IPO and Capital Structure Size and Industry Effects

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Introduction

While many reasons exist for why a firm may make an initial public offer-
ing of common stock (IPO), a very basic rationale is that there is a viable
justification for the funds which cannot be met by other sources of capital.
In one of the few financial studies of small businesses, Walker and Petty
[14] conclude that small firms preparing to enter the public markets main-
tain a capital structure which is more debt oriented than larger, public firms
in the same industry. Consequently, for many firms, the IPO represents an
avenue of last resort. The IPO also represents an opportunity for the firm
to make a permanent change in its capital structure.

Evidence suggests that an optimal capital structure exists and that among
other factors, capital structure varies across size of firm and industrial clas-
sification [3,6,7]. Tests of the impact of corporate changes on capital struc-
ture have been conducted on a number of data bases which have varied by
type and number of firms included [2,4,5,10,11,12]. However, the capital
structure issue has not been specifically addressed to firms making an IPO.
The purpose of this paper is to provide evidence on the impact of an IPO
on the firm's capital structure. Specifically, we test for: (1) the equality of
pre- and post-IPO financial leverage ratios; and (2) the size and industry ef-
fects in pre- and post-IPO financial leverage ratios.

Hypotheses

Since firms in the same industry have comparable asset composition and
risk, a firm's capital structure should be similar to that of other firms in the
industry [2,3,6,7]. The industry average capital structure is relevant as a poten-
tial target capital structure. In a test of this proposition, Bowen, Daley, and
Huber [2] conclude that mean industry capital structures are stable over time,
and that firms exhibit a significant trend towards the industry mean over time.

If, as Walker and Petty conclude, firms making an IPO maintain a more
debt oriented capital structure than public firms in the same industry, we
may expect them to use the IPO as a means of bringing their capital struc-
ture in line with the industry average. We should observe a significant change
between pre- and post-IPO financial leverage ratios. Alternatively, the de-
mand for additional financing may be so great as to preclude any long-run
change in capital structure. The infusion of additional equity from the IPO
may represent only a short-run change allowing the firm to expand debt
financing at a later date. In such a situation, there would be no significant
difference between pre- and post-IPO capital structure.

A second set of hypotheses is concerned with the relationship between size
and capital structure. To date, the evidence on this relationship is not con-
clusive. Remmers et al. [8] found no relationship between size of firm and

financial leverage ratios. Others [5,12,14] present evidence suggesting an inverse relationship exists. Studies by Ferri and Jones [4] and Toy et al. [13] conclude that while size of firm is a determinant of capital structure, no simple linear relationship exists. We test for the equality of pre-IPO leverage ratios and of changes in leverage ratios across size of firm.

A third set of hypotheses concerns the existence of an industry effect. Numerous studies [2,4,11,12] have concluded that financial leverage exhibits significant variation across industrial classification. Only two studies [1,8] did not find a significant industry effect. We test for the equality of pre-IPO leverage ratios and of changes in leverage ratios across industry classification.

Data and Variables

A list of non-financial, non-regulated firms making an IPO in the years 1980-1981 in the amount of two million dollars or more was obtained from **Institutional Investor.** Data for the year prior to the IPO and five years after the IPO were derived from annual reports and the Compustat tapes. The final sample included 171 firms: 65 for 1980 and 106 for 1981. A second sample of publicly-owned firms making an equity offering in 1980-1981 was also derived. The seasoned sample was matched in number, total and by year, and SIC code with the IPO sample. While 4-digit SIC code matching was obtained when possible, the majority were matched by the first two digits of the SIC code. Table 1 provides a summary of the characteristics of the IPO and SEAS samples.

Table 1

Characteristics of the IPO and SEAS Samples
(millions of dollars)

	IPO			SEAS		
	Sample	1980	1981	Sample	1980	1981
One Year Before						
Sales	$17.18	18.10	16.62	556.80	337.08	690.2
Net Income	$ 1.06	1.21	.97	23.03	16.89	26.7
Total Assets	$11.64	13.79	10.32	407.84	194.19	537.6
BDETA	.73	.87	.65	.56	.63	.5
BEQTA	.24	.16	.30	.42	.44	.4
Five-Years After						
Sales	$78.19	93.70	68.77	957.45	811.06	1046.3
Net Income	$ 1.28	− 1.15	2.76	2.61	8.71	− 9.4
Total Assets	$74.02	82.93	68.60	809.20	748.03	1007.1
ADETA	.50	.58	.45	.58	.64	.5
AEQTA	.45	.39	.49	.32	.27	.3

Two leverage ratios were used in the study: common equity divided by total assets (EQTA) and current liabilities plus long-term debt divided by total assets (DETA). The use of two financial leverage ratios was based upon the anomaly observed by Bowen et al. [2] that studies which used an equity ratio found statistically significant differences in industry leverage while studies that used a debt ratio did not.

