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The Shelf Registration of Debt and Self Selection Bias

DAVID S. ALLEN, ROBERT E. LAMY, and G. RODNEY THOMPSON*

ABSTRACT

Prior studies report lower issue costs for shelf registered debt and conclude that the benefits of increased underwriter competition can be realized by those firms using this registration procedure. This study re-examines the purported superiority of issuing debt via shelf registration, and finds that the savings in issue costs displayed by earlier studies can be attributed to a self selection bias and not the method of registration.

SEVERAL PUBLISHED PAPERS HAVE indicated that firms issuing debt registered under the Securities and Exchange Commission's Rule 415 (a shelf registration) have significantly lower issuing costs than do firms using traditional negotiated registrations.¹ In spite of the empirical evidence, however, not all published comments have been positive with regard to shelf registration. From the outset, the rapid sale of securities made possible with a shelf registration has come under fire because of the underwriter's inability to thoroughly investigate the financial status of the issuer.

The objective of this paper is to draw together the positive and negative aspects of the shelf registration of debt in an effort to assess its overall influence on the issuing firm. The first section of the paper briefly describes shelf registration and its short but controversial history. The second section of the paper states the testable hypothesis, describes the models to be employed, and discusses the data. Sections III and IV present the empirical results of the study. A summary of the findings is presented in the final section.

I. Shelf Registration

The Securities and Exchange Commission has consistently held that adequate disclosure is fundamental to a fair and efficient capital market. Further, the stated goals of the Securities Act of 1933 and the Securities Exchange Act of 1934 are to enable investors to make decisions on the basis of accurate and timely information. With respect to the primary issue of securities, for example, the Commission has historically held that significant delays between the registration

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¹ See Kidwell, Marr, and Thompson (1984, 1987) and Rogowski and Sorensen (1985).

and sale of a security would result in investors basing their decisions on stale, inaccurate information. In 1982, the Commission adopted an integrated system of securities registration intended to eliminate obvious redundancies between the 1933 and 1934 Acts, thus streamlining the disclosure system. The new system was designed to reduce compliance costs by eliminating duplicative disclosure, while providing investors with all necessary information in a timely manner. A key component of this new integrated disclosure system was the Commission's substantive revision of its interpretation of "timely information." The integrated system is based on the assumption that, for certain firms, "any information readily available to market professionals, including that contained in periodic reports required by the 1934 Act, will be widely disseminated in the trading community and, therefore, will be reflected in the price of the security. Such information does not need to be repeated in a registration statement filed pursuant to the 1933 Act, but may simply be incorporated in such a statement by reference to the issuer's periodic reports" (Banoff, 1984, p. 138).²

Registration under the SEC's Rule 415 allows firms to register securities for issuance at any time over the following two years.³ Once the securities are registered and placed on the shelf they can be sold almost immediately. The discussion of Rule 415 has generally centered around the Rule's impact on issuing firms, the investment banking industry, and capital markets.

A. Arguments Against Shelf Registration

The major arguments against shelf registration have focused on the due diligence obligations of the investment banker and the potential for increased concentration in the investment banking industry under the guidelines of Rule 415.⁴ Due diligence can be viewed as the foundation of federal securities regulation. Its purpose is to make public certain non-public information that many observers suggest is not reflected in a security's market price. The concern has been that the investment banker's ability to assure that no misstatements or omissions appear in the issuer's registration statement, i.e., to perform the due diligence obligation, is impaired under the rapid-fire nature of security issues under the SEC's Rule 415.

The second argument against shelf registration is that it will lead to increased concentration in the investment banking industry. There are two basic reasons presented that might lead to this increased concentration and both are related to the speed with which decisions are made on shelf registered issues. First, the

² For an extensive review of the evolution of integrated disclosure, the advent of Shelf Registration, and the problems inherent in relying on market professionals as a substitute for traditional diligence activities, see Averbach and Hayes (1986), especially Chapter 9.

