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THE RELATIONSHIP BETWEEN CORPORATE DEBIT ISSUANCE AND CHANGES IN SYSTEMATIC RISK

Ajai K. Kapoor* and Ralph A. Pope*

Abstract

The objective of this article is to determine whether debit issued by a corporation has a significant effect on the systematic risk, of beta, or that corporation's stock. The results of this study suggest that the issuance of debt does not have an effect on beta.

INTRODUCTION

One of the first and foremost decisions to be made regarding corporate finance is whether to use debt or equity financing. Most medium to large corporations have both of these options available, and those that do almost always carry a significant amount of both on their balance sheets, usually with the hope of finding the correct proportion of debt to equity. Modern investment theory states that firms with too much debt are considered riskier to the rational investor than those with a stronger financial background (equity-financed). However, at the same time the theory also states that financial leverage can also provide a higher return on equity. Whatever the reasons that lie behind alternative sources of financing, since the early part of the twentieth century corporations have been steadily increasing the ratio of debt to assets, and since 1982 leverage has increased markedly (Kopcke, 1989). It seems that corporations today have elected to use debt to a greater degree and that investors (stockholders) are willing to take on the increased risk associated with debt.

If an increase in debt, then, does result in investors assuming more risk, how can that risk be measured? According to modern investment theory, stock returns are affected by two types of risk: company-specific risk and market, or systematic, risk. The rational investor can diversify away company-specific risk by investing in different stocks, so this type of risk is really of no concern with respect to this paper. Market risk, however, is that which cannot be eliminated. It is the risk inherent in the stock market itself. In other words, no matter how well an investor spreads himself or herself, there remains the risk of low returns and unsteady stock prices, and this is due to the fact that the market fluctuates. Systematic risk is measured by beta, which is the slope of the regression line between a stock's returns and the returns on the market (the dependent and independent variables, respectively) over a period of time. The higher the beta, the riskier the stock with respect to fluctuating returns. It is the relationship between debt and beta that the authors wish to examine. In other words, does the issuance of debt by a corporation affect the systematic risk of that corporation's stock?

If debt is considered risky, then investors should re-evaluate the riskiness of the firm's equity. Investors would want a higher return on equity to offset the debt, and this would affect the stock returns. If the stock returns are affected (abnormal), then in turn this would produce a change in beta. Specifically, the authors expect to find that an issue of debt will increase the beta, or systematic risk, of a firm's equity.

The problem, then, can be stated in terms of a hypothesis statement:

H_0: The issuance of debt by a firm has no effect on the beta of that firm.
H_A: The issuance of debt by a firm increases the beta of that firm.

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*California State University, Sacramento
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Statement Of Purpose

The objective of this study is to determine whether debt issued by a corporation has a significant effect on the systematic risk, or beta, of that corporation's stock. If the assumption is made that investors are rational and risk-averse, then the researchers should find that increases in debt will, all other things remaining equal, increase the beta. Although the use of financial leverage can magnify the return on equity, it can also do the opposite, causing returns to fall and forcing losses. Thus, issues of debt should be reflected in investors' actions, in turn causing changes in beta.

As was mentioned previously, corporations are using financial leverage to a greater degree now than ever before. If a relationship between debt and systematic risk can be found, such results could mean that firms may have another tool by which to determine if debt or equity should be used in financing decisions. It should be stressed, however, that the nature of this study is purely exploratory. In no way do the researchers feel that the results obtained should be used in making any type of financial decisions. On the contrary, if the results prove to be significant in favor of the alternative hypothesis, further research would be needed before a definite conclusion could be reached. However, a significant finding in this paper could become the starting point for follow-up research.

