Corporate Debt and Islam

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ABSTRACT

Corporate debt is a very important source of capital for businesses. Whereas the market value of equities worldwide amounts to about $23.1 trillion today, corporate bonds outstanding amount to roughly 442% of that. Short-term debt is also a significant part of corporate capital worldwide. The use of debt by companies is pervasive. Islam prohibits the use of interest-bearing debt. This apparently puts companies needing capital in some difficulty. Investors desiring to invest in stocks often find very attractive companies that use debt. However, some Islamic jurists have permitted Muslims to invest in companies with a certain level of debt. This paper explores the benefits of debt, as well its harmful effects. It seeks to show that debt, like wine, has some benefits, but that its harmful effects outweigh its benefits.

I. INTRODUCTION

Debt is a very important source of capital for businesses worldwide. Whereas the total market value of publicly traded equities in developed markets in 1998 was $23.1 trillion,[i] the size of the major bond markets in the beginning of 1998 was $24.1 trillion. Of this amount, approximately 60% were government bonds, 29% was comprised of corporate debt of various types, and 11% was composed of eurobonds. Thus corporate debt and eurobonds amounted to approximately $9.8 trillion, or about 42% of the equity market of $23.1 trillion. The amount of short- and intermediate-term bank borrowing is hard to determine. But taken together, corporate debt would amount to a sizable share of corporate capital. In other words, the use of debt by companies is pervasive.

Islam prohibits the use of interest-bearing debt. This would create difficulty for Muslim-owned companies that need capital. They would not be able to raise debt capital.

This would also create difficulty for practicing Muslim investors. They are not in a position to invest in stocks of companies that use debt. However, some Islamic jurists have permitted Muslims to invest in companies with certain levels of debt.

This paper explores the benefits of debt, as well as its harmful effects. It seeks to show that debt has some benefits, but its harmful effects outweigh these benefits. (This may be akin to the Qur'anic saying that there is some benefit in wine, but its harmful effects outweigh the benefit.)

The first section of the paper uses a hypothetical example and shows the benefit of debt and its harmful effect. The second section looks at the historical experience with respect to relationship between recessions and business failures. The third section is an empirical study on the effect of debt on corporate performances of over 2,500 publicly traded U.S. companies. The reason for using U.S. companies is that data on such companies is more readily available at no cost. The final section makes some tentative conclusions.

II. DEBT, TAXES, AND RETURN ON EQUITY: SOME BASICS

Exhibit 1 shows hypothetical partial income statements for two firms. Both firms have the same asset size. Firm U is unlevered; that is to say, it has no debt (it is all-equity financed). Firm L is levered (or leveraged), which means it uses debt. It is 50% equity and 50% debt financed. By using debt (leverage), Firm L seeks to magnify its returns. If it borrows at, say, a before-tax interest cost of 10% and invests in projects to earn a higher return on its investment. If it earns, say 20% on the investment, it pays an interest cost of 10%; though it has earned 20% return, it does not pay interest of more than 10%. Shareholders benefit as a result. They get what is left after paying the 10% interest. This magnifies the return on equity (ROE) of the shareholders; as residual owners, the return on investment above the interest cost accrues to the shareholders.

In Exhibit 1, forecasts for earnings before interest and taxes (EBIT) are shown for two firms for three possible future scenarios over the next one year: bad, average and good. Both firms are assumed to be equally strong operationally. Hence they are expected to produce the same EBIT under a particular scenario. Interest on the

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debt of Firm L is assumed to be 10%. Firm U does not have interest expenses. Hence, its earnings before taxes (EBT, which is earnings before interest and taxes minus interest expense) is higher than that of Firm L (its interest expense reduces its taxable income). Thus, Firm U pays more taxes than Firm L, $1,600 vs. $1,200. However, because Firm L has to pay interest, its expected net income is reduced to $1,800 vs. $2,400 for Firm U. But the lower net income for Firm L translates to higher ROE (net income/equity) because the equity base for Firm L is half that of Firm U. The lower equity increases ROE.