Results

The paired t-test from the SAS MEANS [9] procedure was used to test the equality of the leverage ratios before and after the IPO. For this procedure, a new set of variables was created by using the difference between the pre- and post-IPO leverage ratio. That is: DDETA = BDETA − ADETA and DEQTA = BEQTA − AEQTA. We tested the hypotheses:

$$\text{Ho1:} \quad \text{DDETA} = 0$$
$$\text{DEQTA} = 0$$
$$\text{Ho2:} \quad \text{DDETAyr} = 0$$
$$\text{DEQTAyr} = 0$$

The results of the paired t-tests are summarized in Table II.

Table II

The Equality of Pre- and Post-IPO Leverage Ratios

	Sample¹	1980	1981	Sample²	1980	1981
DDETA	.2297	.2873	.1947	.2240	.2904	.182
T	5.8600	3.9400	4.3500	5.0800	3.6500	3.550
PR> |T|	.0001	.0002	.0001	.0001	.0006	.000
DEQTA	−.2101	−.2339	−.1957	−.2098	−.2542	−.181
T	−6.0600	−4.4400	−4.2800	−5.3500	−4.3500	−3.480
PR > |T|	.0001	.0001	.0001	.0001	.0001	.000

¹171 firms, original sample
²150 firms, excludes firms which made subsequent equity offering.

For the sample of firms making an IPO during 1980-81, we reject Ho1 and Ho2. We found both DDETA and DEQTA to be statistically different from zero for the sample as a whole and for each of the years, 1980 and 1981. Of the 171 firms in the sample, 131 reduced the reliance on debt financing. We then eliminated the 21 firms in the sample that made an additional equity offering within five years of the IPO and retested Ho1 and Ho2. As indicated in Table II, we again reject Ho1 and Ho2 for both years. For whatever the stated reason the firms in the sample made an IPO, the tests on Ho1 and Ho2 indicate that a change in financial leverage was a resulting effect. The sampled firms used the IPO as a means to reduce the reliance

on debt financing and the reduction in financial leverage was maintained over the five year study period.

The observed decrease in leverage ratios may not have been unique to firms making an IPO. The observed decrease in the leverage ratios over the five-year period may reflect a general trend in the market during the study period. We compared the sample of IPO firms with the matched sample of public firms which also made an equity offering during 1980-81. Table III summarizes the results of the tests on the following hypotheses:

Ho3:   BDETAipo = BDETAseas
        BEQTAipo = BEQTAseas

Ho4:   ADETAipo = ADETAseas
        AEQTAipo = AEQTAseas

Ho5:   DDETAipo = DDETAseas
        DEQTAipo = DEQTAseas

Table III

The Equality of IPO and SEAS Leverage Ratios

	Sample		1980		1981	
	F-Value	PR>F	F-Value	PR>F	F-Value	PR>F
BDETA	8.04	.0049	2.74	.1003	9.29	.0026
BEQTA	15.42	.0001	7.61	.0066	8.41	.0041
ADETA	1.56	.2132	.15	.7029	3.69	.0561
AEQTA	3.88	.0495	.68	.4103	6.36	.0124
DDETA	11.25	.0009	2.90	.0912	13.57	.0003
DEQTA	23.28	.0001	8.81	.0036	16.11	.0001

To test whether or not leverage ratios varied across issuer, we used the F-test from the SAS ANOVA [9] procedure. In our analysis, the data has been stratified by issuer into 2 treatment groups.

Test results in Table III indicate that the observed decrease in leverage ratios for firms making an IPO was not the result of a general market trend. Over the study period, the IPO sample reduced the reliance on debt financing while the firms in the seasoned sample increased the reliance on debt financing (Table I). One year prior to the IPO, firms making an IPO maintained a statistically greater use of debt financing (greater BDETA, lower BEQTA) than public firms in the SEAS sample. Five years after the IPO there was no statistically significant difference. We reject Ho5 and conclude that the change in the leverage ratios, DDETA and DEQTA, was statistically different between the IPO and SEAS samples. The data lend support to the Walker and Petty findings regarding the use of debt by firms preparing to make an IPO. However, these results appear to be driven primarily by the 1981 sub-samples.

