction concerning the sign of its coefficient.

IV.   EMPIRICAL RESULTS

This section presents our empirical findings. A series of tests demonstrate that a differential information effect, linked to firm size, is a significant factor when accounting for the stock price behavior of OTC firms that issue common stock to retire nonconvertible debt.

Excess Return Results

Panel A in Table 2 reports daily excess stock return (ER) results for a seven day event period that includes event Days -3 through +3. The panel reveals a -3.46 percent cumulative excess return (CER) for the total sample during the seven day period. Most of the negative activity (-1.89 percent) occurs on the announcement day. We also find substantial negative activity on Day +1 (-0.92 percent). The latter is explained by the fact that the market can be closed on the day of the announcement. There is also evidence of leakage or late reporting, as significant negative ERs occur for event Days -1 and -2.

In looking at the "small firm size half" and "large firm size half" columns in Table 2, we see that the negative market response is especially evident for the smaller firms. A simple comparison of the two columns indicates that substantial differences exist between the magnitude of the daily returns. The last column in Table 2 reveals that statistical significant differences in ERs between the small and large firm size halves exist for Event Days 0 and +1. Although daily excess return (ER) differences are not significant, the small half also has greater negative ERs for EventDays -1 and +2. For these four event days (Days -1 through +2) for which the small half experiences greater negative ERs, the small half has a more negative cumulative excess return (CER) of -2.57 percent.

Panel B in Table 2 gives CER results for the three event days consisting of Days -1 through +1. The panel reveals that there is a -2.24 percent difference when subtracting the three-day CER for the large half from the

Table 2
Excess Stock Return Results for 179 Over-the-Counter Stock Offerings that Reduce Nonconvertible Debt, 1973-1989

Event Day(s)	Total Sample (n=179)	Small Firm Size Half (n=89)	Large Firm Size Half (n=90)	Small Half vs Large Half
	Panel A: Daily Excess Return Results			
−3	0.07%; 0.39 [a]	0.35%; 1.30 [a]	−0.20%; −0.80 [a]	1.49; 177 [b*]
	49%; −0.22	48%; −0.32	50%; 0.00	0.86
−2	−0.52%; −2.52**	−0.52%; −1.61	−0.51%; −2.02**	−0.02; 167
	36%; −3.66***	31%; −3.50***	41%; −1.69*	−0.97
−1	−0.47%; −1.73*	−0.55%; −1.20	−0.38%; −1.35	−0.32; 145
	42%; −2.17**	40%; −1.80*	43%; −1.26	−1.20
0 [c]	−1.89%; −6.08***	−2.40%; −4.97***	−1.39%; −3.56***	−1.63; 176**
	31%; −5.01***	28%; −4.13***	34%; −2.95***	−1.40*
1	−0.92%; −3.40***	−1.45%; −3.75***	−0.39%; −1.05	−1.97; 176**
	37%; −3.51***	31%; −3.50***	42%; −1.48	−2.07**
2	−0.06%; −0.26	−0.23%; −0.61	0.10%; 0.31	−0.67; 177
	45%; −1.42	39%; −2.01**	50%; 0.00	−0.92
3	0.33%; 1.54	0.30%; 0.92	0.36%; 1.29	−0.14; 177
	53%; 0.82	51%; 0.11	56%; 1.05	−0.77
	Panel B: Three–Day Cumulative Excess Return Results			
−1,0,+1	−3.28%; −7.45***	−4.40%; −6.41***	−2.16%; −4.08***	−2.56; 166***
	27%; −6.05***	24%; −4.98***	31%; −3.58***	−3.24***

Notes: Three asterisks (***), two asterisks (**), and one asterisk (*) denote significance at the one, five, and and 10 percent levels, respectively.

[a] The first row reports the mean excess stock return followed by the two-tailed t statistic (when testing if the mean excess stock return equals zero). The second row gives the percent of the sample that has a positive excess stock return followed by the two-tailed binomial z statistic (when testing if the percent equals 50 percent).

[b] The first row reports the one-tailed parametric t statistic (when testing the null hypothesis that excess stock returns for the small group is less negative or equal to excess stock returns for the large group) followed by the degrees of freedom. The third row reports the z statistic for the one-tailed nonparametric Wilcoxon test.

[c] Day 0 is the announcement day. Assuming no leakage or late reporting, the announcement is expected to impact the market on Day 0 or, if the announcement occurs after the market is closed, on Day +1.

three-day CER for the small half. This difference is significant at the one percent level for both the parametric and non-parametric tests. Although not reported in Panel B, the same results are found for other announcement periods including two-day CERs and four-day CERs.