The higher ROE of Firm L is not because it is operationally superior to Firm U. Both firms have the same basic earning power (BEP) since operationally, they are equally strong. However, Firm L manages to increase its ROE 50% higher. The expected ROE of Firm L is 18% and that of Firm U is 12%. This increase is because of the use of debt, as the interest on debt is tax deductible. So the higher ROE of Firm L is because of the financing decision. It has nothing to do with operational decisions or the efficient use of resources.

However, debt is not an unmixed blessing; it can also magnify ROE downwards. If EBIT of a company is less than the interest expense, it still has to pay interest. Income will thus be negative, as will ROE. Thus, debt cuts both ways. If a company cannot pay interest to its creditors, it may be forced into bankruptcy. But if a company is all-equity financed, and its net income is negative, it does not have to pay dividends to shareholders. Even when the net income is positive, the company may not pay any dividend; it may want to reinvest all or part of its net income into attractive projects that will boost the stock price.

The risk inherent in debt is reflected in the standard deviation of the ROEs under the three scenarios for each firm. The expected ROE of Firm L is 50% higher than that of Firm U, but the standard deviation of the ROE is two times that of Firm U, 4.24% vs. 2.12%. Thus higher ROE comes with higher risk.

Companies that use debt stand to benefit from higher expected ROE, but at the same time, they are exposed to higher risk: the risk of being forced into bankruptcy.

III. RECESSIONS AND BUSINESS FAILURES

Firms do well or poorly as a result of company specific factors, industry specific factors, and market-wide factors. It is easy to gauge the effect of market-wide factors on firms. One way to gauge the risk of firms with high debt is to analyze if business failure rates increase in times of recessions. In a recession, the downturn causes firm revenues to fall. A firm with high debt may run out of cash flow and find it difficult to make interest payments. This can cause a firm to seek bankruptcy protection. In many such cases, firms may go out of business. We would thus expect to find high rates of business failure in times of recessions.

Exhibit 2 shows business failure rates from 1927 to 1997, a 71-year period that experienced 12 recessions lasting from 6 months to 43 months. A recession is defined as the period from peak to trough of a business cycle. The 12 recessions cover a month to 12 months of 26 years. The duration of the recession in each of these 26 years is shown in the last column of Exhibit 2. Except for 6 years, in each of the other 20 recession years, failure rate was higher than in the preceding year (the failure rates in these 20 recession years are noted in **bold**). Of the 6 exception years, one recession lasted a month, and two lasted two months each. The failure rates are per 10,000 businesses, and include failures due to bankruptcy, death of owner, closure due to retirement of owner, etc. It is more likely that the increase in failures in recession years is due to bankruptcy than any other factor.

Exhibit 3 graphically displays part of the data in Exhibit 2: failure rates (Y-axis) are plotted against the years 1950 to 1997 (X-axis). Recession periods are shaded. The graph tells us that business failures have generally increased during every one of the eight recessions that occurred in the 48-year period. After nearly every recession, failure rates decreased. Businesses with debt thus have a higher risk of failure during recession than if they had no debt, given the extra financial risk that they bear.

What is apparent from the above analysis is that debt increases ROE, but it also increases the risk to shareholders. In good years, debt can magnify ROE. But good times cannot last forever. Even in a resource-abundant and technologically advanced country like the U.S., 26 out of 71 years since 1927 were partially or wholly affected by recession. The incidence of recession is likely to be greater in less well-endowed countries of the world.

In bad years, shareholders' equity is at stake. When a company goes bankrupt and its assets are sold, creditors (banks, bondholders, etc.) get their share first, and are only then followed by the claims of preferred stock holders. Common stockholders finish last.