³ During Rule 415's original trial period, from March 1982 until November 1983, almost all debt-issuing firms were allowed to use shelf registration. When the Rule was made permanent in November 1983, the eligibility requirements were made much more stringent and many smaller firms were no longer eligible. For a detailed discussion of the eligibility requirements see Banoff (1984, pp. 136–143).

⁴ Due diligence refers to the underwriter's obligation to assure that there are no misstatements or omissions in the issuer's registration statement. For a thorough discussion of the due diligence obligations of the underwriter see Fox (1984), Nicholas (1983), and Averbach and Hayes (1986).

smaller, often regional firm may not have sufficient capitalization to assume the risk of “taking down” a large issue that is sold through a rapid financing. Further, the small firm may not have time to establish a syndicate with other small firms so that it may compete with the larger, better capitalized firms. Second, the larger firms may not be as likely to form syndications, thereby bringing in the smaller firms, under the time-frame of a rapid financing.⁵ These lines of reasoning point to increased concentration and therefore decreased competition in the investment banking industry.

B. Arguments in Favor of Shelf Registration

The major arguments that have been presented in favor of shelf registration have included flexibility, of both design and timing, and the prospects of increased competition. The flexibility arguments have been consistently made by the management of issuing firms who have argued that shelf registration has allowed them to come to market quickly when interest rates appear to be particularly low.⁶ Additionally, they have the opportunity to alter the type of issue (notes or debentures, long or short term, for example) at the point in time when the sale is actually made. It has been argued that this type of flexibility increases marketability, and therefore decreases the yields, of shelf registered issues.

Increased competition may be fostered by the fact that once the issuing firm registers under Rule 415, the securities can be sold to the investment banker that offers the best deal in a manner similar to competitive bidding. This potential for increased competition among investment banking houses could lead to increased price and therefore to lower yields.⁷

The empirical studies addressing shelf registration of debt include works by Kidwell, Marr, and Thompson (1984, 1987), Rogowski and Sorensen (1985), and Fung and Rudd (1986). These studies vary to some extent in their modeling techniques, yet three of them find significant savings in yields associated with the use of a shelf registration. Kidwell, Marr, and Thompson (1984) use a dichotomous variable to account for the method of registration. Their findings indicate that issuing firms save between thirty and forty basis points when using a shelf registration. Rogowski and Sorensen (1985) use the same technique, with a different sample, and find a savings of just over twenty basis points attributable to shelf registration. Fung and Rudd (1986) offer mixed results with an indication that if any savings exist, they may be less than previously indicated.

These results are quite compelling in arguing that shelf registration decreases the direct issuing cost of debt. Indeed, it appears that in terms of issuing expenses, the issuing firm's shareholders' best interests can be served when the shelf registration procedure is used. However, these lower issuing costs that are reported as benefits of shelf registration have been challenged by Hansen (1986). Hansen argues that the observed differences in issuing costs between shelf and

⁵ See then-Commissioner Thomas' dissent for a thorough explanation of these points [Federal Register, Friday, September 10, 1982, p. 39804].

⁶ For numerous examples see SEC Public Comment File Number S7-925.

⁷ This line of reasoning, based on the work of Kessel (1971), has been pursued by Kidwell, Marr, and Thompson (1984, 1987).

traditionally registered securities may be related to structural differences between the issuing *firms* and not due to registration method. Indeed, if these “shelf” firms paid lower costs on their securities issues prior to Rule 415, then it is quite possible that a self selection bias is driving the previously reported savings. Hansen goes on to suggest that one should investigate “... whether firms that now use shelf also had lower issuing costs prior to the inception of Rule 415 than those firms that have chosen not to ...” (1986, p. 54). Such an investigation is the major thrust of this paper.