If a firm size effect is present, then it should be stronger if groups are compared that have greater differences in firm size. We find this to be true.

Although not reported in table format, tests are conducted when the sample is partitioned into groups other than halves. For these tests, even stronger evidence that small firms have greater negative ERs and CERs is discovered. For example, the three-day CER difference of -2.24 percent found for halves increases in magnitude to -3.10 percent when those one-fourth sample observations that have the smallest firm sizes (n=45) are compared with those one-fourth sample observations that have the greatest firm sizes (n=45). When the sample is partitioned into eighths, the three-day CER difference increases in magnitude to -3.65 percent. Furthermore, the group consisting of those one-eighth observations (n=22) with the largest firm sizes has a three-day CER that is not statistically significant from zero ($t = -1.08$).

The Regression Model

Ordinary least squares (OLS) regression tests are conducted to explain the announcement period returns of OTC stock offerings that reduce non-convertible debt. The general regression model is:

$$CER = b_0 + b_1 LFS + b_2 SIZ + b_3 COM + b_4 BAN + b_5 LEV$$

where   CER is the three-day cumulative excess stock return that includes Days -1, 0, and +1.

LFS is the logarithm of firm size. (Firm size is defined in Table 1 and is expressed in millions of dollars.)

SIZ is a dummy variable that equals zero if in small firm size half, or equals one if in large firm size half.

COM is a dummy variable that equals zero if a primary offering, or equals one if a combination offering.

BAN is a dummy variable that equals zero if the debt reduction is identified as a bank debt reduction, or equals one if the debt reduction is not identified as a bank debt reduction.

LEV is the par value of the planned reduction in debt divided by firm size.

The five explanatory variables are chosen in order to compare a differential information effect (based on firm size) with three signaling effects that prior research has found to be explain pure leverage decreases.

The first two variables (LFS and SIZ) are motivated by a desire to test for a wealth effect stemming from an observation's firm size. Differential information theory (Atiase, 1980; Klein & Bawa, 1977; Wilson, 1975) pre-

dicts positive coefficients for both variables. Since market participants know less about the future cash flow possibilities for small firms, a more negative stock return for a negative news release (such as a stock offering announcement) is expected for small firms.

The last three explanatory variables (COM, BAN, and LEV) attempt to test valuation effects associated with signaling models (Fama, 1985; Leland & Pyle 1977; Ross, 1977) premised on information asymmetries between insiders and outsiders. The motivation for testing these three variables is supplied by the stock offering research that suggests signaling models best explain announcement period CERs for pure leverage decreases. Details on these three variables and their predicted coefficient signs are given below.

A signaling model predicated on changes in inside ownership proportions (such as Leland & Pyle, 1977) predicts a negative coefficient for COM. For combination offerings, the market will be apprehensive that insiders are among those selling secondary shares. Although published reports in the financial press are typically vague in just referring to those selling as "current" or "principal" shareholders, investors (as a protective measure) would likely assume that insiders are among those selling. This is particular true for the 60 combination offerings in our sample where secondary sales average about half of primary sales.[7]

A signaling model emphasizing the role of bankers (such as Fama, 1985) predicts a positive coefficient for BAN. If bank debt offerings reflect favorable inside information by bankers, then bank debt reductions should be viewed unfavorably. For those 90 observations in our sample that retire bank debt, investors are likely to believe that the reductions are caused by bankers who want to unfavorably revise loans, or who refuse to extend loans.

A signaling model premised on relative changes in debt levels (such as Ross, 1977) predicts a positive coefficient for LEV. Greater negative values for LEV are expected to be accompanied by greater negative signaling effects. This is because market participants are likely to infer greater negative news as the relative amount of the debt reduction increases.[8]

Correlation Results

Pearson and Spearman correlation tests reveal several pairs of explanatory variables that have sufficiently large correlation coefficients (*rhos*) to cause potential colinearity problems.[9] First, as expected, the two firm size variables (LFS and SIZ) are correlated. The Pearson (Spearman) *rho* is 0.79 (0.87). Because of this extremely large correlation, each variable is tested separately when conducting regression tests on the total sample.