Another problem with debt is the moral hazard issue that it raises. Owners may raise significant debt capital and put in little money of their own. Since they have little stake in the business, they may be induced to take a great deal of risk. If the business succeeds, they cut it big, since they have to pay a fixed interest cost. If they fail in their enterprise, their loss is small. If the risky venture pays off, they win handsomely.

IV. EXPERIMENTAL DESIGN

One of the previous sections shows that debt has value because interest on debt is tax deductible. This translates to lower taxes for the government, higher income for shareholders, and consequently higher returns. The higher potential return has a cost: higher risk. A firm that does not have debt faces only business risk. When it borrows, financial risk (risk of bankruptcy and financial distress) is added to the business risk.

This means that Muslim investors who shy away from investing in companies with debt would invest in companies that should have lower financial risk and consequently lower total risk, and hence lower returns. This may also mean that they are depriving themselves from investing in companies with better performance. The intent of this section is to test this.

Four measures of corporate performance are used:

1. Return on equity (ROE)
2. 5-year compound average revenue growth rate
3. 5-year compounded average stock price growth rate
4. 5-year total compounded return

Companies were screened based on debt/equity ranges and data on ROE of screened companies were obtained using the Internet site http://www.marketguide.com. The return on equity (ROE) of a company is defined as net income for the most recent fiscal year divided by shareholders' equity on the company's balance sheet. (Shareholders' equity is assets minus liabilities). The number is expressed as a percentage.

Companies were screened based on debt/equity ranges and data on the other 3 performance measures was obtained using the Internet site: http://www.hoovers.com.[ii] Hoovers.com defines these 3 performance measures as follows:

- The 5-year compound revenue growth rate measures a company's sales growth rate over time. Sales for the five most recent fiscal years are used to calculate a compound average based on a linear regression.
- The 5-year compound average stock price growth rate measures the appreciation (or depreciation) of a company's stock price over time. The five data points used are the closing stock price for the most recent business day and the closing stock price for that same day (or the nearest previous business day) for each of the past five years. These five numbers are used to calculate a compound average based on a linear regression.
- The 5-year total return is the 5-year period price change plus dividends paid during the past 5 years, divided by the stock's price at the beginning of the period. The 5-year period is the 5 years previous to the most recent day on which the stock traded. The number is expressed as a percentage.

The data were collected in early to mid-2000 from these Internet sites.

First, I screened companies that have no long-term debt (debt-to-equity ratio of 0) and obtained the ROE for each company. Then I screened companies that have debt/equity ratio in the range of 1% to 10% and obtained their ROEs. In this way I screened companies falling in various debt ranges. The debt ranges that I took are 0%, 1% to 10%, 11% to 20%, 21% to 30% and so on in increments of 10%, until 91% to 100%. Beyond this point the increment chosen was 20%. I stopped with debt/equity ratio of 200%. (Many companies with debt/equity ratios greater than 200% are banks, which in any case are impermissible for Muslims.) Thus we have 16 categories based on debt/equity. I obtained the ROE for each company. Then I tested to see if the ROEs of a particular debt/equity range are significantly different from ROEs of the other 15 debt/equity ranges. The number of companies in each of the 16 categories of companies and the result of statistical test for differences in ROEs appears in Exhibit 4A.

The Kruskal-Wallis test is used to test for difference in performance measures. It is a non-parametric test, which is appropriate when the data is not normally distributed, which is generally the case with market data. The test performs test for differences among several population medians.

Once again I use the 16 debt/equity ranges to screen companies and obtain data for the other three performance measures for each company:

- 5-year compound average revenue growth rate
- 5-year compounded average stock price growth rate
- 5-year total compounded return

Data on these three performance measures are obtained simultaneously for each of the screened companies. Initially companies were screened based on the 16 categories of debt/equity ranges and data was obtained simultaneously for ROE and the above 3 performance measures. The number of companies in each category came out significantly less than when ROE is excluded. Hence companies were first screened based on debt/equity ranges and data on ROE was obtained, and then again screened based on debt/equity ranges and data were obtained on the other 3 performance measures.