II. Testable Hypothesis

A. Hansen’s Self Selection Bias Hypothesis

The paper’s testable hypothesis, designated the Self Selection Bias Hypothesis, states that the savings reported in earlier studies reflect differences in the issuing firm and not the method of issuing debt. If there is some special characteristic of those firms that have chosen to register their securities under Rule 415 that makes them different from the other firms that have registered debt since March of 1982, then it is possible that the savings attributed to the use of shelf registration may actually be caused by that other special characteristic. By identifying those firms that issued shelf registered debt during the period from March 1982 through December 1983, the approximate group of firms that yielded the results presented by Kidwell, Marr, and Thompson (1984, 1987) and Rogowski and Sorensen (1985) can be isolated. A self selection bias is present if the savings in issuing costs on “shelf” firms’ debt also existed in the period before March 1982. Of course the length of this period should not be too long because the unknown characteristic might well be something that specific firms gain and lose through time. The decision is to use the five years before Rule 415 became effective (March 1977 through February 1982) as the comparison period.

To evaluate the Self Selection Bias Hypothesis, a standard bond pricing model is used. The null hypothesis is that reoffering yields on debt issued by “shelf” firms during the comparison period (March 1977–February 1982) are, on average, no different from reoffering yields on debt issued by “non-shelf” firms, *ceteris paribus*.

B. Empirical Test of Self Selection Bias Hypothesis

The bond pricing model as presented by Kidwell, Marr, and Thompson (1984, 1987), Rogowski and Sorensen (1985), and Fung and Rudd (1986) specifies the yield on the bond issue as a function of several issue and market risk variables in addition to the type of registration. Using the form of the model proposed by Lamy and Thompson (1988) this paper employs the precise specification:

$$RY_i = \alpha_0 + \alpha_1 RATING + \alpha_2 INTVOL + \alpha_3 SIZE \\ + \alpha_4 SINK + \alpha_5 CALL + \alpha_6 SHELF + \varepsilon, \quad (1)$$

where

RY_i = yield to maturity on issue i minus the yield on the constant maturity U.S. Treasury index with the same maturity on the date of issue divided by that U.S. Treasury index. Daily Treasury rates are from *Federal Reserve Statistical Release H.15: Selected Interest Rates*. Linear interpolation is used when no matching maturity is available;

$RATING$ = zero-one variables for Moody's Investors Service ratings (Aaa, Aa, A, Baa, and Ba). Ba issues serve as the reference group in the regressions (no issues rated lower than Ba are included in the sample);

$INTVOL$ = volatility in interest rates computed at the previous ten days' (from issue date) mean absolute variation in the 20 year constant maturity U.S. Treasury bond index;

$SIZE$ = the natural log of the size of the issue;

$SINK$ = zero-one variable where $SINK = 1$ if the issue has a sinking fund and $SINK = 0$ otherwise;

$CALL$ = the ratio of years to call or first refunding divided by the years to maturity. This is a continuous variable bounded by zero, no call protection, and one, protected from call until maturity; and

$SHELF$ = zero-one variable where $SHELF = 1$ if the issue was registered pursuant to Rule 415 and $SHELF = 0$ otherwise.

Using approximately the same sample period as Kidwell, Marr, and Thompson (1984, 1987) and Rogowski and Sorensen (1985) this model should replicate the savings previously reported. The firms that used a shelf registration in the March 1982 through December 1983 period have their bond issues identified in the sample period of March 1977 through February 1982. Using a simple dichotomous variable the model can be respecified as

$$RY_i = \gamma_0 + \gamma_1 RATING + \gamma_2 INTVOL + \gamma_3 SIZE + \gamma_4 SINK + \gamma_5 CALL + \gamma_6 BIAS + \xi, \quad (2)$$

where

$BIAS$ = zero-one variable where $BIAS = 1$ if the firm chose to register an issue under a shelf registration during the period March 1982 through December 1983 and $BIAS = 0$ otherwise; and

all the other variables are previously defined.