To test for a size effect, the original sample of 171 firms was divided into three groups based on total assets before the IPO. With respect to size, we tested the following hypotheses:

$$Ho6: \quad BDETAi = BDETAj$$
$$BEQTAi = BEQTAj$$

$$Ho7: \quad DDETAi = DDETAj$$
$$DEQTAi = DEQTAj$$

$$Ho8: \quad DDETAi = 0$$
$$DEQTAi = 0$$

Based on the F-tests in Table IV, we reject Ho6 for BDETA and BEQTA and conclude a statistically significant difference in leverage ratios across size one year before the IPO exists. The Tukey multiple comparison tests indicate that mean leverage ratios for size group 1, the smallest firms, were significantly different from groups 2 and 3. Similar results were derived on the test of Ho7. We reject Ho7; DDETA and DEQTA were statistically different over the three size groups. DDETA was significantly greater for group 1 than for groups 2 and 3. However, the change in the leverage ratios was significantly different from zero for all three groups. While all the firms in the sample may be considered small, the evidence presented suggests the presence of a size effect.

Table IV

Size and Industry Effects

	Size Effect		Industry Effect	
	F-Value	PR>F	F-Value	PR>F
BDETA	9.15	.0002	.51	.7704
BEQTA	7.96	.0005	.43	.8281
DDETA	4.86	.0089	.47	.7959
DEQTA	4.12	.0179	.40	.8490

	Size			Industry			
	1	2	3	1311	3573	3662	737
BDETA	1.0014	.6085	.5881	.750	.840	.538	.679
BEQTA	−.0039	.3653	.3631	.191	.143	.411	.301
ADETA	.6020	.4643	.4411	.929	.592	.376	.321
DEQTA	.3526	.4986	.5127	.035	.383	.600	.653
DDETA	.3994	.1442	.1470	−.1780	.2480	.1620	.358
T	3.8900	3.2200	5.1600	−.4600	1.4700	1.9400	4.980
PR>|T|	.0003	.0021	.0001	.6533	.1573	−.1105	.002
DEQTA	−.3486	−.1332	−.1496	.1561	−.2398	−.1891	−.352
T	−4.0000	−3.0200	−4.8200	.3700	−1.43	−1.9300	−4.950
PR>|T|	.0002	.0038	.0001	.7135	.1701	.1117	.002

Finally, we tested for an industry effect in the leverage ratios of firms making an IPO. An industry was identified by a 4-digit SIC code. From the sample four industries were identified: (1) 1311 crude petroleum and natural gas, 17 firms; (2) 3573 electronic computing equipment, 20 firms; (3) 3662 radio and TV transmitter equipment, 6 firms, and; (4) 7372 computer program and software services, 7 firms. The following hypotheses were tested:

$$Ho9: \quad BDETAi = BDETAj$$
$$BEQTAi = BEQTAj$$

$$Ho10: \quad DDETAi = DDETAj$$
$$DEQTAi = DEQTAj$$

$$Ho11: \quad DDETAi = 0$$
$$DEQTAi = 0$$

We found no evidence of a statistically significant industry effect. For all three sets of hypotheses we could not reject the null hypothesis (Table IV). We found no statistical evidence of a difference in financial leverage across industry nor any statistical difference in the change of financial leverage across industry. Only one industry, 7372, showed a statistically significant decrease in the use of debt financing following the IPO. The lack of a significant industry effect may reflect the similarity of the risk of the industries.

Summary and Conclusion

The purpose of this paper was to provide evidence on the impact of an initial public offering of equity on the firm's capital structure. Based on a sample of firms making an IPO during the years 1980-81, we observed a statistically significant decrease (increase) in the debt to total assets ratio (equity to total assets ratio) over the period one year prior to the IPO and five years after the IPO for the sample as a whole and for each year. Similar results were obtained when the sample was pared of firms which made a subsequent equity offering. The decrease in the use of debt financing was in contrast to a general market trend. During the same time period, a sample of public firms making an equity offering increased their reliance on debt financing. The change in leverage ratios for the IPO sample was statistically different from the change in leverage ratios for the seasoned sample. We found evidence of a size effect but not an industry effect on the capital structure of firms making an IPO.

This study provides a first attempt at testing the impact of an IPO on the firm's capital structure. Much remains to be done in empirically isolating the causes for why some firms making an IPO use the IPO as a means of changing their capital structure and other firms do not.

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