Then the Kruskal-Wallis statistical test was conducted to analyze if significant difference in 5-year compound average revenue growth rates existed in the 16 categories of companies. Thus I check to see if there is a significant difference in the 5-year compound average revenue growth rates of one category of companies (within a given debt range) compared to the other categories of companies. Exhibit 5 shows the output of the Kruskal-Wallis tests. I do similar tests to analyze differences in 5-year compounded average stock price growth rates (Exhibit 6) and then 5-year total compounded returns (Exhibit 7) of the 16 categories of companies. The total number of companies in the 16 categories is 2967.

V. ANALYSES OF RESULTS

A. Test for Difference in ROE

The Kruskal-Wallis test for difference in the medians of the 16 categories of companies is presented in Table 4A. The exhibit shows the number of companies in each category. The total number of companies in all categories is 5740. The p-value of 0.00 shows that there is a significant difference in the medians. Companies with debt/equity of 0.81 to 0.90 have the highest average rank. Companies within debt ranges of 1.01 to 1.20 and 1.21 to 1.40 have the second and third average rankings. Generally speaking, companies with higher debt have higher average rankings; companies with lower debt have higher average rankings. Companies with higher debt appear to have higher ROE. Companies in the last category (debt/equity ratio of 1.81 to 2.00) with an average ranking of 13 are an exception.

Descriptive statistics of the ROE data for the 5740 companies (Exhibit 4B) show that there are outliers as large as +25,480% and –54,237%. All the mean ROE values of the 16 categories of companies are negative; it is more than –15% for 12 of the 15 categories of companies. When the smallest 5% and largest 5% ROE values are trimmed from the sample, and then mean values are computed, the means are more meaningful; only 2 categories of companies have mean ROE less than –15%; companies in categories 10 through 13 (debt/equity ratios ranging from 0.81 to 1.40) have mean values that are low positive or close to 0. The median values of all are positive with one exception (Category 2: debt/equity ratio of 0.01 to 0.10).

Next, I exclude companies that have ROE outside ±2,000% to get rid of outliers. This eliminates 22 companies. Then the Kruskal-Wallis test is conducted on the remaining 5,718 companies. Exhibit 4B presents the output. The first three rankings do not change. Another 8 rankings also do not change.

Another nonparametric alternative, Mood's Median Test, is more robust than Kruskal-Wallis Test against outliers (though less efficient for data from many distributions). It performs a nonparametric analysis of a one-way layout. The test assumes that the data are independent random samples from distributions of the same shape. Mood's Median Test is highly robust against outliers and errors in data. Exhibit 4D shows the output of Mood's Median Test on the full sample of 5,740 companies. The p-value of 0.00 shows that significant differences exist in the medians of the 16 categories of companies. Hence it is apparent that companies with higher debt have higher ROE.

B. Test for Difference in 5-Year Compound Average Revenue Growth Rates

The test is on the difference in medians of five-year compound average revenue growth rates of the 16 categories of companies with various debt levels. The median five-year compound average revenue growth rates of companies with 0 debt is 9.69% (Exhibit 5A). The exhibit also shows medians of the other 15 categories of companies. The p-value of 0.05 shows that at the 5% significance level there are differences in the medians of the 16 categories of companies. Companies with higher levels of debt exhibit higher five-year compound average revenue growth rates. The company with the highest average rank has a debt level of 1.01–1.20. The six categories of companies with the highest debt/equity ranges (from 0.91–1.00 to 1.81–2.00) share the first six ranks among them, which means that they experienced higher revenue growth rates.

This result is hard to explain, but there may be two factors at play here:

1. These companies are from certain industries, which have grown in the last five years at higher rates than others.
2. Companies with higher debt are under pressure to service their debt (make interest and principal payments) and are therefore more aggressive in achieving higher sales and hence achieve higher revenue growth rates.

