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Pricing New Corporate Bond Issues: An Analysis of Issue Cost and Seasoning Effects

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ABSTRACT

The pricing of new corporate bond issues is examined, with particular emphasis on the seasoning effect and the cost of underwriting. Considerable attention is paid to some special features of the corporate bond market, including the use of actual trader quotes so as to accurately measure holding period returns. Our results suggest that the cost of issuing corporate bonds is less than previously reported.

THE PAST FEW YEARS have witnessed tremendous innovations in the market for debt securities. For example, bonds with variable coupon rates and maturity options, frequently held by both the issuer and by bondholders, are commonplace.[1] These innovations present several interesting and important challenges. Of these challenges, one of the more important is the development of empirical methods, which is made more difficult because of the problem of data availability.

The traditional approach to fixed income empirical testing is to use new issues of corporate bonds, which are typically the most liquid, as the source of pricing data. However, it is widely believed that the price behavior of new issues differs from that of existing issues. Therefore, theories and tests that describe the pricing behavior of new issues would not necessarily be applicable to existing issues.

Why may new issues of corporate bonds display different price or yield behavior than existing issues? There are three possible explanations in the literature. First, there may be differences in the contractual features between new issues and existing bonds. The second major factor is conjectured to be the relative illiquidity of existing bonds. The third explanation relates to issue costs arising from the alternative methods of delivering the security to the marketplace.

Let us deal with these three explanations in turn. As far as empirical testing is concerned, any differences in the contractual features among bonds are usually accounted for via dummy variables. This approach has been used in numerous studies; see for example Kessel [4], Ederington [2], Sorensen [7], Kidwell, Marr and Thompson [5], and Bhagat, Marr and Thompson [1]. Aside from minor technical deficiencies, the methodology appears to perform satisfactorily.

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[1] For example, a recent issue by California Power & Light has both a sequence of put options on the bond held by the bondholder and a matching sequence of call options by the issuer on every coupon date from a specified date onwards.

The impact of liquidity is less easily explained. Weinstein [8] noted that the positive lag-dependent relationship between new and "seasoned" issues observed by Ederington [2] and Lindvall [6] could be an artifact due to asynchronous pricing. Weinstein was also concerned by the use of index data in Lindvall's study, since it is well known (see, e.g., Fisher [3]) that asynchronous pricing could lead to observed serial correlation of index returns.

Weinstein concluded that if there is a "seasoning" effect it is strictly within the month of issue, which agrees with Ederington's and Lindvall's results. This is reassuring in that the same empirical conclusion is reached by using very different methodology. Both Ederington and Lindvall based their tests on index yields, while Weinstein used holding period returns for individual issues. While the conclusion is the same, there is a troublesome aspect to these studies. In the Ederington and Lindvall studies, "seasoned" or "existing" bonds lagged new issues. Implicitly, they assume that yields on current issues are better indicators of equilibrium yields. However, in the Weinstein study, new issues "season" towards the mean of a portfolio of existing issues with similar quality ratings. Here, the implication is that new issues trade towards an unobserved equilibrium value which is closer to the average of seasoned issues.

This different interpretation of the evidence on the seasoning process during the issue month is related to the final possible explanation for the difference between new and existing issues. New issues may be priced to yield a differential from the equilibrium value to reflect the transaction costs in delivering the issue to the marketplace. In other words, what has been observed as seasoning (whichever way one chooses to run the causality) may simply be an issue cost effect.

There have been a number of studies on the pricing of new corporate debt offerings. Kessel [4], Sorensen [7], Kidwell, Marr and Thompson [5], and Bhagat, Marr and Thompson [1] have all examined the effect of alternative underwriting methods. Their conclusions broadly support the assertion that different methods for delivering a security to the market incur differential "total" costs to the issuer. There are some uncomfortable implications from these studies. Under perfect competition, one would expect the cheapest method for delivering securities to the market to prevail. How then does one account for the fact that different underwriting methods continue to be used? If there is a seasoning effect for new issues, how does one estimate the true transaction cost of issuing the security when the equilibrium price cannot be observed? Finally, could the seasoning effect found by Ederington, Lindvall, and Weinstein be attributable to differential underwriting costs on newly issued bonds?

