Analysis On Determinants of Debt Capacity

1. Model

The models we used was based on the corresponding hypothesis illustrated in the paper: "DeterminantsOfDebtCapacity"

We tried four models in sequence. We get the best fitted one (Model 4), by adding variables, considering different hypotheses, and refining the model. The models we use are as follows:

Model	Corresponding Hypotheses	Code in Matlab
Model 1	H1a, H1b, H2a, H2b	EL ~ LM : AP + BL : AR - 1
Model 2	H1a, H1b, H2a, H2b & Take volatility into account	EL ~ LM : AP + BL : AR + Vol -1
Model 3	H1a, H1b, H2a, H2b, H1c, H2c	EL ~ LM : AP + BL : AR + Vol_lo : LM + Vol_lo : BL - 1
Model 4	H1a, H1b, H2a, H2b, H2c Note: H1c is rejected because in Model 3 the p-value of variable *Vol_lo:LM* was high	EL~ LM : AP+BL : AR+ Vol_lo : BL - 1

2. Interpretation of the model

The interpretation of the four models we constructed in the project is as follows:

Model	Interpretation
Model 1	LM interact with AP, BL interact with AR, while LM and BL determines EL
Model 2	LM interact with AP, BL interact with AR, while LM, BL and Vol determines EL
Model 3	LM interact with AP, BL interact with AR, Vol_lo interact with BL, Vol_lo interact with LM, while LM, BL determines EL
Model 4	LM interact with AP, BL interact with AR, Vol_lo interact with BL, while LM, BL determines EL

3. The Quality of Fit

	Model 1	Model 2	Model 3	Model 4
R^2	0.3795	0.4765	0.4911	0.4885
Adjusted R^2	0.3760	0.4705	0.4823	0.4826

From the table above, Adjusted R^2 of Model 1 to Model 4 are increasing, which shows that Model 4 is the fittest one.

It needs to be mentioned that although Model 3 has the highest R^2, as using multi-regression model, we should pay more attention on the Adjusted R^2. Adjusted R^2 of Model 4 is bigger than The p-value for the independent variables in each model are all approach to 0, which means a significant effect to EL except to variable "Vol_lo:LM (0.34)". It is removed from the Model 3 to get Model 4.

The regression result of Model 4 is as follows, we can see that p-value of all the coefficient are smaller than 0.01, which means all the variables we included in this model has significant impact on EL and the magnitude of effect can be seen in the "Estimate" term.

```
model4 =
Linear regression model:
    EL ~ BL:Vol_lo + BL:AR + LM:AP

Estimated Coefficients:
                   Estimate       SE        tStat       pValue
                   ________    _________    ______    __________

    BL:Vol_lo       0.23566       0.0386    6.1051    6.4464e-09
    BL:AR           0.76822     0.036693    20.937    1.5618e-49
    LM:AP          0.022258    0.0055864    3.9843    9.9163e-05


Number of observations: 178, Error degrees of freedom: 175
Root Mean Squared Error: 0.109
```

Therefore, it can be concluded that Model 4 has high quality of fit.

4. Suggestions for next steps

As we find out how the Book Leverage, Asset Intensity, Leverage Multiplier and Volatility interact with each other and determine Enterprise Leverage, we can take more aspects into consideration in the next step.

1) Classify the companies by asset intensity and earning volatility, add dummy variables to the model to test the effect of different classification to the enterprise leverage and explain the reasons.
2) A potential AIC process may be implemented to further improve the model.

Appendix

1. Terminology and Abbreviation

AR (Asset Richness) = 1-AP

AP (Asset Poorness) = EVBV

AI (Asset Intensity) = 1/EVBV

EV (Enterprise Value) = Market Capitalization - BV of Equity - Total Liability

LM (Leverage Multiplier) = Debt/EBITDA

BL (Book Leverage) = Debt/Book value

Vol = Volatility of Income

EL (Enterprise Leverage) = Debt/EV *Represents capital structure &Target of this study*

2. Scatter of Yactual and Yest (Model 4)