Second, LEV is significantly correlated with LFS and SIZ. This is true for tests conducted on the total sample, as well as for tests performed on either the small firm size half (e.g., when SIZ=0) or the large firm size half (e.g., when SIZ=1). For all of the correlation tests between LEV and the firm size variables, the Pearson and Spearman *rhos* range from 0.37 to 0.62. Because these values exhibit substantial magnitudes, regression tests (reported in Table 3) are conducted with these variables used jointly and separately.

Regression Results

Panel A in Table 3 reports regression results for the total sample. The first firm size variable tested is LFS. The results of this test are reported in the first row. The coefficient for LFS is the only coefficient that is significant at the one percent level. This suggests that a firm size effect is a dominant effect relative to óther tested effects. The coefficients for COM and BAN are significant at the five percent level. This indicates that signaling effects stemming from changes in ownership proportions and the type of retired debt (e.g., bank debt versus non-bank debt) are also important. The coefficient for LEV is not significant implying that the relative size of the debt retired is less important than firm size, insider sales, or banker actions.

The test reported in the first row of Panel A is repeated with the second firm size variable (SIZ) replacing LFS. These results are reported in the second row. Once again, the coefficient for the firm size variable is significant at the one percent level. Thus, a simple dummy variable is able to capture valuation effects attributed to firm size. The results for the other variables (COM, BAN, and LEV) in the second row are like those reported in the first row.

When the tests in the first two rows of Panel A are repeated with LEV deleted, the third and fourth rows reveal that coefficients for the remaining explanatory variables keep their same significant levels. These two rows reveal that deleting LEV increases the F value, while leaving the R^2 value virtually unchanged.

The fifth and last row in Panel A presents the results when the test is conducted without either of the two firm size variables included. This row reveals that the results are not materially altered in that the coefficient for LEV remains insignificant and the coefficients for COM and BAN are still significant at the five percent level. Any potential colinearity when LEV is used with the firm size variables does not influence the significance levels. However, when either LFS or SIZ is not included in the test, the fifth row shows that the coefficient sign for LEV changes and values for the R^2 and F fall noticeably.

Panel B in Table 3 reports results for the small firm size half (e.g., those observations where SIZ = 0 holds). Adjusted R^2 and F values reported in this panel fall considerably compared to the previous panel. The first row in Panel B shows that the coefficients for LFS, COM, BAN, and LEV are all greater in magnitude than found for the test in the first row of Panel A. However, the smaller sample size results in a less powerful test. The t statistics for LFS, COM, and BAN fall in magnitude. The coefficients for LFS and COM are now only significant at the 10 percent level, while BAN remains significant at the five percent level.

The second row in Panel B reports that, when LEV is deleted, the coefficient for LFS is no longer significant while the coefficients for COM and BAN are significant at the five percent level. The third row shows that deleting LFS produces results for COM, BAN, and LEV that are very similar to those in the first row.

Panel C in Table 3 presents results for the large firm size half (e.g., those observations where SIZ = 1 holds). The R^2 and F values in this panel fall noticeably compared to the previous panel, with the F values no longer significant. The only variable in Panel C with a significant coefficient is LEV. It now has its predicted positive sign and is significant at the 10 percent level. Thus, the findings for the large firms are quite different from the small firms. The results for LEV indicate that the only evidence for a signaling effect is that predicated on the relative degree of the leverage change.

Consistent with differential information theory (Atiase, 1980; Klein & Bawa, 1977; Wilson, 1975), the regression tests in Table 3 show firm size as a significant explanatory factor when tests are conducted on the total sample. For these tests, there is a greater variation in firm sizes. However, when samples with fewer observations are tested (e.g., the small or large firm size halves), the firm size variable is only marginally significant or insignificant. These tests also demonstrate that the market response is more negative when common stock offerings of small *OTC* firms are accompanied by secondary sales or are involved with reducing bank debt. For large *OTC* firms, the market appears to be primarily concerned about the relative decrease in the debt level. Thus, it appears that the signaling models posited by Leland and Pyle (1977) and Fama (1985) are more applicable for small OTC firms, while the signaling model of Ross (1977) is more applicable for large OTC firms.[10]

Small Versus Large Sample Comparisons

Our next series of tests attempt to further determine if a differential information effect, attributable to firm size, is important. We compare

Table 3
Ordinary Least Squares Regression Results for 179 OTC Stock Offerings that Reduce Nonconvertible Debt, 1973-1989

The general model is:

$$CER = b_0 + b_1LFS + b_2SIZ + b_3COM + b_4BAN + b_5LEV$$

CER   is the three-day cumulative excess stock return that includes days −1, 0, and +1.