Perhaps even more at stake here, however, is the traditional notion of the rational investor. Historically, economics and finance textbooks have utilized the indifference curve to show individual tradeoffs between risk and return. The assumption is made that when taken as a whole, investors are risk-averse. Thus was born the "rational" investor, and to this day it is stressed in economic and financial theory courses that this investor is averse to risk. There is an obvious connection between the rational investor and debt. Debt is inherently a risky source of funds. The magnified returns that stockholders may receive are offset by interest rate risk, default risk, and the riskiness of the project or investment the firm may be undertaking. Because of these risks, the rational investor, according to investment theory, would require a higher return on his or her investment. In other words, he or she would re-evaluate the riskiness of the firm's equity and adjust the required rate of return. According to the rational investor assumption, then, the firm's (stock's) risk has increased when it borrows. This increase in market risk should be reflected in the beta. In essence, then, this study tests the rational investor assumption with respect to the riskiness of debt. If the results show that increases in beta occur shortly after debt issues, then the assumption is supported. However, if beta is not increasing after debt issues, then the validity of the assumption should be addressed by academicians.

One more point should be made here. This study is limited to large, well-established corporations, namely, those that are listed on the New York Stock Exchange and the American Stock Exchange. Small or start-up companies are sometimes highly leveraged due to the constant need for capital in order to fund growth. The authors realize that including such firms in the current study may disrupt or interfere in obtaining meaningful results. Moreover, the securities of NYSE and AMEX firms are traded on a daily basis and the data is made available to the public.

LITERATURE REVIEW

Prior to testing the hypothesis of this paper, a thorough review of previous research similar to the current subject was undertaken. Although the authors could not find any studies where a direct relationship between debt issues and betas was examined, many interesting pieces of information were nevertheless uncovered, some of which lends support to the current study, and some of which do not. In order to shape the current study, a review of past studies is necessary.

Much of the early literature is concerned with financing decisions or capital structure changes and their effects on investors. Fama (1977) argues that a firm's financing decisions have no effect on its market value and thus security holders are indifferent to debt versus equity financing. However, Fama's argument relies entirely on the existence of a perfect capital market and the idea that firms maximize combined stockholder and bondholder wealth. This latter idea contradicts financial theory, which states that the firm's goal is to maximize stockholder wealth. Yet Fama's research has bearing on the current study: If financing decisions do not affect the market value of a firm and are of no consequence to investors, then would any change in market risk occur? Fama does not address this question.

Masulis (1983) studied the valuation effects of changes made to capital structure. Among his findings, there were two specific results that are worth mentioning. Masulis found that changes in stock prices were positively related to leverage changes and changes in firm values were positively related to changes in debt level. At first glance, these findings seem to cast doubt on the current hypothesis. However, Masulis does not address the notion of risk. Financial leverage can increase the value of the firm, but, if investors are risk-averse, the riskiness of the firm should also increase. Masulis shows that when firms increase their use of leverage, returns and values can be magnified, but he does not test to see whether market risk is altered.

Other areas of relevant literature include effects of debt on stock returns and market reactions. Bhandari (1988) found that expected common stock returns are positively related to the ratio of debt to equity. Because investors require a higher return as the debt-equity ratio increases, Bhandari’s results do not seem surprising and support the belief that investors will only take on more risk if they can be compensated with higher returns. However, Bhandari believes there is something more at work than investors requiring a risk premium and advises that more research is necessary in this area.

Kish and Livingston (1993) studied market reactions to different types of debt-callable and noncallable issues. They tested to see whether market reactions to callable bond issues were more favorable than to noncallable bond issues. The authors found two interesting results. The first was that noncallable debt is still issued by firms in great numbers, suggesting that callable debt does not provide substantial advantages over noncallable debt to the issuing firms. This was supported when the authors found that market reactions to callable debt were not different from zero. Using cumulative average returns, Kish and Livingston also found evidence that suggests the market reacts negatively to short-term bonds but postively to long-term bonds.