Clearly the seasoning efect is closely related to the differential underwriting cost problem. In this study, we attempt to resolve some of these empirical issues by tackling these two problems jointly. Section I of the paper outlines the empirical methodology while Section II describes our data and empirical results. Concluding remarks are in Section III.

I. Methodology

As there are several interrelated hypotheses, it is helpful to segment the test design in order to focus on the question addressed in each segment. We begin by

asking the question: Do different methods of issuing securities induce differential offer yields and thus differential costs?

In order to answer this question, one must attempt to control the effect of issue costs on yields. The following regression model is performed for two different dates:

$$\mathrm{OYS}_j = a_0 + \sum_{i=1}^{12} a_i X_{ji} \tag{1}$$

Equation (1) expresses the spread, OYS_j, between the offer yield of bond j and the average yield of a default free bond index as a linear function of:

- X_{j1} The semi-annual yield-to-maturity on the Shearson Lehman Treasury Securities Index lagged one day from the observation of the offer yield on bond j
- X_{j2} Natural log of the number of years to stated maturity on bond j
- X_{j3} Natural log of the number of years to first call on bond j
- X_{j4} Natural log of the size of issue on bond j
- X_{j5} Dummy variable corresponding to Moody's rating class A
- X_{j6} Dummy variable corresponding to the industrial sector
- X_{j7} Dummy variable corresponding to the financial sector
- X_{j8} Dummy variable, 1 denotes shelf registration (Rule 415) issues and 0 denotes negotiated issues.[2]

Although the form of the model resembles that of Kessel [4], etc., the specification of some of the variables merit comment. Sorensen [7] and Kidwell, et al [5] used a corporate bond index instead of a default free bond index, as we have done, in their regressions. Not only could their use of the corporate bond index cause econometric problems as a result of asynchronous pricing, but it is not clear that the yield spread between the new issue and a corporate bond index of seasoned bonds is the relevant comparison. The Shearson Lehman Treasury Securities Index is an index of actively quoted bonds, so we circumvent the problem of an inherent lag structure in the index's component prices which could complicate the investigation of the seasoning effect.

Notice that the offer yield of a bond is determined by the underwriting syndicate prior to the issue date.[3] Therefore, this yield reflects information available to the syndicate at best up to the day before the issue date. The Shearson Lehman Treasury Securities Index is computed daily and reflects prices of the component treasury securities as of 5:00 p.m., hence the correct interest rate level adjustment to the model (1) is the yield on the previous day's reported index. Also, for "hot issues" the offer period may not last a whole trading day. Therefore, the interpretation of the "offer yield" should be around the opening of business on the issue date. To what extent this one-day shift may have affected earlier results is not clear. Nonetheless, previous studies using variants of equation (1) did not adjust for this.

[2] Shelf registration enables a company to register all securities it plans to issue over the next two years and then sell some or all of the securities when it chooses.

[3] The issue date is the date when the security is initially offered to the market, which is not necessarily the "dated date" from which accrued interest is calculated.

The dummy (zero/one) variables are chosen to reflect the following issues:

(1) Quality. The number of existing Aaa bonds in the market is small as is the number of newly issued Aaa corporate bonds. Moreover, the spread between Aaa and Aa bonds is narrower than for other quality spreads so we simply divide the sample into two groups; those bonds rated as A (we do not distinguish between A1, A2 and A3) by Moody's and those rated as above A. Lower quality bonds are not included in this test.[4]
(2) Sectors. Simple correlation tests reveal that the effect of industry groups cannot be ignored. Hence three dummy variables divide the sample according to the main economic sectors.
(3) Underwriting Method. The last control variable distinguishes between bonds sold under "shelf registration," rule 415, or under negotiated commission. This binary classification is meant to represent the difference between competitive versus negotiated underwriting as alternatives. The important question here is whether the two alternative methods of underwriting lead to significant differences in yield spreads.