LFS   is the logarithm of firm size. (Firm size is defined in Table 1 and is expressed in millions of dollars.)

SIZ   is a dummy variable that equals 0 if in small firm size half, or equals 1 if in large firm size half.

COM   is a dummy variable that equals 0 if primary offering, or equals 1 if combination offerings.

BAN   is a dummy variable that equals 0 if the debt reduction is identified as a bank debt reduction, or equals 1 if the debt reduction is not identified as a bank debt reduction.

LEV   is the par value of the planned reduction in debt divided by firm size.

Panel A: Total Sample (n=179)

Constant b_0	LFS b_1	SIZ b_2	COM b_3	BAN b_4	LEV b_5	R^2 (Adjusted R^2)	F Value
−0.094	0.012		−0.017	0.016	−0.037	0.082	3.89***
−3.32***	2.64***		−1.84**	1.96**	−0.60	(0.061)	
−0.051		0.025	−0.016	0.019	−0.017	0.083	3.95***
−3.50***		2.31***	−1.77**	2.29**	−0.30	(0.062)	
−0.081	0.011		−0.018	0.016		0.080	5.08***
−4.52***	2.94***		−2.00**	1.95**		(0.064)	
−0.048		0.023	−0.017	0.019		0.083	5.26***
−5.58***		2.70***	−1.88***	2.25**		(0.067)	
−0.026			−0.021	0.016	0.054	0.052	3.18**
−2.98***			−2.25**	1.87**	1.14	(0.035)	

Panel B: Small Firm Size Half (n=89)

	(1)	(2)	(3)	(4)	(5)	R^2	adj. R^2	F
coeff.	0.013	−0.109	−0.022	0.025	−0.068	0.082	0.038	1.88
t	1.30*	−2.69***	−1.49*	1.87**	−0.90			
coeff.	0.010	−0.083	−0.025	0.026		0.074	0.041	2.25*
t	0.89	−2.12**	−1.82**	1.95**				
coeff.		−0.057	−0.020	0.024	−0.043	0.071	0.038	2.15*
t		−3.22***	−1.38*	1.80**	−0.56			

Panel C: Large Firm Size Half (n=90)

	(1)	(2)	(3)	(4)	(5)	R^2	adj. R^2	F
coeff.	0.001	−0.015	−0.011	0.008	0.134	0.050	0.005	1.12
t	0.15	−0.33	−0.93	0.75	1.28*			
coeff.	0.006	−0.053	−0.010	0.111	0.037		0.004	
t	0.87	−1.53	−0.82	1.03	1.11			
coeff.		−0.008	−0.012	0.008	0.142	0.049	0.016	1.48
t		−0.76	−0.94	0.77	1.56*			

Notes: SIZ is only applicable for the total sample tests in Panel A. It is not applicable for Panel B (where SIZ=0) and Panel C (where SIZ=1). The first and second rows for the first six columns report estimated coefficients and robust *t* statistic using the White (1980) heteroskedasticity adjustment procedure. One-tailed *t* statistics are given for the five explanatory variables. Three asterisks (***), two asterisks (**), and one asterisk (*) denote significance at the one, five, and 10 percent levels, respectively.

CERs for small and large firm size groups when signaling effects (found to be significant in the regression tests) are not expected to influence the outcome. For example, the tests are designed so that homogeneity (concerning the degree of insider trading, the bank versus non-bank debt nature of the debt reduction, and the degree of leverage change) exists for the groups being compared.

To assess if a firm size effect holds regardless of the presence of insider trading, we separately examine the primary offering sample (n=119) and the combination offering sample (n=60). It can be noted, that when the combination sample is divided into small and large firm size groups, the secondary offering as a percent of the total offering is virtually the same for both groups. Thus, any differences in CERs (that occur) cannot likely be attributed to differences in the amount insider sales. To determine the impact of firm size regardless of the degree of bank debt signaling, we separately test the bank debt reduction sample (n=90) and the non-bank debt reduction sample (n=89). Finally, we control for the degree of the leverage change by comparing small and large firm size groups when values for LEV (the planned reduction in debt divided by firm size) are similar. Since small firms undergo relatively greater reductions in debt levels, the procedure described below is used to make LEV values similar for the small and large firm size groups being compared.

We first take the small firm size half (n=89) and delete those one-third observations (n=29) that have the most negative values for LEV. We then take the large firm size half (n=90) and delete those one-third observations (n=30) that have the least negative values for LEV. This deletion process produces small and large firm size groups that have similar values for LEV. For example, the mean, median, and standard deviation for LEV are -12.8, -12.6, and 4.1 percent for the small group. The respective values are -12.3, -12.0, and 3.8 percent for the large group.