As stated above, the null hypothesis is that those issues made by firms that later issued shelf registered securities were priced the same as issues made by other firms. The hypotheses are formally stated as:

$$\begin{aligned} H_0: & |\gamma_6 \cdot BIAS| = 0 \text{ (no yield differential before shelf registration); and} \\ H_a: & |\gamma_6 \cdot BIAS| \neq 0 \text{ (differing yields in the pre-shelf environment),} \end{aligned} \quad (3)$$

where

γ_6 = the estimated coefficient of the $BIAS$ variable from equation (2).

Rejection of the null hypothesis presented in equation (3) will lead to a direct test of the Self Selection Bias Hypothesis presented earlier in the paper. That is:

$H_0: |\gamma_6 \cdot BIAS| = |\alpha_6 \cdot SHELF|$ (self selection bias); and

$H_a: |\gamma_6 \cdot BIAS| \neq |\alpha_6 \cdot SHELF|$ (differential yields, pre- and post-shelf),

where

α_6 = the estimated coefficient of the *SHELF* variable from equation (1).⁸

C. The Sample

The debt issues are identified in Drexel Burnham Lambert's *Public Offerings of Corporate Securities*. As discussed above the sample test period is March 1977 through 1983. All publicly offered straight debt issues with fixed coupons, not sold at deep discount, having a Moody's rating of Ba or better, sold by domestic industrial firms are included in the sample. For the period March 1982 through December 1983 the sample consists of 88 issues, 60 shelf registrations and 28 traditional registrations. In the period March 1977 through February 1982 the sample has 176 issues including 42 issues by those firms that later used a shelf registration.

III. Empirical Results

The results of using equation (1) to replicate the Kidwell, Marr, and Thompson (1984, 1987) and Rogowski and Sorensen (1985) studies are presented in Table I. These results are consistent with numerous other applications of the bond pricing model. Most importantly, the reoffering yields are significantly lower on those issues registered pursuant to Rule 415.⁹

⁸ Recall that *SHELF* and *BIAS* are zero-one variables so therefore the test is $|\alpha|$ relative to $|\gamma|$.

⁹ To illustrate the significance of the estimated coefficient of *SHELF* in the first column of Table I, compare the mean of the dependent variable, .1184, to the average Treasury yield off which these securities are priced, 10.55% for this period. The implied average yield to maturity is

$$\frac{\text{Yield to Maturity} - \overline{TRS}}{\overline{TRS}} = RY,$$

$$\frac{YTM - .1055}{.1055} = .1184,$$

$$YTM = .11799 = 11.799\%,$$

but *RY* is decreased for shelf issuers to .0983 (.1184 - .0201). Therefore,

$$\frac{YTM_{Shelf} - .1055}{.1055} = .0983,$$

$$YTM_{Shelf} = .11587 = 11.587\%.$$

The yield on an issue that would have otherwise reflected the mean return is indicated by these figures to have a reduction in yield of 21.2 basis points (11.799% - 11.587%), *ceteris paribus*. This estimate is surprisingly close to Rogowski and Sorensen's estimate of 21 basis points.

Table I

Regression Results Using Traditional Bond Pricing Model

Dependent variable: relative yield off a U.S. Treasury of a comparable maturity. Independent variables: *Aaa*, *Aa*, *A*, and *Baa* are zero-one variables reflecting the Moody's Investor Service rating (*Ba* and lower rated bonds are the reference group); *INTVOL* is volatility in interest rates computed as the previous ten days' (from issue date) mean absolute variation in the 20 year constant maturity U.S. Treasury bond index; *FEDCHG* is a variable that is set equal to *INTVOL* if the observation is after October 6, 1979 and zero if before. As has been pointed out by numerous authors the change in Fed operating policy on that date significantly influenced primary markets.^a *SIZE* is the natural log of the size of the issue; *SINK* is a zero-one variable where *SINK* = 1 if the issue has a sinking fund and *SINK* = 0 otherwise; *CALL* is the ratio of years to call or first refunding divided by the years to maturity. This is a continuous variable bounded by zero, no call protection, and one, protected from call until maturity; *SHELF* is zero-one variable where *SHELF* = 1 if the issue was registered pursuant to Rule 415 and *SHELF* = 0 otherwise; *BIAS* is zero-one variable where *BIAS* = 1 if the firm chose to register an issue under a shelf registration during the period March 1982 through December 1983 and *BIAS* = 0 otherwise; and *SAVER* is *BIAS* plus *SHELF*. To test for the ability to combine these two variables an F-test was conducted for differences in the estimated coefficients of the *BIAS* and *SHELF* variables when included independently in the combined regression. The computed *F* value is 0.5283 (prob. = .4680).