Although these studies are important to the current research in the sense that each has studied the effects of debt on different financial variables, none have attempted to find a link between debt and systematic risk. Because of the lack of previous research in this area, the authors were determined to undertake the present study and test the hypothesis that a positive relationship exists between debt issues and changes in beta. However, without any prior research, it was necessary to find an analagous study in order to develop a theoretical framework. Such a study was found. Carroll and Sears (1994) performed a study in which they tried to find a relationship between dividend announcements and changes in beta. By placing dividend announcements into favorable and unfavorable groups, Carroll and Sears tried to measure changes in beta. They hoped to find that favorable announcements would cause the beta to decline, while unfavorable announcements would provide for an increase in beta. The results, however, were disappointing. The authors found that regression order bias is a large problem when trying to estimate changes in beta due to specific announcements, and thus no definite conclusions could be reached, although it was found that there may be some dividend announcement effect on betas.

With respect to the current study, the researchers realize that the Carroll and Sears article points out some deficiencies in studying beta changes. Yet it does not warrant discarding the current study. Debt issues and dividend announcements are not the same phenomena and their effects on systematic risk should be tested separately. Thus, although there is a chance that the results of this study may not be significant, it was still deemed important to proceed with the analysis.

DATA AND METHODOLOGY

In order to test the hypothesis that an issuance of debt produces upward pressure on the beta of the issuing firm, a series of event studies were conducted. Event studies look at the changes in variables relative to the timing of an event (Bergh, 1993). In the current study, the event consists of the issuance of debt; the variable of interest is the issuing firm’s beta.

Data

A sample of debt issues occurring during 1989 was obtained, along with the issue date and type of debt, from *Investment Dealers Digest*. The test date chosen was the issue date. This was done specifically to avoid the problem of uncertainty. Because some announced securities are withdrawn, market reaction may not occur until just before the issue date (Kish and Livingston, 1993). Indeed, a separate study could focus on announcement day (filing date with the Securities and Exchange Commission) effects; this study, however, is geared toward issue day effects.

The next step was to establish some form of uniformity with respect to the type of debt. Many different types of debt exist, each with differing degrees of risk. Thus, certain restrictions had to be placed on the sample to reduce the bias due to variances in risk between securities (Kish and Livingston, 1993). In order for the sample to be included in the study, three requirements were enforced. Firstly, only long-term debt issues were utilized. Long-term debt is defined as debt maturing one year or later from the issue date. Secondly, only industrial debt issues were included; international, public utility, or financial debt issues were excluded. In addition, the debt issue had to be a fixed-rate coupon bearing bond or note. Sinking fund, floating rate, zero coupon, and convertible debt issues were not included. Again, the purpose of these restrictions was to include samples that were uniform and consistent, allowing a more precise measurement of the debt's effect on the beta. By enforcing the data restrictions, the initial sample size of 116 debt issues was reduced to 64 usable debt issues. As was mentioned previously, only firms listed on the New York and American Stock Exchanges were utilized.

Estimation of Betas

The value of a stock's beta is determined by regressing an individual stock's returns against the market returns. The result of this regression is the characteristic line, which is shown by the following equation:

$$r_j = a_j + b_j r_m + e_j$$

where r_j is the return on the stock, a_j is a constant (y-intercept), b_j is the beta coefficient, r_m is the return on the market, and e_j is the error term. One readily sees that the beta is the slope of the characteristic line. By utilizing the method of ordinary least squares to find the coefficients a_j and b_j, the error term e_j is minimized. Thus, in order to estimate beta, both individual stock returns and the returns on the market (the market index) over the same period of time are needed.

The question arises of whether to use daily or monthly return data in the estimation of betas. Evidence has shown that problems exist when daily returns are used to estimate betas. Specifically, if the index against which the beta is estimated is more actively traded than the individual stock, Ordinary Least Squares (OLS) beta estimates are biased downwards (Dimson, 1979; Fowler, Rorke, and Jog, 1989; Scholes and Williams, 1977). The result of this bias could lead to beta estimates that are insignificant or even unreliable. The issue can be resolved to some degree by switching to monthly return data, thus increasing the interval over which betas are estimated.