Table 4 presents the results for small versus large firm size group comparisons described above.[11] The "small firm size group" column shows that the small firm size groups for these samples have parametric and non-parametric statistics for three-day CERs that are statistically significant from zero at the one percent level. The magnitude of the negative CERs reported in this column are generally about twice the negative magnitudes given in the "large firm size group" column for the large firm size groups. The last column shows that differences in CERs between the small and large groups are significant at the five percent level or better with two exceptions.

The first exception is Test 1 for the combination offering sample. The CER difference is only significant at the 10 percent level when comparing large and firm size halves. However, the magnitude of the CER difference

Table 4
Small Firm Size Versus Large Firm Size Comparisons for OTC Stock Offerings that Reduce Nonconvertible Debt, 1973-1989

Sample[a] Test	Small Firm Size Group	Large Firm Size Group	Small vs Large Group
Primary Offerings (n=119)	-3.45%; -4.27*** [b] 29%; -3.25***	-1.73%; -2.74*** [b] 33%; -2.58***	-1.67**; 110 [c] -2.38***
Combination Offerings Test 1 (n=60)	-5.71%; -4.73*** 13%; -4.62***	-3.50%; -3.51*** 27%; -2.56***	-1.41*; 58 -1.57*
Combination Offerings[d] Test 2 (n=40)	-6.37%; -5.17*** 10%; -3.54***	-2.74%; -2.43** 30%; -1.79*	-2.17**; 38 -2.10**
Bank Debt Reductions (n=90)	-5.16%; -5.93*** 22%; -3.73***	-3.03%; -4.03*** 24%; -3.43***	-1.85**; 88 -1.91**
Non-Bank Debt Reductions Test 1 (n=89)	-2.97%; -2.86*** 27%; -3.02***	-1.89%; -2.41*** 36%; -1.94*	-0.83; 80 -1.50*
Non-Bank Debt Reductions[e] Test 2 (n=60)	-4.17%; -4.36*** 24%; -2.79***	-1.62%; -1.60 37%; -1.46	-1.83**; 57 -2.13**
Degree of Leverage Change[f] (n=120)	-4.68%; -5.28*** 20%; -4.65***	-2.41%; -3.35*** 28%; -3.36***	-1.99**; 118 -2.73***

Notes: Three asterisks (***), two asterisks (**), and one asterisk (*) denote significance at the one, five, and 10 percent levels, respectively.

[a] Unless noted otherwise, each sample being tested is divided into small and large firm size halves.

[b] The first row reports the mean three-day cumulative excess stock return (CER) followed by the two-tailed t statistic (when testing if the CER equals zero). The three days include -1, 0 (the announcement date), and +1. The second row gives the percent of the sample that has a positive CER followed by the two-tailed binomial z statistic (when testing if the percent equals 50 percent).

[c] The first row reports the one-tailed parametric t statistic (when testing the null hypothesis that the CER for the small group is less negative or equal to the CER for the large group) followed by the degrees of freedom. The third row reports the z statistic for the one-tailed nonparametric Wilcoxon test.

[d] This test compares groups with greater differences in firm size than found in the first combination offerings test. It compares those one-third combination offerings that have the smallest firm sizes (n=20) with those one-third combination offerings that have the largest firm sizes (n=20).

[e] This test compares groups with greater differences in firm size than found in the first non-bank debt reductions test. It compares those one-third non-bank debt reductions that have the smallest firm sizes (n=30) with those one-third non-bank debt reductions that have the largest firm sizes (n=30).

[f] This test compares a small firm size group (n=60) and a large firm size group (n=60) when values for LEV (the par value of the planned reduction divided by firm size) are similar for both groups. The procedure is described in Section IV prior to presenting the results of this table.

is greater than that found for the primary sample test (-2.21 percent difference versus -1.72 percent difference) even though the average difference in firm sizes for its groups is $119 million less than that for the primary sample

groups. Test 2 for the combination offering sample compares groups with greater differences in firm size than found in Test 1. It does this by comparing those one-third combination offerings that have the smallest firm sizes (n=20) with those one-third combination offerings that have the largest firm sizes (n=20). For this comparison, Table 4 reveals that both parametric and non-parametric tests are significant at the five percent level.