In order to isolate the possible effect of issue cost on the intertemporal behavior of new issue yields, the model (1) is reestimated with the dependent variable observed at the first date the security is released from syndication; we refer to this as model (2). It is important to note that this is the first day that secondary trading for the new issue takes place. As before, the treasury index yield is the level as of 5:00 p.m. on the previous day. Like the offer yield, the first release day quotes tend to be nearer to the opening of business, hence the lag term for the index.

If the market is efficient, then the dummy variable representing the method of issuing should not be significant. In this case, one may conclude that an issue cost effect no longer figures in the yields of new issues released from syndication. Any remaining yield spread adjustment can therefore be attributed to some other "seasoning" process. If, on the other hand, the issue cost variable still figures significantly in the regression result, then another point in time further away from the issue date will have to be included in the analysis in order to answer the basic question.

It is clear that the tests do not escape an objection of Weinstein [8] that yield to maturity essentially assumes a holding period equal to the stated maturity of the bond and is at best an approximation of investors' behavior. Furthermore, if differences in yield spreads between seasoned and new issues are used to proxy issue cost then the re-investment risk inherent in yield to maturity calculations is important.[5]

Another problem in using yield spreads to measure issue costs is that there is no reason to believe that differences between the yield to maturity and the stated coupon rate necessarily represent issue cost. At a trivial level, the two measures

[4] We did not include lower quality variable coupon, or putable issues because of their obvious differences.

[5] There is virtually no chance that coupon receipts could be expected to be consistently reinvested at a favorable risk such as the offer yield.

often differ simply because yields are continuous variables whereas coupons change in discrete amounts, typically eighths. Also, prior to open market trading, the level of coupon for any particular bond issue to sell at par is unknown.

Next, we analyze holding period returns to gain further insight as to whether new issues are "underpriced." Holding period returns are computed from the issue date to the date of first release from syndication. The argument for using the issue date as the base day for computation is as follows: The syndication period can range from a few hours to a few days. Generally, the precise length of the syndication period is unpredictable. In order to simulate the return to an investor purchasing the bond during the syndication period and selling it on the first day of release from syndication, the only realistic assumption is that purchase orders are placed at the beginning of the syndication period in order to ensure a successful purchase. The sale is therefore assumed to take place at the open of business on the first day the security is released from syndication.[6] Likewise, the market level indicator is now defined as the holding period return on the Treasury Index from the close of business one day prior to the issue date to the close of business one day before the first release of the new issue.

Holding period returns are computed using the offer price for purchases and bid price for sales. Hence the return in excess of the treasury index return provides insight into the viability, net of interest rate risk, of the strategy of immediately buying new issues and selling at the first available bid. In other words, the holding period return analysis directly examines the hypothesis that new issues are "underpriced" and that the benefits accrue to bond holders, as asserted in earlier studies (e.g., Kidwell et al. [5]).

Although the above tests examine the effect of issue costs on newly issued corporate bonds, they do not directly address the issue of the seasoning question. In order to pursue this question, our final tests examine the performance of a matched sample of existing bonds to the new issues. The matching is done as follows: For each of the new issues, two bonds in the same sector and quality rating are selected. The bonds are selected such that the coupons and maturities "bracket" the new issue bond.[7] Variants of Models (1) and (2) are now re-estimated, and a similar holding period return analysis is also performed for the seasoned set for comparison.

II. Data and Empirical Results

A sample of new issues over the period from January, 1983 to October, 1985 was collected for this study. The offer yield, price and basic descriptive statistics were obtained from Moody's. The detailed data pertaining to the syndication process were obtained from Shearson Lehman Bros.[8] It is notable that since the release price and yield data represent trader quotes, we avoided the problem of asynchronous pricing. Table I presents the summary statistics on our sample.

[6] We are indebted to Larry Fisher for pointing out this argument.