Exhibit 5B shows output from Mood's Median Test for difference in five-year compound average revenue growth rates. As mentioned earlier, the Mood's Median Test is more robust against outliers. The result is interesting. The p-value of 0.72 shows that there is no significant difference in the medians of the 16 categories of companies. So, the outcome on test for difference in five-year compound average revenue growth rates is inconclusive: the Kruskal-Wallis Test showing significant difference whereas the Mood's Median Test showing no significant difference.

C. Test for Difference in 5-Year Compounded Average Stock Price Growth Rates

The output of Kruskal-Wallis test for difference in the medians of 5-year compounded average stock price growth rates of the 16 categories of companies is shown in Exhibit 6. The p-value of 0.32 shows that there are no significant difference in the medians of the 16 categories of companies. Companies with debt level of 21%–30% have the highest ranking. The median value is 10.2%. Companies with debt between 31%–40% have the next ranking with a median value of 6.36%. Rankings of the other categories is scattered. No clear-cut pattern emerges. If higher debt theoretically should lead to higher ROE, then that should have an impact on stock price. But this test on the 5-year compounded average stock price growth rates does not exhibit any pattern.

The Mood's Median Test was also done on this data set (the output is not shown as exhibit). It produced a p-value of 0.29 implying no significant difference.

D. Test for Differences in 5-Year Total Compounded Return

The p-value of 0.35 in Exhibit 5 shows that there are no significant differences in the medians of the 16 categories of companies based on 5-year total compounded return. Companies with debt level of 21%–30% had the highest ranking (median = 68.16%); companies with debt of 1%–10% have the next ranking. Overall, companies with lower debt have higher 5-year total compounded return.

The Mood's Median Test for this data set (the output is not shown as exhibit) produced a p-value of 0.60 implying no significant difference.

VI. CONCLUSION

Since interest on debt is tax-deductible, debt has value. Theoretically, this translates to higher ROE and therefore higher returns for equity holders. But it also implies that equity holders have to bear higher risk. I find that companies with higher debt have experienced higher ROE. I also find that companies with higher debt have experienced higher five-year compound average revenue growth rates. However, significance tests on these results are mixed. They are significant based on one test, and not significant based on another. It must also be noted that higher compound average revenue growth rates did not necessarily translate to higher 5-year compounded average stock price growth rates or higher 5-year total compounded returns for equity holders of companies with high debt.

EXHIBIT 1. PARTIAL INCOME STATEMENTS FOR A LEVERED AND AN UNLEVERED FIRM

Both firms have same asset size. Firm U is financed only by equity (hence the term unlevered); Firm L is 50% equity- and 50% debt-financed (hence levered). Forecasts for earnings before interest and taxes (EBIT) are shown for each firm under three possible scenarios: bad, average, and good. The rate of interest (INT) on debt is 10%. EBT is earnings before taxes; BEP is basic earning power; ROE is return on equity. Both firms have the same BEP; operationally, they are equally strong. Firm L has a higher expected ROE because interest on debt is tax deductible. However, the risk of ROE (variability, as measured by σ [standard deviation]) is also higher for Firm L.

	Firm U (unlevered)			Firm L (levered)		
Assets		$20,000			$20,000	
Equity		$20,000			$20,000	
Debt		$0			$0	
Scenario	**Bad**	**Average**	**Good**	**Bad**	**Average**	**Good**
Probability	0.25	0.50	0.25	0.25	0.50	0.25
EBIT	$3,000	$4,000	$5,000	$3,000	$4,000	$5,000
INT (10%)	$ –	$ –	$ –	$1,000	$1,000	$1,000
EBT	$3,000	$4,000	$5,000	$2,000	$3,000	$4,000
Taxes (40%)	$1,200	$1,600	$2,000	$800	$1,200	$1,600
Net Income (NI)	$1,800	$2,400	$3,000	$1,200	$1,800	$2,400
BEP (EBIT/Assets)	15%	20%	25%	15%	20%	25%
ROE (NI/Equity)	9%	12%	15%	12%	18%	24%