Independent Variable	Shelf Registration Period (March 1982–December 1983)		Pre-Shelf Period (March 1977–February 1982)		Combined Periods (March 1977–December 1983)	
	Estimated Coefficient	Prob > t ^b	Estimated Coefficient	Prob > t	Estimated Coefficient	Prob > t
Constant	0.1802	.0001	0.2445	.0001	0.2240	.0001
Aaa	-0.1765	.0001	-0.2563	.0001	-0.2314	.0001
Aa	-0.1558	.0001	-0.2433	.0001	-0.2162	.0001
A	-0.1095	.0001	-0.2015	.0001	-0.1772	.0001
Baa	-0.0530	.0033	-0.1303	.0001	-0.1120	.0001
INTVOL	5.7742	.0001	-8.0919	.0228	-4.9767	.1035
FEDCHG	—	—	11.4292	.0001	9.5141	.0002
SIZE	-0.0065	.3624	0.0083	.0992	-0.0013	.7575
SINK	0.0325	.0002	0.0351	.0001	0.0261	.0001
CALL	0.0031	.1111	-0.0021	.3789	0.0025	.0947
SHELF	-0.0201	.0201	—	—	—	—
BIAS	—	—	-0.0117	.0339	—	—
SAVER	—	—	—	—	-0.0100	.0283
	<i>n</i> = 88		<i>n</i> = 176		<i>n</i> = 264	
	Adj <i>R</i> ² = .7031		Adj <i>R</i> ² = .8207		Adj <i>R</i> ² = .7608	
	<i>F</i> = 23.896		<i>F</i> = 81.092		<i>F</i> = 84.637	

^a See Lamy and Thompson (1988).

^b The Prob > |t| is the probability that a *t*-statistic would obtain a greater absolute value than that observed given that the true parameter is zero.

In order to pursue Hansen's Self Selection Bias Hypothesis, equation (2) is estimated for bonds issued during the five year period before shelf registration. The results of this estimation, also presented in Table I, reject the null hypothesis of no significant difference in yields between *BIAS* issues and the remaining sample. The estimated coefficient of the *BIAS* variable is negative and significantly different from zero.¹⁰ Once this null is rejected, the Self Selection Bias Hypothesis can be tested. For this test the two data sets are pooled and the bond

¹⁰ Following the technique described in footnote 9 (the mean of the dependent variable = .1059, the mean average Treasury yield = 10.19%) reveals a point estimate of decreased yields of 11.92 basis points.

pricing model is estimated with both the *BIAS* and *SHELF* variables included. Based on these results an F-test is calculated to test the hypothesis that the estimated coefficient of the *SHELF* variable is equal to the estimated coefficient of the *BIAS* variable. Based on the calculated test statistic, $F_{1,252} = 0.5283$ (prob. = .4680), we fail to reject the Self Selection Bias Hypothesis. These results are consistent with a self selection bias leading to the savings attributed to the use of shelf registrations.¹¹ Further, these results allow estimation of the model for the combined dataset using the variable *SAVER*, where $SAVER = BIAS + SHELF$.¹² These results are presented in the last columns of Table I.

The results presented in the last columns of Table I offer evidence that there are systematic differences between the firms whose issues are identified with the *SAVER* variable and the balance of the firms represented in the sample. These are differences that the primary market bond pricing model is failing to capture with the other independent variables. Further, whatever these differences may be, the market appears to have been pricing them before shelf registration became available. The next section of the paper attempts to ascertain whether systematic differences can be identified between the two groups of firms.