[7] This procedure resembles the usual step in a typical bond swap analysis.

[8] To some extent the exact choice of the sample is constrained by the availability of the release price/yield data, which may have caused some bias.

Table I

Data Sample Statistics
Total Number of Issues: 123

	No. of Issues	Coupon Percent	Offer Yield	Average Yield on Release From Syndication
Industrial	31	11.50	11.54	11.67
Utility	28	12.40	12.45	12.48
Finance	64	11.36	11.39	11.46
Aaa	7	10.59	10.64	10.68
Aa	43	11.37	11.41	11.49
A	73	11.88	11.92	12.00
Negotiated	60	11.82	11.86	11.94
415	63	11.45	11.49	11.56

Notes:
1. Maturity is measured in years
2. Offer Yield-to-Maturity is in % Corporate Bond Equivalent
3. Release Yield is in % Corporate Bond Equivalent

The regression results relating to model (1) are given in Table II. The first panel of Table II gives the results using all 123 issues in the sample. The findings are broadly consistent with those of Kidwell et al. [5] with the following exceptions:

(1) The coefficient on the Treasury Index yield is negative. This is initially puzzling. However, close examination of the general behavior of corporate bond yield spreads over the estimation period shows that the spread was narrowing.[9] The sign of this coefficient is irrelevant to whether different underwriting methods lead to different spreads. However this result indicates that the level of the market appears to be a significant determinant of the level of spread.
(2) The coefficient on the issuing method is insignificant, which appears to be a major departure from existing results.

However, further investigation into the regression model showed that the sample behaves as if there are two separate regression regimes differentiated by the level of the yield of the Treasury Index. In a sense, this is not unreasonable, as previous authors have noted that studies like this are frequently sensitive to the choice of historical periods (especially to changes in interest rate levels). Accordingly, we divided the sample into two halves, one corresponding to the

[9] The average yield to maturity of the Shearson Lehman Intermediate Corporate Bond index is compared to the Treasury Bond index on a monthly basis over the period from January 1983 to August 1985. The narrowing of spread between corporates and treasuries is readily apparent. This is especially the case during rising yield periods. The choice of the Intermediate Corporate Bonds Index is an attempt to control for maturity differences between the corporate universe and the treasury universe. Although the intermediate corporate bonds index limits the maturity of the bonds to 10 years and under, its average duration, typically around 4.0, is only slightly higher than the typical duration of the Treasury Bond index of 3.8.

Table II

Regression Analysis on Offer Yields Spread off the Treasury Index Yield

	A. Using all 123 observations			B. Using 64 observations with high market *ytm*			C. Using 59 observations with low market *ytm*		
Dependent Variables	Coeff.	Std. Err.	*t*-value	Coeff.	Std. Err.	*t*-value	Coeff.	Std. Err.	*t*-value
Continuous Variables									
Constant	10.042	0.818	12.272	15.533	0.985	15.764	3.019	1.994	1.514
Ave *YTM* of Treasury Index	−2.405	0.195	−12.309	−3.732	0.240	−15.520	−0.481	0.541	−0.889
Log (Years to Maturity)	0.183	0.089	2.058	0.295	0.051	5.736	0.073	0.147	0.501
Log (Years to 1st Call)	0.136	0.145	0.935	0.137	0.074	1.849	0.268	0.280	0.958
Log (Issue Size in $ *M*)	0.078	0.068	1.164	0.032	0.035	−0.903	0.136	0.124	1.091
Zero/One Variables									
Quality (1 = *A*, 0 otherwise)	0.213	0.090	2.360	0.110	0.050	2.199	0.175	0.153	1.145
Industrial (= 1, 0 otherwise)	−0.294	0.146	−2.018	−0.256	0.087	−2.957	−0.375	0.237	−1.580
Finance (= 1, 0 otherwise)	−0.118	0.151	−0.781	−0.159	0.098	−1.622	−0.114	0.221	−0.516
Issuing Method (1 = shelf reg., 0 = negotiated)	−0.001	0.091	−0.006	−0.100	0.051	−1.939	0.155	0.157	0.985
Adjusted R^2	0.791			0.937			0.143		
Std. Err.	0.434			0.167			0.504		
F-value	26.400			57.860			1.150		

subset where the Index yield is below the overall mean and conversely for the other.