However, while the use of monthly returns may solve the trading problem, it gives birth to another problem. The present study's focus is to record the effect of a debt issue on beta. Using monthly returns would greatly increase the interval over which betas are estimated (versus using daily returns), so the effect of any particular debt issue would also be subject to the longer interval. This longer time period would subject the beta estimates to the influence of other events *in addition to* the debt issue (Carroll and Sears, 1994). Lengthening the time horizon over which the event is analyzed would only reduce the strength of any conclusion reached. Thus, for purposes of the current study, daily return data is more appropriate than monthly return data.

The Scholes-Williams Technique

In order to reduce the effect of the aforementioned problems in estimating betas, the researcher utilized the Scholes-Williams technique. This technique has been shown to reduce the bias (due to the presence of thin trading) in betas estimated from daily return data when using the ordinary least squares method. (Cohen, Hawawini, Maier, Schwartz, and Whitcomb, 1983; Scholes and Williams, 1977). In addition, the Scholes-Williams estimator has also been found to be consistent (Fowler et al, 1983).

According to Scholes and Williams (1977), the problem in estimating betas from daily returns lies in the observation that securities are not traded on a continuous basis. There are periods during which trading is halted for the day and also periods where the stock is inactive. In addition, these periods of inactivity are not distributed evenly over time. To compound the problem, some securities trade frequently while others infrequently, relative to the average security. These trading issues cause a "lag" effect in the true returns. In other words, observed returns will lag behind true returns when thin trading is present. As a result, betas estimated from such returns are biased downwards. On the flip side, other securities trade about as frequently as the average security (i.e, the index against which the security's returns are measured). This situation causes a "lead" effect, and thus the estimated betas are biased upwards.

To correct the problem, Scholes and Williams determined that, in order to estimate the true beta, both the lead and lag effects must be taken into account. This is accomplished by calculating, using OLS regression, not only the observed beta during period *t* (the time frame of interest) but also calculating the beta during $t - 1$ (the lag beta) and $t + 1$ (the lead beta). In addition, the market lead beta is also included in the analysis. Once these regression estimators are found, the Scholes-Williams technique can determine a consistent, less biased estimator (β_j) for the true beta:

$$(\beta_j = (b_j + b_{j+1} + b_{j-1}) / (1 + 2b_{m+1})$$

where b_j, b_{j+1}, b_{j-1}, and b_{m+1} are the OLS regression estimators of the observed beta, lead beta, lag beta, and the market lead beta, respectively.

This research uses the Scholes-Williams technique to estimate betas in order to reduce the bias present in OLS beta estimates when working with daily returns. However, Carroll and Sears (1994) point out that although the Scholes-Williams estimate may lessen bias, it is still an inefficient estimator. This inefficiency can result in larger standard errors and greater levels of insignificance. Because of this inefficiency, they recommend that only significant betas be used in the analysis. The researchers heeded this advice, and in this study only those betas that are significant at the 5 percent level are included.

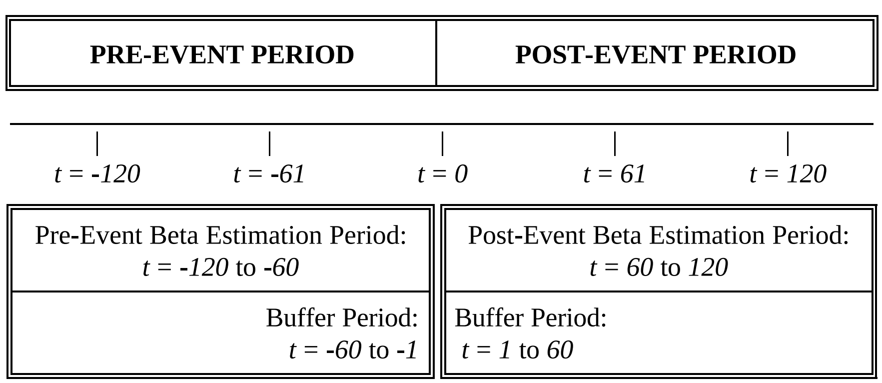
Event Study Model

As was mentioned previously, the issue date was chosen as the test date for the event study analysis. In order to determine if a change in beta occurs after the issue date, two betas must be measured for each event: the pre-event beta and the post-event beta. The pre-event beta is the value of the beta prior to the event's occurrence. This estimate is then compared to the post-event beta, or the value of the beta following the event. The researchers were thus able to directly test the alternative hypothesis which states that an issuance of debt increases the beta.