IV. Differences Between Savers and Non-Savers

The objective of this section of the paper is to ascertain whether systematic differences exist between those firms that chose to use shelf registrations when they were available and those that did not. To satisfy this objective it seems appropriate to begin the search using information representing very basic, firm specific characteristics. The variables chosen are designed to proxy for measures of asset utilization, capital structure, firm size, and earnings retention. Specifically the proxies are total assets, the ratio of long term debt to equity, the standard deviation of the long term debt-to-equity ratio over the last ten years, the ratio of earnings before interest and taxes (*EBIT*) to total assets, the standard deviation of *EBIT* to total assets over the past ten years, and the firm's dividend payout ratio.¹³ The data for these proxies are gathered from the COMPUSTAT,

¹¹ These results are not contrary to the findings of Kidwell, Marr, and Thompson (1987) that indicate that it is the number of bids, not the use of shelf registration alone, that leads to reduction in yields. The *indication* is that the same factors that lead to multiple bids under Rule 415 existed for these firms prior to the advent of shelf registration.

¹² There is a potential problem in the definition of the *SHELF* and *BIAS* variables. The *SHELF* variable is issue-specific whereas the *BIAS* variable is firm-specific. Because of this, a firm that sold a shelf registered issue as well as a traditionally registered issue during the period when shelf registrations were available would be identified as a *SAVER* as well as a *NON-SAVER*. Inspection of the data reveals that four firms issued both traditional and shelf registered issues during the shelf registration period. These are Dayton-Hudson (5/26/82), Sears (8/20/82), Tenneco (8/20/82), and Humana (9/21/82 and 12/16/82). None of these firms, nor any of the other firms in the sample, switched from using a shelf registration to using the traditional issuance method. In an effort to assure that the results of Table I are not sensitive to these five issues, the $SHELF = BIAS$ F-test is recomputed after 1) reclassifying all of the issues by each of the listed firms as *SAVERS* ($F = 1.3521$, prob. = .2460), and 2) deleting all of the issues made by the four firms from the dataset ($F = 0.9454$, prob. = .3319).

¹³ These measures are not in any way meant to be exhaustive. Indeed, the number of potential measures is almost infinite.

Table II
Means Difference Tests Investigating the Possibility of
Structural Differences Between Firms Using and Not
Using Shelf Registrations

Firms placed in the Saver group issued shelf registered securities after that registration technique became available. Firms in the Non-Saver group chose not to use shelf registrations after they became available. The sample period is from March 1977 through December 1983.

Variable	Means		<i>t</i>	Prob > <i>t</i>
	Saver	Non-Saver		
Total Assets (millions)	6,564	4,154	-2.68	.0081
Long Term Debt to Equity	.6141	.6572	0.79	.4327
Ten Year Variation in Long Term Debt to Equity	.1818	.1525	-1.38	.1680
<i>EBIT</i> to Total Assets	.1013	.1237	2.97	.0034
Ten Year Variation in <i>EBIT</i> to Total Assets	.0231	.0327	0.19	.8482
Payout Ratio	.4698	.2812	-1.50	.1353

Industrial Annual Files with 248 of the original 264 firms represented in the final sample. This includes 97 of the 102 issues made by *SAVERS* and 151 of the 162 issues made by the *NON-SAVERS*.

The results of univariate *t*-tests are presented in Table II. Two of these measures display significant variation in means between those firms choosing to use shelf registrations and those not making such a choice. Those firms that have been identified as "savers" are on average significantly larger than the other debt-issuing firms and the "saving" firms on average have significantly lower gross profitability on total assets.¹⁴ While these univariate tests offer evidence of systematic differences between these two types of firms, multivariate analysis offers more useful insights.