The second exception is Test 1 for the non-bank debt reduction sample. The CER difference is only significant at the 10 percent level for the non-parametric test when comparing large and firm size halves. The average difference in firm sizes for its groups is $83 million less than that for the bank debt sample groups. Test 2 compares groups with a greater difference in firm sizes than found in Test 1. This is done by comparing those one-third non-bank debt reductions that have the smallest firm sizes (n=30) with those one-third non-bank debt reductions that have the largest firm sizes (n=30). Like Test 2 for the combination offerings, Test 2 for the non-bank debt reductions produces parametric and non-parametric statistics that are significant at the five percent level.

Besides the significant coefficients for LEV found in Panel C for Table 3, the degree of leverage change test is important due to the correlation that exists between firm size variables (LFS and SIZ) with the relative size of the leverage change variable (LEV). This test yields parametric and non-parametric statistics that are significant at the five and one percent levels. These results show that firm size is a significant factor even when small and large firm size groups undergo leverage changes that are similar. The results are not biased by the presence of insider sales and banker actions, as the number of combination offerings and bank debt reductions are similar for both groups. Although not reported, the support for a size effect is still evident when other relative sizevariables (resembling LEV) are analyzed in a like manner.[12]

The Relationship between Firm Size and Issuance Expenses

It is possible that support for a firm size effect can be explained by issuance expenses if the expenses impact stock prices at the time of the announcement, and the impact is sufficiently greater for small OTC firms. Hull and Fortin (1993) offer insight into variables that can be tested to determine the impact of issuance expenses on announcement period CERs. They derive a flotation cost adjusted measure (ADJ) that, when added to CER, gives an adjusted CER representing the fall in stock price if issuance expenses are zero. ADJ can be expressed as -1*COS*SHR where COS is the issuance expenses per new share and SHR is the planned percentage

change in outstanding common stock. The values calculated for ADJ are positive since COS is negative (to represent the negative cash flow associated with issuance expenses) and SHR is positive.[13]

Before using ADJ and its two components (e.g., the variables, SHR and COS) to determine if issuance expenses can account for CERs, we perform correlation analysis since we suspect colinearity if ADJ or SHR is used with LEV. This suspicion is confirmed. For example, the Pearson (Spearman) *rhos* between LEV and ADJ are: -0.50 (-0.63) for the total sample; -0.42 (-0.43) for the small firm size half; and, -0.25 (-0.42) for the large firm size half. *Rhos* between SHR and ADJ are even greater in magnitude ranging from -0.60 to -0.76.

Since the correlation between ADJ and LEV is substantial, we repeat the tests in Tables 3 and 4 with ADJ replacing LEV. We find that ADJ yields results similar to LEV with support for size and signaling effects unchanged. Tests are also repeated with SHR replacing LEV. Once again, results are similar (reflecting the fact SHR is highly correlated with both ADJ and LEV). However, when tests are conducted with COS, results change. The results are summarized below.

Correlation analysis discovers that *rhos* between COS and LFS are high compared to those between COS and relative size variables (e.g., LEV or SHR). For the total sample test, the Pearson (Spearman) *rho* between COS and LFS is 0.45 (0.51), while the *rho* between COS and LEV is 0.13 (0.23) and between COS and SHR is -0.12 (-0.25). The differences (in *rhos* between COS and LFS compared to those between COS and relative size variables) remain when the small and large halves are analyzed.

For the total sample regression tests, using COS with firm size variables cause colinearity problems as coefficients for COS and firm size variables fall considerably in magnitude. Replacing firm size with COS produces results for COS that are similar to firm size. The *rhos* between COS and firm size, along with their similar regression results, leave open the possibility that firm size may be capturing negative issuance expenses (in addition to a differential information effect). However, this interpretation raises several questions. Why do we not observe stronger results for ADJ? Is it because statistical significant support for ADJ is weakened by the possibility that a substantial number of sample observations capture positive leverage-related effects (e.g., as might result if onerous debt covenants are retired)? Future research needs to explore variables capable of capturing positive leverage-related wealth effects.

To further examine the relationship between a size effect and issuance expenses, a test similar to that reported in Table 4 for the degree of leverage change is conducted. When small and large firm size groups are formed

(similar to that described for the degree of leverage change test) such that
COS values are equal, mixed support is found for a size effect. When three-
day CERs for the small and large firm size groups are compared, the para-
metric test is insignificant ($t = -1.16$) but the non-parametric test is signifi-
cant at the five percent level ($z = -1.97$). Future research needs to continue
to explore if (and to what degree) a firm size effect captures an issuance
expenses effect.

