
Class #16

“Ratio Analysis & Bankruptcy Detection”

Where have we been/where next?

- Complete discussion of accounting trading strategies from last class
- Cost of capital discussion
 - http://www.ibbotson.com/content/cc_lv11.asp
 - Charge of \$15 per beta!

Contracting and Accounting

- Examples of Contracts:
 - Loan Agreements:
 - Principal – Bank, Bondholders, Private lenders
 - Agent – Equityholders (managers)
 - Compensation Agreements (Class 18):
 - Principal – Equityholders
 - Agent – Managers (CEO, division managers)
 - Agreements with Suppliers, Customers, Partners
 - Principal – Equityholders
 - Agent(s) – “Third parties”
 - Agreements with Government/Regulators
 - Principal – IRS (tax authority, regulatory agency)
 - Agent – Firm

Contracting and Accounting

- Contract terms should be designed to address conflicting incentives of self-interested parties:
 - Accounting numbers (such as earnings, book value of assets, cash flows, etc) can be used to specify contract terms and as a tool to monitor performance and contract compliance.
- Why use GAAP accounting numbers?
 - Are they objective, verifiable, unbiased, consistent, comparable, timely, reliable, and neutral?

Lending Contracts

- The “Agency Problems” of Debt:
 - Dividend Payout Problem (Repayment)
 - Claim Dilution Problem (Repayment)
 - Asset Substitution Problem
 - Underinvestment Problem

Lending Contracts - Continued

- How do we get around the “lemons problem” and other failures in the lending market?
 - Solution – Debt Covenants
 - Affirmative Covenants:
 - Using the loan for the agreed-upon purpose
 - Financial covenants and reporting requirements
 - Compliance with laws
 - Rights of inspection
 - Maintenance of insurance, properties and records

Lending Contracts

- Negative covenants:
 - For example -Limits amount of total debt, amount of investment and capex, size of dividend payments, etc.
- Use of accounting numbers in debt agreements:
 - i.e. Fixed charge coverage =
$$\text{EBITDA} / (\text{Interest} + \text{debt due now} + \text{dividends} + \text{replacement Capex})$$
 - What if the firm is about to violate the terms of a lending agreement?

Lending Contracts

- URS Corp:10-Q Report (March, 2001)
 - “The senior collateralized credit facility is governed by affirmative and negative covenants. These covenants include restrictions on incurring additional debt, paying dividends or making distributions to our stockholders, repurchasing or retiring capital stock and making subordinated junior debt payments, and require us to submit quarterly compliance certification. The financial covenants include maintenance of a minimum current ratio of 1.20 to 1.00, a minimum fixed charge coverage ratio of 1.10 to 1.00, an EBITDA minimum of \$160,000,000 and a maximum leverage ratio of 4.00 to 1.00 for the period ended January 31, 2001. We were fully compliant with these covenants as of January 31, 2001.”

Lending Contracts

- URS Corp:10-Q Report (March, 2001)
 - PERFORMANCE PRICING:
 - Why?
 - What does Performance Pricing Address?
 - “The term loans each bear interest at a rate per annum equal to, at our option, either the Base Rate or LIBOR, in each case plus an applicable margin. The revolving credit facility bears interest at a rate per annum equal to, at our option, either the Base Rate, LIBOR or the Adjusted Sterling Rate, in each case plus an applicable margin. The applicable margin adjusts according to a performance-pricing grid based on our ratio of Consolidated Total Funded Debt to Consolidated Earnings Before Income Taxes, Depreciation and Amortization ("EBITDA").”

Contracts and Accounting Manipulation

- When do managers have the greatest incentive to manager earnings?
 - When contract provisions are about to be violated.
 - le Debt covenant
 - Minimum capital requirements in banks:
 - Capital adequacy ratio = Invested Capital/Total Assets
 - Other cases: Regulated industries
 - Allowed Revenue=Operating Costs + Depreciation + Taxes + (ROA*Asset Base)
 - Taxation

Debt Contracts:

Tools for early detection of financial distress?

Covenants in debt contracts

- Used as early warning indicators of financial distress
- Avoid risk of non re-payment
- Question/Key Issue: Are simple financial ratios timely indicators of risk and financial distress?

Predicting Bankruptcy Using Multiple Discriminant Analysis (MDA)

How is it performed?

- Identify sample of bankrupt firms
- Match firms with healthy firms of same size and same industry.
- Matching procedure also attempts to control for firm size and industry factors.
- Calculate a number of financial statement ratios that are expected to be related to the likelihood of bankruptcy.

Bankruptcy Prediction: Altman's Z-score

A well-known MDA bankruptcy prediction model is Altman's Z-score. Altman used data for manufacturing firms to develop the model.

Calculation of the model's Z-score is as follows:

$$\begin{aligned} \text{Z-score} = & 1.2(\text{Net Working Capital/Total Assets}) + \\ & 1.4(\text{Retained Earnings/Total Assets}) + \\ & 3.3(\text{Earnings Before Interest and Taxes/Total Assets}) + \\ & 0.6(\text{Market Value of Equity/Book Value of Liabilities}) + \\ & 1.0(\text{Sales/Total Assets}) \end{aligned}$$

Altman's Z- score

The ratios capture different aspects of profitability & risk:

Net Working Capital/Total Assets: Captures short-term liquidity risk.

Retained Earnings/Total Assets: Captures accumulated profitability and relative age of a firm.

Earnings before Interest and Taxes/Total Assets: Measures current profitability.

Market Value of Equity/Book Value of Liabilities: A debt/equity ratio, but incorporates market's assessment of firm equity value. Captures long-term solvency risk and the market's overall assessment of the firm's profitability and risk.

Sales/Total Assets: Indicates the ability of a firm to use assets to generate sales.

Real World Applications of Z-Score

- Bond rating services (Moody's and Standard & Poor's) use models similar to the Z-Score to rate corporate bonds.
 - Details on ratings at Moody's:
For example, check out the research methods (the Z''-Score) for determining private firm default risk:
<http://riskcalc.moodyrms.com/us/research/crm/45768.pdf>
Information on default analysis methods at Moody's:
<http://riskcalc.moodyrms.com/us/research/defrate.asp>
 - Attached page with S&P rating definitions

Where Next?

- Assignment #2 is due in class next Tuesday.
 - Be prepared to discuss your results in class.
- Next Class: Merger and Acquisitions:
 - Reading will be handed out next class.