Table III presents the results of logistic regression analysis using the same variables upon which the univariate tests are performed. The results of this multivariate analysis are consistent with the results of the univariate *t*-test. Specifically, firm size is a significant variable in determining group classification, with larger firms having a significantly higher probability of being a *SAVER*. The *EBIT* to total assets variable is significant with the indication that firms with higher *EBIT* to total assets are less likely to be shelf registering firms. Further, Table III displays the value of a multivariate analysis over the simple *t*-test approach. That is, the capital structure and capital structure volatility measures are both significant in the determination of group membership for these firms. Firms with higher debt ratios are less likely to have used shelf registrations while those firms with more volatility in their capital structures are more likely to have used Rule 415.

¹⁴ Recall from footnote 3 above that during the temporary period from March 1982 through November 1983 there were no size restrictions for firms issuing debt pursuant to Rule 415. Therefore, the difference in average size is not "legislated."

Table III
Logistic Regression Analysis Testing for
Differences Between Firms Using and Not
Using Shelf Registrations

Dependent variable: *SAVER*, where *SAVER* = 1 if, during the period from March 1982 through December 1983, the issue was registered under Rule 415 or, during the period for March 1977 through February 1982, the issue was made by a firm that later used a shelf registration. *SAVER* = 0 otherwise. Sample period is March 1977 through December 1983.

Independent Variable	Estimated Coefficient	Chi-Square	Prob > χ^2
Intercept	0.4658	0.80	.3720
Total Assets	0.0001	5.92	.0150
Long Term Debt to Equity	-1.3394	7.69	.0055
Ten Year Variation in Long Term Debt to Equity	4.1355	9.81	.0017
<i>EBIT</i> to Total Assets	-8.9665	10.10	.0015
Ten Year Variation in <i>EBIT</i> to Total Assets	-7.0249	0.85	.3556
Payout Ratio	0.6881	1.90	.1678

$n = 246$
Model Chi-Square ($w/6$ d.f.) = 30.91
Prob. Value of Model = 0.00001

It is important to point out that this ability to discriminate is provided with a very general group of variables and any number of other models may discriminate as well or better.¹⁵ Indeed, it is not the objective of this paper to fully explore the source of all differences between these groups of firms, but rather to display that systematic differences can be documented. Fulfilling this objective should be sufficient to verify the arguments made earlier in the paper—that there are firm specific differences between shelf and non-shelf registering firms. When coupled with the empirical evidence that firms using shelf registrations had lower reoffering yields before shelf registrations became available, the realization that these groups of firms are significantly different offers evidence that it is firm specific information that causes the lower yields on shelf registered securities.

One final test is performed. If the variables from the logistic regression are included in the original bond pricing model [equation (1)], the firm specific information for which the *SAVER* variable is proxying might be appropriately included, in which case the *SAVER* variable would no longer be significantly related to yields. The results of this test are presented in Table IV. Two firm specific variables are significantly different from zero, *EBIT* to total assets (prob.

¹⁵ Using data from COMPUSTAT, the authors have developed numerous variations of the model presented in Table III, all of which distinguish between the groups of firms. The model presented is chosen because it is as good at discriminating as the others and because the variables included represent basic areas where theory might suggest broad differences.

Table IV
Regression Results Including Additional Firm-Specific Variables

Dependent variable: relative yield off a U.S. treasury of a comparable maturity. Independent variables: Aaa, Aa, A, and Baa are zero-one variables reflecting the Moody's Investor Service rating (Ba and lower rated bonds are the reference group); *INTVOL* is volatility in interest rates computed as the previous ten days' (from issue date) mean absolute variation in the 20 year constant maturity U.S. Treasury bond index; *FEDCHG* is a variable that is set equal to *INTVOL* if the observation is after October 6, 1979 and zero if before. As has been pointed out by numerous authors the change in Fed operating policy on that date significantly influenced primary markets^a. *SIZE* is the natural log of the size of the issue; *SINK* is a zero-one variable where *SINK* = 1 if the issue has a sinking fund and *SINK* = 0 otherwise; *CALL* is the ratio of years to call or first refunding divided by the years to maturity. This is a continuous variable bounded by zero, no call protection, and one, protected from call until maturity; *SAVER* is a zero-one variable where *SAVER* = 1 if the issue was registered pursuant to Rule 415 or, for issues sold between March 1977 and February 1982, the firm chose to register an issue under a shelf registration during the period from March 1982 through December 1983, *SAVER* is zero otherwise; *T ASSETS* is total assets; *LTD/EQ* is the long term debt to equity ratio; *EBIT/T ASSETS* is the *EBIT* to total asset ratio; *PAYOUT* is the dividend payout ratio; and σ is the ten year variation in the relevant variables. Sample period is March 1977 through December 1983.