$E(ROE_U) = 0.25(9\%) + 0.5(12\%) + 0.25(25\%) = 12\%$ = Expected ROE of Firm U

$E(ROE_L) = 0.25(12\%) + 0.5(18\%) + 0.25(24\%) = 18\%$ = Expected ROE of Firm L

$\sigma_{ROE_{(Unlevered)}} = 2.12\%$ = Standard deviation of the ROE of Firm U

$\sigma_{ROE_{(Levered)}} = 4.24\%$ = Standard deviation of the ROE of Firm L

EXHIBIT 2. FAILURE RATES PER 10,000 BUSINESSES, 1927–1997

Year	Failure Rate	Duration (months)	Year	Failure Rate	Duration (months)
1927	106		1963	56	
1928	109		1964	53	
1929	104	5	1965	53	
1930	122	**12**	1966	52	
1931	133	**12**	1967	49	
1932	154	**12**	1968	39	
1933	100	2	1969	37	1
1934	61		1970	44	**10**
1935	62		1971	42	
1936	48		1972	38	
1937	46	8	1973	36	2
1938	61	**5**	1974	38	**12**
1939	70		1975	43	**2**
1940	63		1976	35	
1941	55		1977	28	
1942	45		1978	24	
1943	16		1979	28	
1944	7		1980	42	**6**
1945	4	8	1981	61	**6**
1946	5		1982	88	**12**
1947	14		1983	110	
1948	20	**2**	1984	107	
1949	34	**9**	1985	115	
1950	34		1986	120	
1951	31		1987	102	
1952	29		1988	98	
1953	33	**6**	1989	65	
1954	42	**6**	1990	74	**6**
1955	42		1991	107	**2**
1956	48		1992	110	
1957	52	**5**	1997	109	
1958	56	**3**	1994	86	
1959	52		1995	82	
1960	57	**9**	1996	80	
1961	64	**1**	1997	88	
1962	61				

Note: recession years are in bold.

EXHIBIT 3. BUSINESS FAILURES, 1950–1997

Shaded periods represent recessions.