Betas were estimated using daily stock return data and the CRSP Equally Weighted Index. In addition, all betas were calculated over a 180 trading-day period which included a 60-day "buffer" period just prior to and after the issue date. The reason for the buffer period is to capture the effects of any information leakage (Kish and Livingston, 1993). In addition, it has been shown that betas may be highly unstable near or on the day of the event (Cohen et al, 1983; Scholes and Williams, 1977). By not including the buffer period, the risks of estimating unreliable betas are thus increased considerably.

Figure 1 illustrates the time frame associated with the event study portion of the analysis. The issue date is defined as day $t = 0$. The buffer periods begin on day $t = -60$ to $t = -1$ and $t = 1$ to $t = 60$ for the pre-event period and post-event period, respectively. Betas are actually estimated over the days $t = -120$ to $t = -61$ for the pre-event beta and $t = 61$ to $t = 120$ for the post-event beta. This event time frame is repeated exactly as shown for each sample in the study in order to end up with uniformly estimated betas. In other words, all betas were estimated using the same number of trading days (120) and buffer periods (60).

FIGURE 1
Event Time Frame



The time frame chosen required one final adjustment to the sample size included in the study. The researchers found that many companies issued debt on more than one occasion within the time frame described above. Thus, with respect to an individual firm, issues of debt may overlap during the beta estimation periods. Including such observations would surely produce this same "overlapping" effect in the estimated betas, so that one beta may actually reflect the impact of two or three debt issues. Because of this "overlapping" effect the sample size was reduced further from 64 observations to 38 usable observations, removing those samples where more than one debt issue occurred in the event time frame.

Empirical Results

Table 1 lists the values of all betas, including lead and lag betas, calculated using ordinary least squares regression. Lead and lag betas were estimated in order to utilize the Scholes-Williams technique previously discussed. The columns marked Pre-Issue Beta and Post-Issue Beta contain the actual pre- and post-event estimates of beta using the Scholes-Williams technique. All observed betas listed in the table are significant at the 5 percent level.