Independent Variable	Estimated Coefficient	t-value	Prob > t
Constant	0.2565	11.08	.0001
Aaa	-0.2080	-13.87	.0001
Aa	-0.1959	-15.72	.0001
A	-0.1639	-15.07	.0001
Baa	-0.1044	-9.66	.0001
<i>INTVOL</i>	-3.2241	-1.05	.2964
<i>FEDCHG</i>	8.0462	3.12	.0021
<i>SIZE</i>	-0.0114	-2.26	.0250
<i>SINK</i>	0.0289	4.77	.0001
<i>CALL</i>	0.0023	1.52	.1289
<i>SAVER</i>	-0.0134	-2.83	.0050
<i>T ASSETS</i>	0.000001	1.27	.2043
<i>LTD/EQ</i>	0.0122	1.66	.0983
$\sigma(LTD/EQ)$	-0.0113	-0.61	.5427
<i>EBIT/T ASSETS</i>	-0.1400	-3.44	.0007
$\sigma(EBIT/T ASSETS)$	0.1482	1.39	.1675
<i>PAYOUT</i>	0.0035	1.34	.1830

$n = 246$

Adj $R^2 = .7720$

$F = 52.858$

^a See Lamy and Thompson (1988).

= .0007) and long term debt to equity (prob. = .0983). Both of these have the expected influence on yields. That is, more *EBIT* to total assets drives yields down while more long term debt in the capital structure increases yields. The inclusion of these firm specific variables, however, does not weaken the estimated relationship between the *SAVER* variable and yields.

The results in Table IV do not contradict the conclusions presented earlier. Indeed, it is important to note that the coefficient of the *SAVER* variable is enhanced by the addition of the other variables. When the model is specified with the *SHELF* and *BIAS* variables individually included their estimated coefficients are *SHELF*: -0.0131 (prob. = .0331) and *BIAS*: -0.0138 (prob. = .0217). The *F*-test for the equality of estimated coefficients is $F_{1,228} = 0.0085$ (prob. = .9264). This indicates that there are firm specific variables not included among the six in the logistic model that are continuing to be represented by the *SAVER* variable.

The firm specific variables that continue to be represented by the *SAVER* variable may or may not be financial and may indeed be items that would be extremely difficult to quantify. To speculate, such items as management style, quality of employee relations, and area of functional training of the Chief Executive Officer could potentially all play a role in making these groups of firms different. Whatever the driving force, the evidence presented in this paper strongly supports Hansen's arguments that the firms using shelf registrations were saving before shelf registration.

V. Conclusions

From the above results it is evident that firms issuing debt using a shelf registration were issuing debt with lower yields before Rule 415 became available. These results suggest that the influence of shelf registrations on the cost of issuing debt may well have been overstated. Indeed, while earlier empirical studies indicate that firms can decrease issuing costs of debt by using a shelf registration, those studies fail to consider that the savings reported are generated by a self selection bias problem. Those studies make the implicit assumption that shareholders can capitalize the potential savings in issue costs that are reported to be a function of the type of registration used. The results presented here indicate that those firms having chosen to use shelf registration had lower issuing costs during the period *before* shelf registrations were possible and that the use of shelf registration, when it became available, had no incremental effect on reoffering yields.

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