The second and third panels of Table II give the results for the two subsets. Interestingly, in the best case, namely the high market yield environment, the results indicate that shelf registration offers no more than a 10 basis point advantage; see the second panel in Table II. This is substantially lower than earlier conclusions reached in Kidwell et al. [5]. One possible explanation is that competition has narrowed the gap between alternative underwriting methods since the Kidwell et al. study was performed. In the low market yield environment, shelf registration appears to be associated with a 15 basis point increase in the offer yield spread.

The first and second panels of Table II also indicate that yield spreads are positively related to maturity and are unrelated to the call provision variable. This is reasonable since new issues tend to have a long period before the issue becomes callable; therefore variations around this first call date have little impact on yield spreads. The quality variable has a positive coefficient within reasonable bounds of statistical error, which is consistent with accepted market wisdom that spreads increase as quality decreases. The remaining variables representing industrial sectors show mixed results. Without further controlled tests, the impact of economic sectors on yield spreads of new issues over and above the effect of quality differences should not be ignored. Finally, it is notable that the model fits less well in the low market yield environment.

Table III gives the result of model (2) based on release yield spreads, again using the full sample and two subsets according to market yield. The pattern of the regression results is similar to that of model (1) in Table II. This time, however, we cannot reject the null hypothesis that different underwriting methods have no influence on the bond's yield once secondary trading takes place. In fact it is doubtful whether there is any issue cost effect at all.

Just how significant is the initial underpricing or increase in offer yield? Earlier studies have given estimates in the form of basis points in either yield or price. However, neither of these specifications are reliable in the absence of an observed equilibrium price. In the previous section, we have noted the deficiency of measuring the benefits of possible underpricing in terms of yield. In contrast, we analyzed the holding period return over the syndication period. Table IV below gives the results.

It is clear that if there is underpricing, the bond holders would not be able to benefit since the excess returns over and above the Treasury Index return are predominantly negative. This does not in itself completely refute the possibility of underpricing, for it is entirely possible that during the test period, Treasury securities have performed better. However, it does raise serious doubt on the magnitude of the "benefit" passed on to investors from the initial underwriting, because on a risk-adjusted basis it appears insufficient to compensate for normal trading spreads.[10]

[10] One could argue that there may be greater benefit with longer holding periods. However, longer periods must bring increased interest rate risk. Therefore, on a risk adjusted basis it is hard to see what the bond holder could gain.

Table III

Release Yields Spread Off Treasury Index Yields

Dependent Variables	A. Using all 123 observations			B. Using 64 observations with high market *ytm*			C. Using 59 observations with low market *ytm*		
	Coeff.	Std. Err.	*t*-value	Coeff.	Std. Err.	*t*-value	Coeff.	Std. Err.	*t*-value
Continuous Variables									
Constant	9.921	0.784	12.647	18.237	1.211	15.056	2.623	2.016	1.301
Ave. *YTM* of Treasury Index	−2.385	0.186	−12.685	−4.385	0.274	−15.998	−0.334	0.547	−0.610
Log (Years to Maturity)	0.179	0.086	2.079	0.259	0.494	0.524	0.076	0.140	0.541
Log (Years to 1st Call)	0.089	0.141	0.632	0.098	0.071	1.380	0.252	0.268	0.941
Log (Issue Size in $ *M*)	0.089	0.141	0.631	−0.015	0.034	−0.445	0.116	0.118	0.981
Zero/One Variables									
Quality (1 = *A*, 0 otherwise)	0.224	0.087	2.565	0.092	0.049	1.882	0.230	0.142	1.618
Industrial (= 1, 0 otherwise)	−0.237	0.141	−1.678	0.244	0.085	2.883	−0.319	0.225	−1.419
Finance (= 1, 0 otherwise)	−0.088	0.147	−0.600	−0.183	0.096	−1.896	−0.099	0.211	−0.468
Issuing Method (1 = shelf reg., 0 = negotiated)	0.006	0.088	0.066	−0.025	0.509	−0.050	0.066	0.141	0.466
Adjusting R^2	0.798			0.945			0.192		
Std. Err.	0.420			0.162			0.482		
F-value	27.670			56.660			1.080		