Exhibit 3

Business failures from 1950 to 1997; shaded periods represent recessions

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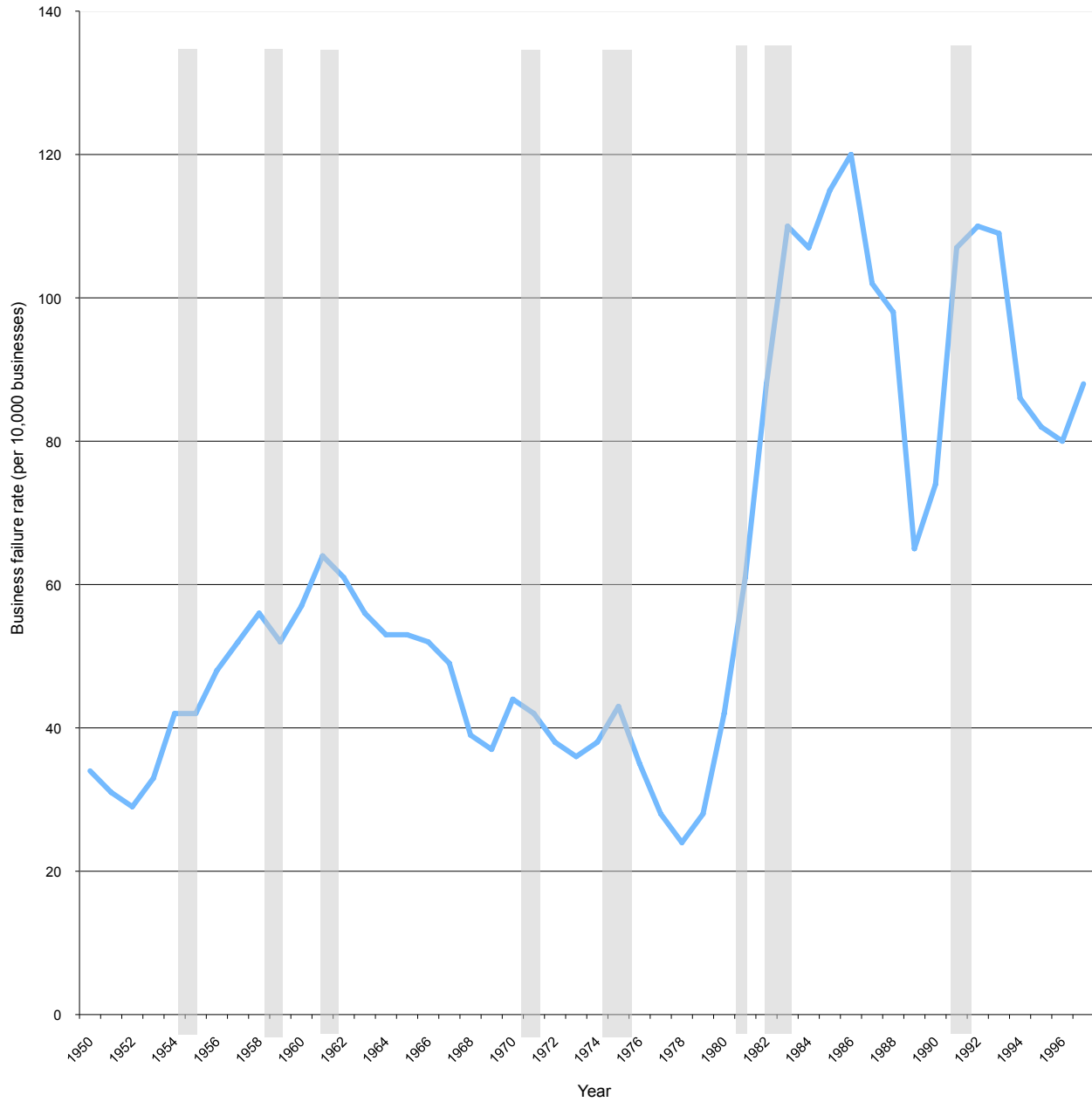http://ifp.law.harvard.edu/login/contact

EXHIBIT 4A. KRUSKAL-WALLIS TEST OF DIFFERENCES IN THE MEDIANS OF RETURN ON EQUITY (ROE) OF COMPANIES IN 16 DEBT/EQUITY RANGES (FULL SAMPLE)

Category	Debt	Number of Observations	Median	Average Rank	Z-Value	Rank
1	0.00 – 0.00	1268	0	2659.3	−5.14	15
2	0.01 – 0.10	880	−1.7	2510.6	−7	16
3	0.11 – 0.20	479	1.47	2717.3	−2.11	14
4	0.21 – 0.30	400	5.19	2933.3	0.79	12
5	0.31 – 0.40	340	6.11	3068	2.27	7
6	0.41 – 0.50	268	4.98	2986.5	1.17	11
7	0.51 – 0.60	292	7.7	3161.9	3.08	4
8	0.61 – 0.70	232	5.61	2955.3	0.8	10
9	0.71 – 0.80	205	7.23	3102.8	2.04	6
10	0.81 – 0.90	212	9.63	3388.4	4.64	1
11	0.91 – 1.00	211	8.47	3149.1	2.49	5
12	1.01 – 1.20	304	8.34	3207.8	3.65	2
13	1.21 – 1.40	221	8.63	3199.1	3.01	3
14	1.41 – 1.60	179	6.79	3010.8	1.15	9
15	1.61 – 1.80	139	7.67	3059.2	1.36	8
16	1.81 – 2.00	110	2.54	2752.9	−0.75	13
Whole sample		5740		2870.5		

H = 138.19   df = 15   p = 0.00
H = 138.19   df = 15   p = 0.00 (adjusted for ties)