V. SUMMARY

We examine 179 OTC stock offerings that reduce nonconvertible debt. We
find that small firms (relative to large firms) experience more negative stock
returns for announcements of common stock offerings that retire noncon-
vertible debt. This is especially evident when samples with larger differences
in firm size are compared. To the extent firm size represents firms with less
available information, our findings are consistent with a differential infor-
mation effect.

Regression tests on the total sample indicate that a firm size effect is a
dominant effect. There is also evidence that signaling effects, based on
changes in insider ownerships and in actions by bankers, explain stock
returns. This is especially evident when the small half is tested. Results for
the large firm half differ. For these regression tests, any possible signaling
effect can only be linked to the reduction in the relative level of debt. For
larger firms, the market appears to be more concerned with the relative
amount of the debt reduction as opposed to what insiders might be doing.

Additional tests further show that a differential information effect,
linked to firm size, is a dominant effect. For example, statistical significant
support for a firm size effect is evident when we examine samples designed
so that other signaling effects (e.g., those stemming from changes in insider
ownership, banker actions, and debt levels) are not expected to bias results.
The results of these tests (along with prior tests) point out that the strength
of a firm size effect depends upon the size of the sample. This is because
samples with more observations can produce groups with greater differ-
ences in firm sizes.

Finally, we offer some evidence to suggest that a firm size effect may be
at least partially explained by issuance expenses. Future research needs to
further explore this possibility. A good starting point would be senior secu-
rity offerings (such as debt offerings) where issuance expenses are not typi-
cally large. If a firm size effect is found for this sample, then additional (and
stronger) support for a differential information effect could be established.

APPENDIX

Classifying Observations Based on Firm Size

Before classifying an observation according to firm size, its firm size is adjusted by recognizing the fact that firm size is measured in dollars and a dollar's worth of firm value can decline substantially over two decades. For example, a $100 million firm in 1977 is relatively larger than a $100 million firm in 1985. To compare reported firm size values for these two years without adjusting the values may produce erroneous conclusions.

For a firm that announces a stock offering during or prior to 1980, we adjust its firm size by multiplying by an adjustment factor (AF) given as

$$AF = (1 + r)^n$$

where r represents the annual compounded rate of decline in the value of the dollar, and the exponent (n) is equal to the base year of 1980 minus the year of announcement.

To illustrate, assume the following: firm size is reported by sources as $100M (M = million) at the time of the announcement; the annual compounded rate of decline in the dollar (r) is 0.05; and, the announcement occurs in 1977 which is three years before the base year. Given that n is 3 (e.g., 1980 - 1977 = 3), then AF is 1.05^3 and the adjusted firm size is $100M*1.05^3$ or (to the nearest million) $116M.

Now, keep the above numbers except assume the announcement occurs in 1985 which is five years after the base year. The value for n is now -5 (e.g., 1980 - 1985 = -5). Thus, AF is 1.05^{-5} and the adjusted firm size is $100M*1.05^{-5}$ (or $100M/1.05^5$) which is about $78M.

Like the illustration, this study assumes a five percent compounded annual decrease in the value of a dollar over time and a base year of 1980. However, the findings are similar if a zero percent or a 10 percent decrease in dollar value is used. The similar results (for either 0, 5, or 10 percent) can be at least partially attributed to the fact that about two-thirds of the observations are clustered between the years 1978 and 1983. Thus, firm sizes for these observations are not substantially altered when adjusted.

After an observation's firm size has its dollar value adjusted, it can be ranked by its adjusted firm size and placed in a size group. In this study, we perform statistical tests by taking the particular sample being considered and placing each observation into one of two groups. For most tests, we only consider a grouping into halves. Thus, observations with the smallest firm size values are placed in the "small half," while those with the largest firm

size values are put in the "large half." For tests that seek to compare samples with greater differences, groups other than halves are used. This causes observations with middle firm size values to be discarded.