TABLE 1
Ordinary Least Squares Beta Estimates

	PRE-EVENT BETAS					POST-EVENT BETAS				
Sample	Observed Beta	Lag Beta	Lead Beta	Market Beta	Pre-Issue Beta	Observed Beta	Lag Beta	Lead Beta	Market Beta	Post-Issue Beta
1	2.003	0.363	-0.003	0.118	1.913	1.761	-0.139	0.402	0.156	1.542
2	1.472	0.002	0.319	0.104	1.483	1.087	0.865	0.436	0.307	1.480
3	1.527	-0.042	0.403	0.052	1.711	-1.750	-1.136	-0.063	0.151	-2.266
4	1.178	-0.622	-0.079	0.066	0.421	1.764	0.489	0.613	0.201	2.045
5	1.404	-0.484	-0.510	-0.105	0.518	1.387	0.523	0.895	0.328	1.693
6	1.435	0.277	0.679	0.068	2.103	1.361	0.039	0.494	0.194	1.365
7	1.512	0.551	0.393	-0.124	3.262	0.831	0.701	0.153	0.151	1.293
8	1.222	-0.198	0.183	0.195	0.868	2.061	0.295	0.402	0.169	2.062
9	1.747	0.136	-0.308	0.075	1.370	1.809	0.713	-0.470	0.182	1.505
10	2.162	0.813	1.240	0.153	3.228	1.270	0.317	0.345	0.203	1.374
11	2.145	-0.309	0.148	0.158	1.508	2.279	-0.372	0.201	0.252	1.400
12	1.284	0.057	0.395	0.189	1.260	1.239	-0.288	0.184	0.136	0.892
13	1.433	1.564	0.596	0.198	2.575	2.507	0.384	-0.388	0.220	1.738
14	1.450	-0.025	-0.047	0.062	1.227	1.572	0.003	0.088	0.153	1.273
15	2.048	1.133	0.964	-0.058	4.692	1.511	0.763	0.632	0.336	1.737
16	1.912	0.711	0.039	0.075	2.313	2.160	0.683	0.406	0.193	2.345
17	1.952	-0.257	0.276	-0.133	2.686	1.266	0.046	0.528	0.335	1.102
18	1.020	0.266	0.087	0.208	0.970	1.821	0.016	0.180	0.174	1.496
19	1.330	-0.170	-0.219	0.227	0.648	1.812	0.762	-0.027	0.120	2.055
20	1.242	-0.129	0.128	0.263	0.813	1.738	-0.449	0.207	0.157	1.138
21	1.506	0.273	-0.059	0.014	1.674	1.490	0.652	0.425	0.324	1.558
22	1.277	-0.916	0.833	0.070	1.048	0.930	0.243	0.003	0.192	0.850
23	1.202	0.034	-0.175	0.115	0.862	0.658	-0.040	0.189	0.056	0.725
24	1.533	0.856	-0.236	0.153	1.650	1.609	0.751	1.662	0.204	2.858
25	0.522	0.160	0.254	0.176	0.692	1.157	0.013	-0.023	0.000	1.147
26	1.542	0.845	-0.057	0.078	2.015	1.981	0.607	-0.223	0.189	1.716
27	2.178	1.068	0.369	0.218	2.518	1.271	-0.363	0.362	0.134	1.002
28	1.287	0.983	0.586	0.077	2.473	0.910	0.193	0.440	0.337	0.923
29	1.400	0.091	0.344	0.015	1.783	1.269	0.798	0.584	0.331	1.595
30	1.651	0.084	0.468	0.200	1.574	2.110	-0.634	1.075	0.159	1.936
31	1.360	0.348	0.630	0.066	2.064	2.320	1.463	0.828	0.201	3.289
32	3.133	0.512	-0.342	0.069	2.902	2.403	0.587	0.552	0.198	2.536
33	1.522	0.391	0.383	0.151	1.763	1.594	0.601	0.780	0.306	1.846
34	1.112	-0.135	-0.082	0.253	0.594	1.134	0.027	0.305	0.148	1.131
35	2.013	-0.267	0.015	0.075	1.530	2.032	1.253	-0.578	0.193	1.954
36	1.135	0.188	-0.061	0.249	0.843	1.396	-0.188	0.284	0.158	1.133
37	1.292	0.150	0.101	0.216	1.078	1.512	0.115	0.237	0.164	1.403
38	2.180	0.702	0.651	0.228	2.427	1.167	0.665	0.114	0.136	1.530

Table 1 indicates that out of the 38 samples of debt issues utilized in the study, only 18, or 47.37%, actually produced an increase in the beta of the stock. The remaining 20 samples, or 52.63% of the total, show a decrease in the beta after the issue date. Initially, then, there seems to be no evidence that issues of debt would produce an increase in beta. However, in order to significantly conclude that the null hypothesis cannot be rejected, statistical analyses must be performed on the results displayed in Table 1 with respect to the pre- and post-issue beta estimates.

STATISTICAL ANALYSIS OF RESULTS

In order to determine whether or not the null hypothesis can be rejected, the resulting values of the pre- and post-issue shown in Table 1 must be statistically analyzed. Although not as powerful, nonparametric tests are more appropriate than parametric tests for the data used in this study. Before proceeding with this analysis, it is necessary to determine what types of significance tests to utilize. This can be accomplished by analyzing the characteristics of the data.

Each observation included in the study is made up of two samples. Beta is calculated twice, first using a set of pre-event returns and then a set of post-event returns. These two sets of returns are not independent; rather, they are related samples because the beta for one company is measured twice. In addition to the lack of independent samples, the beta estimates do not have equal variances due to the market index's fluctuations. Finally, the data is nominal. These factors appropriately point towards nonparametric tests of significance rather than parametric tests.

