# Moodys’ Model

: Published Credit Rating of Company ,

: Credit Score Transform Table



: Moodys Credit Score (Unknown)

: Moodys Credit Score Adjustment (Unknown)

Then,

Score of Factor j of Company , where



Each factor has sub factor(s).

* Scale

are Transform Table where



<Calculation of and >

They use average annual revenue of last three fiscal years. So,

e.g.) If we derive the rating of 2014, we need revenue of 2011, 2012 and 2013.

They also use average of last three fiscal years. So,

* Competitive Landscape

This score is calculated by unknown procedure.

They says, “*This factor includes* ***an assessment of the defensibility of a company’s business position that incorporates items*** *such as pricing pressure, product substitution, and other barriers to entry like patents, product differentiation, investment requirements, customer relationships, or channels to market*.” and “*Another consideration that informs our measurement of competitive landscape is o****ur estimate of the market share ranking for the company’s core market or the majority of its segments using public data from company financial statements, market research reports, issuer presentations and/or Moody’s internal research****. An issuer is ranked highest if it is a clear dominant market leader in its core business.*”

This is so called fundamental research. In this process, they use both quantitative and qualitative factors. Since precise criterion is vague, we cannot completely replicate this score, but we can approximate this score by using the information they use.



* Operating Performance Stability

*“Operating margin stability is measured on a rolling twelve-month basis over the past five years and is measured as the average of five years’ operating margins divided by the standard error of the data points.”*

*“Free cash flow margin is measured as free cash flow divided by revenue. Free cash flow margin stability is measured on a rolling twelve-month basis over the past five years and is measured as the average of five years’ free cash flow margins divided by the standard error of the data points.”*

Transform Table are



<Calculation of and >

They use the average of five years’ operating margins divided by the standard error of data points. However we need to be careful about their calculation method. In “Notes on Measurement Criteria”, they says they use trailing twelve-month data on a quarterly base.

Companies usually issue their financial statement quarterly. Let we assume that today is 10/19/2014. In this situation, trailing twelve-month data on a quarterly base means the date of 2014\_2Q, 2014\_1Q, 2013\_4Q and 2013\_3Q. In other words, start at the recent end of quarter and go back to 12 months. In the case of 5 years, the data is from 2014\_2Q to 2009\_3Q.

Let

is also calculated by this method.

* Financial Strength

Transform Tables are



<Calculation of s>

are calculated by three year average of annual data, but is calculated by different way.

* Total Score

Then,

where

# Our Model

Unknown part of Moodys’ model (**bold**):

where

If we omit unknown part, the model reduced to

We assume we and Moody’s use same information (e.g. We use same Free Cash Flow, EBITDA …). If this assumption is violated, we cannot handle it.

Let we assume we can get and , then we define error as

Then we determine which predictors explain unknown part **.**

* How to calculate error b/w our estimate and moodys’?

We can observe , but we cannot observe and . This means that we cannot compare and .

<Method 1> Take median of the score

If we observe and get , we regard (Median of the table) and calculate error as .

<Method 2> Comparison b/w rating

If we observe and , compare them directly.

…

## Indentify (Replicate) unkown part

### Where doescome from**?**



* Possible explanation (just my idea)
  + Adjustment in Same direction
    - Sector Outlook

If the future of Technology/Hardware industry is hopeless, they may do negative adjustment to most companies.

* + - Specialization/Diversification of business

Some companies are specialized in producing some specific product(s) (Hard disk, Memory, and so on). If that products becomes worthless, their business will also be worthless.

* + - Macroeconomic Situation

If US economy is in depression, they may do negative adjustment to most companies.

* + Individual Factor
    - If there is important information everyone cannot see from financial statement, they include that information by adjustment.

If my inference above hold true, is not independent, not identical and not random.

Remember that they say,

“*This factor includes* ***an assessment of the defensibility of a company’s business position that incorporates items*** *such as* ***pricing pressure****,* ***product substitution****, and* ***other barriers to entry like patents****,* ***product differentiation****,* ***investment requirements****,* ***customer relationships****, or c****hannels to market***.”

and

“*Another consideration that informs our measurement of competitive landscape is our estimate of* ***the market share ranking for the company’s core market or the majority of its segments using public data from company financial statements, market research reports, issuer presentations and/or Moody’s internal research****. An issuer is ranked highest if it is a clear dominant market leader in its core business.*”

If we can get that information, we can construct a model that explains the information has.

* Example: Predictor of Market share

Let : Sales amount (USD) of company i. Then,

* Estimation of (Statistical Part)

Let

Then we identify the function and select *Z*. Maybe, some of will be overlapped with the component of . (In my understanding, Xiaotong calls the overlapped part as “internal” and other parts as “outside effect”. But the idea is same.)