Table IV

Analysis of Holding Period Return from Offer Price to Bid Price on Release from Syndication

	Excess Return Over Treasury Index in %
Industrial	−0.53
Utility	−0.24
Finance	−0.45
Aaa	−0.42
Aa	−0.43
A	−0.42
Negotiated	−0.36
415	−0.48
Average Treasury Index Return (in %)	−0.25
Average Sample Return (in %)	0.17

One way of interpreting the results is that the issuer is selling the security at the offer price/yield through an intermediary. Therefore, if an investor purchases at the "offer price" and then sells back to the market at the "bid price" within a short period, the return is very likely to be negative provided trading spreads are non-zero.

Our final tests involved substituting a matched sample for the dummy variables in the test described above. The major difficulty in this approach is in finding seasoned bonds which are sufficiently liquid that the price/yield data is accurate. Accordingly, we performed these tests only for new issues in 1985.

The following regression model was performed for two different dates:

$$\mathrm{OYS}_j = b_0 + b_1 Y_{ji} + b_2 Y_{j2} + b_3 X_{j8}, \tag{3}$$

where Y_{j1} and Y_{j2} are the spreads for the two matching issues for bond j, and X_{j8} is the dummy variable for issue method. The model is first estimated for yield spreads as of the issue date, and then re-estimated with spreads as of the release from syndication.

The results for 1985 are very close to those obtained using dummy variables and reported above: the coefficient on the issue method is insignificant both at the offer and release. Due to lack of data, we could not estimate the impact of issue method separately in high and low market yield environments. Further work, which in retrospect is difficult to perform due to the data availability, is necessary in order to conclude that the same result applies over the entire sample.

III. Conclusions

Our results are somewhat at variance with those previously reported in the literature. Using trader quotes, which we believe to be the most significant source of the differences between our results and others, we show that (i) different methods of issuing corporate bonds have less of an impact on the issue cost than previous studies conclude, and (ii) there appears in our sample to be no clear evidence of underpricing at the offer. By implication, the absence of both a significant issue cost and underpricing suggest that the seasoning process is not

as substantial as some studies have indicated. This result is reinforced to some degree in our quite limited matched sample tests where we can explain yield spreads of new issues on the release date in terms of yield spreads on seasoned bonds.

Nevertheless there are some aspects of our results which are worthy of additional research. For example, the impact of issue method is different in high versus low market yield environments. This suggests there may be market sectors or environments where investors can "beat the spread" and earn positive risk adjusted returns during the issue period.

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DISCUSSION

ROBERT A. TAGGART, JR.*: This paper has two facets. The first deals with issues in empirical methodology, while the second deals with the working of the corporate bond market.

The primary point stemming from the paper's methodological facet is that researchers should pay attention to even the smallest details of the bond trading process in order to construct effective empirical tests. Since corporate bonds are not as actively traded as stocks, the problem of synchronizing actual transaction prices across bonds with different characteristics assumes special importance. Fung and Rudd, therefore, take a number of steps to mitigate this problem, including:

1. the use of a daily Treasury securities index rather than a corporate bond index as a reference point, in order to ensure timely quotations;
2. measurement of the index as of the close of trading on the day prior to issuance of each corporate bond, in order to obtain a reference point that most accurately reflects market conditions at the precise time of issue;
3. comparison of yield behavior at the time of issue with behavior at the time the bond is released from syndication in an attempt to separate the issue cost component; and
4. the use of actual trader quotes at the release date to accurately measure holding period returns over the offering period.