Although nonparametric tests are not as powerful as parametric ones, the latter require that assumptions of independence, normal distribution, and equal variance be satisfied. The data in this case do not meet these assumptions. However, nonparametric tests are still highly efficient and are appropriate when two related samples are compared, as in the present study. Specifically, the researcher utilized three different tests of significance: the paired-samples t-test, the sign test, and the Wilcoxon matched-pairs test.

Paired-Samples t-Test

The paired-samples t-test can be used to determine if a statistically significant difference exists between the pre- and post-issue betas. The difference (D) between the pre- and post-issue betas was calculated for each observation. In addition, the square of the differences (D^2) was also calculated. Each of these parameters was then summed up:

$\Sigma D = 8.658$
$\Sigma D^2 = 52.543$

Using 38 samples and 37 degrees of freedom, the standard deviation was found to be 1.169. At a level of significance of 5 percent, the t statistic calculated was 1.190. The critical t value for a one-tail test was found to be 1.687. Since the critical value is greater than the t statistic, there is no evidence supporting that a difference does indeed exist between pre- and post-issue betas over the entire sample. Thus, the null hypothesis, which states that debt issues have no effect on the firm's beta, cannot be rejected. Table 2 summarizes the results of the paired-samples t-test.

Table 2
Results of Paired-Samples t-Test
n = 38, d.f. = 37, α = 0.05

ΣD	ΣD²	Std. Dev.	t - stat	t - critical	Result
8.658	52.543	1.169	1.190	1.687	Cannot reject null hypothesis

The Sign Test

As stated earlier, only 18 out of the 38 samples of debt issues used in the regression analysis were associated with an increase in beta. The remaining samples showed that the beta had decreased. The sign test can be used in such a situation to determine if increases and decreases in beta are equally likely for differences in beta. In other words, the sign test can determine whether differences in beta exist over the entire sample range.

In this case, the researcher associated "pluses" with those observations where the beta increased after the issue date. "Minuses" were associated with the observations where beta decreased after the issue date. The observed probability of pluses is thus 18/38 or 0.47368. Table 3 shows the results of the calculations performed for a one-tailed test. The sign test also indicates that the null hypothesis cannot be rejected.

Table 3
Results of Sign Test
n = 38, α = 0.05

Prob. of "Pluses"	Std. Dev.	z- statistic	z- critical	Result
0.47368	0.08111	-0.32444	0.6334	Cannot reject null hypothesis

The Wilcoxon Matched-Pairs Test

The sign test was used because the directional changes of the betas are known. In addition, the magnitude of the changes is also known; thus the Wilcoxon matched-pairs was also utilized. This test calls for the ranking of the differences between the pre- and post-issue betas for each sample. The calculated value (*T*) is merely the sum of the ranks of those samples where the beta increased after the issue date; the remaining ranks, where the beta decreased, are not included. Table 4 shows the results of the one-tail test. Once again, the null hypothesis cannot be rejected.

Table 4
Results of Wilcoxon Matched-Pairs Test
n = 38, α = 0.05

T	Std. Dev.	z- statistic	z- critical	Result
325	68.955	-0.66	1.645	Cannot reject null hypothesis

Summary of Analysis

The three statistical procedures employed in the analysis of results were the matched-pairs t-test, the sign test, and the Wilcoxon matched-pairs test. All three tests are appropriate for nonparametric data, i.e., when the assumptions for parametric data cannot be met. Each test was employed to determine if the probability of beta increasing was equal to the probability of beta decreasing after the issue date. All three tests indicated that this probability was equal. Thus, the null hypothesis of the current study–debt issues have no effect on beta–cannot be rejected.