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NOTES

1. Atiase, Bamber, and Freeman (1988) summarize the research that indicates the relation between accounting earnings announcements and aggregate investor reactions depends on firm size. They note that this finding has emerged consistently from research based on samples involving different time periods, different security exchanges, and different definitions of "small" versus "large."
2. Although less frequently cited than signaling models, negative stock returns are also consistent with other competing models. For example, a price pressure model predicts a negative stock return for an increased supply of stock assuming a downward sloping demand curve. An issuance expenses model predicts negative stock returns if stockholders, as residual owners, bear the costs of floating a new issue. Tax models, rooted in the Modigliani and Miller (1963) model, predict a negative effect due to loss tax shields. Optimal capital structure models (Jensen & Meckling, 1976; Kraus & Litzenberger, 1973) predict a negative return if firms are moving away from optimal debt levels.
3. Stock offerings research (Asquith & Mullins, 1986; Dierkens, 1991; Masulis & Korwar, 1986) where cash is raised to change the asset structure also finds general support for asymmetric information signaling models. This line of research generally mentions signaling models (Miller & Rock, 1985;Myers & Majluf, 1984) predicated on new financing that is directed at changing the asset structure. Such signaling models are not generally applicable when analyzing pure leverage changes. This research also cites support for the Leland and Pyle (1977) signaling model (since its prediction is independent of the purpose of the offering). For the Dierkens (1991) study, one of her asymmetric information variables may very well proxy for firm size (and thus be capturing a differential information effect). This variable is a dummy variable set equal to one when the firm has 16 or less announcements listed in the *Wall Street Journal Index* for the year prior to the equity issue announcement. This dummy variable fares better than other asymmetric information variables. This is true when tested either separately or simultaneously with other asymmetric variables.
4. Publication in *The Wall Street Journal* of the planned offering typically lags by one day the announcement date given by other sources (such as the *Investment Dealers' Digest*) that gather or publish information after the fact. Thus, for those 38 observations for

which *The Wall Street Journal* is the only source, the day before the date of publication is taken as the announcement date.

5. Empirical results reported in this paper are similar if firm size is measured by the market value of common stock.

6. Our findings are also not dependent on the inclusion of 34 observations where the announcing firm makes other firm-specific announcements for event days -3 to +3. For 23 of these cases, the sources disagree as to whether all of the proceeds will be used to reduce debt.

7. A negative coefficient for COM may also be consistent with agency models, rooted in Jensen and Meckling (1976), if insiders include managers. Managers, who lower their ownership proportion, are less likely to make wealth maximizing decisions on behalf of stockholders. However, since the primary portion of combination offerings is for debt reduction purposes, positive agency effects are also possible to the extent debt with onerous covenants are retired. Thus, the net agency effect is hard to predict.

8. A positive coefficient for LEV is also consistent with Modigliani and Miller (1963). They hypothesize greater tax shield losses as greater amounts of debt are retired. A positive coefficient is also consistent with optimal capital structure models (Jensen & Meckling, 1976; Kraus & Litzenberger, 1973) if the stock for debt transaction causes the firm to move away from its optimal debt level. However, since optimal models hypothesize a negative coefficient when the firm moves closer to its optimal debt level, the sign of the coefficient for LEV is difficult to predict based on these models.

9. For the remainder of this paper, *rhos* between pairs of explanatory regression variables are not reported unless there is evident (in particular, from statistical significance and sufficient *rho* magnitudes) to indicate colinearity. To further ascertain colinearity, variance inflation factors are calculated for each regression test. Factor values are not reported in this paper since the values never exceed 1.63 (which is well below conventional levels for indicating multicolinearity). See Belsley, Kuh, and Welsch (1980) for more details on the relationship between variance inflation factors and multicolinearity.

10. As revealed in Table 1, there is a propensity for small firms to occur in the 1970s. For this reason, the tests in Table 3 are repeated with a dummy variable (DEC) representing the decade of occurrence (1970s versus 1980s) included. DEC is not significant at the 10 percent level in any of the tests. Also, a dummy variable representing the cash versus non-cash offerings is not significant. Finally, tests are conducted with other relative size variables suggested by the event study regression research of stock offerings (Asquith & Mullins, 1986; Cornett & Travlos, 1989; Hull & Moellenberndt, 1994; Masulis, 1983). The results for these variables are generally similar to those reported for LEV.

11. For the results reported in Table 4, each small and large firm size observation is classified relative to the sample being tested. Although not reported, similar results are found if observations are classified relative to the total sample (n=179).

12. For example, results are unchanged when the percentage change in outstanding shares is tested ($t = -2.53$ and $z = -3.29$).

13. There are 157 observations for which data is available from the Investment Dealers' Digest to calculate COS. Values for COS range from -16.5 percent to -2.6 percent with a mean (median) of -6.2 (-6.2) percent. Of the 157 observations, there are 77 and 80 in the small and large firm size halves. Mean (medians) for the small and large halves are -7.0 (-6.9) percent and -5.4 (-5.6) percent.

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