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

The results of the statistical analyses presented in the preceding chapter do not warrant rejection of the null hypothesis. As Tables 2 - 4 demonstrated, betas are equally likely to increase or decrease after the issue date. While the alternative hypothesis was not supported in this case, it should be noted that issues of debt do have some effect on beta. Table 1 shows that in many cases post-issue betas changed dramatically. How much of this change is actually due to the specific debt issue is another matter which the researchers leave for another study. The purpose of this paper was to determine if debt issues place upward pressure on the firm's beta. That hypothesis was not supported by this study.

Businessmen and academicians alike have long debated amongst themselves whether to use debt or equity in financing decisions. Modern investment theory has always stressed that debt, while providing an opportunity to magnify return on equity, carries with it an increase in risk to the investor (stockholder). This notion is reinforced by the observation that firms with no or very little debt are rated higher and stronger than firms that carry a substantial amount of debt on the books. Yet the fact that corporations have been increasing their use of borrowed funds over the last two decades, coupled with the results of this paper, seems to indicate, as Kopcke (1989) pointed out, that investors are willing to assume more risk. Thus, the traditional concept of the "rational" investor being risk-averse does not seem fully warranted at the very least. At the very best, it could be that the rational investor of today is willing to take on higher risks. It may be time for economic gurus to redefine (with further research) the term "rational investor."

Finally, it should be noted that studies involving betas have not been perfected, especially when daily returns are involved. The following section discusses this problem (and others) in greater detail.

Recommendations for Future Research

While the results expected were not obtained, it should be stressed that this research was exploratory in nature. To the researchers' knowledge, no studies prior to the current one attempted to find a link between debt and systematic risk. This research has laid down the necessary foundation and hopefully will spark an interest among business and economic academicians to further pursue the debt-beta relationship. In addition, the authors recommend that, while the methodology employed in the current research is sound, subsequent research in this area would only be helpful if some minor modifications are made to the approach.

The first modification should be an increase in the sample size. While the 38 observations of debt issues is large enough from a statistical standpoint, there is no doubt that a larger sample would result in higher significance levels. The researchers feel that a usable sample size of at least 100 would be adequate. As this study showed, out of 116 original samples collected, only 32.8 percent were actually included. In order to retrieve 100 usable samples, then, over 300 observations must be collected.

A second modification should involve using a different time period in the event study model. The period chosen here to estimate betas both before and after the debt issue was 180 trading days with a "buffer" period of 60 trading days. Future research may want to alter these periods, especially the post-event period. Specifically, it may be helpful to estimate post-issue betas over a shorter time period, if possible, in order to better capture the effects of the debt issue on the beta. Longer intervals can lead to the "contamination" of beta estimates by events other than the specific debt issue.

The researchers would also recommend re-testing the hypothesis of this study using the announcement day as the test date in the event study model. The announcement day is the day the debt issue is registered with the Securities and Exchange Commission and is considered the day investors first become aware of a company's intent to borrow money (Kish and Livingston, 1993). This study avoided choosing the announcement day as the test date because some registered securities are withdrawn. However, announcement day effects should not be overlooked and could produce significantly different results than issue day effects.

This last recommendation leads into another. While the rational investor may no longer look at all debt as risky, he or she may try to classify the announcement of the debt issue as "good news" or "bad news." Knowledge of the market's reaction to the debt issue could show that increases in beta occur when "bad news" is associated with a particular debt issue and decreases in beta occur if the debt issue is "good news." Information on favorable or unfavorable reactions could be obtained from Value Line, Standard & Poor's, or one of the many other investment survey publications available.

Finally, as Carroll and Sears (1994) and Cohen et al (1983) pointed out, estimating betas from daily stock and market returns is at best an inefficient process. This is due to the fact that it is difficult to isolate a single event's effect on beta; indeed, many factors are involved simultaneously, and this problem is compounded in the case of daily returns. Carroll and Sears (1994) also found that regression order bias plays a big role in the regression tendencies of betas. Thus, while some relationship between debt and beta may be present, this relationship may be obscured due to the inability to isolate and eliminate these unwanted regression tendencies. Further research is needed in this area.

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