

TW3421x - An Introduction to Credit Risk Management

Default Probabilities

Internal ratings and recovery rates

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Week 4
Lesson 3

Lack of rating?

- ❖ The ratings that are published by rating agencies are only available for (relatively) large companies.
- ❖ Many SMEs do not issue publicly traded bonds, therefore they are not rated.

Internal ratings

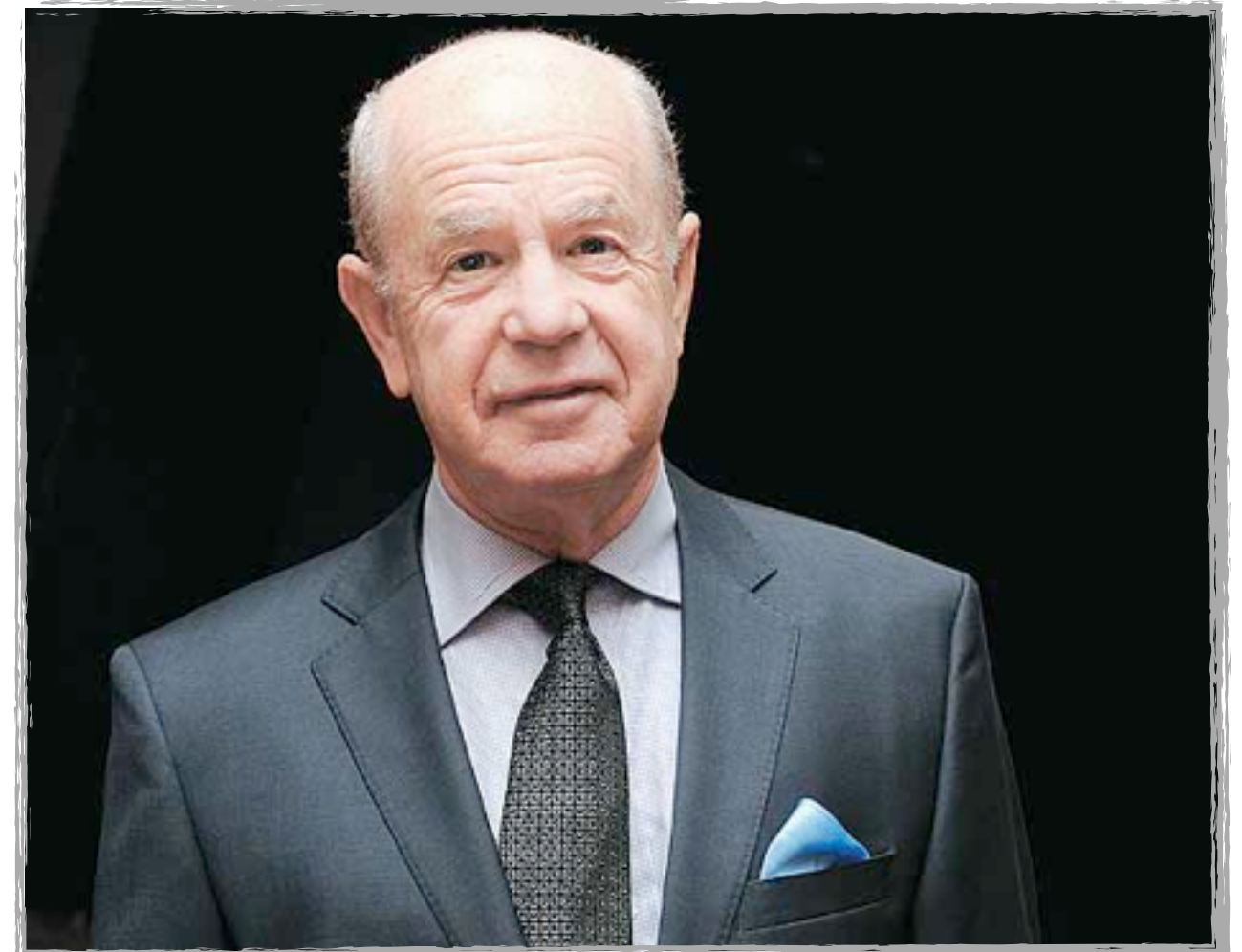
- ❖ As we have seen, the internal-rating based (IRB) approach of Basel II and III allow banks to use internal methods to determine the probability of default of a counterparty.
- ❖ This is why most banks have **their own procedures** to assess the creditworthiness of their corporate and retail clients.
- ❖ This is a necessity, when external information is not available.
- ❖ If, for a client, an external rating is also available, the bank can choose the one to be used (internal or external).

Internal ratings

- ❖ Internal-rating approaches typically rely on profitability and balance sheet ratios.
- ❖ Since a bank (but every company in general) is interested in the capability of its counterparty to service its debts, the liquidity of each client is extremely important.
- ❖ In simple terms: **cash is more important than profits**, in repaying a debt.

Altman's Z-score

- ❖ Introduced in 1968 by Edward Altman, Altman's Z-score is the prototype of internal-rating methods.
- ❖ There exist different versions of Altman's Z-score, depending on the type of company / client under scrutiny.
- ❖ In simple terms, it is a **financial distress index**, and it is considered an essential tool of fundamental analysis.
- ❖ The typical time horizon is 1 year.

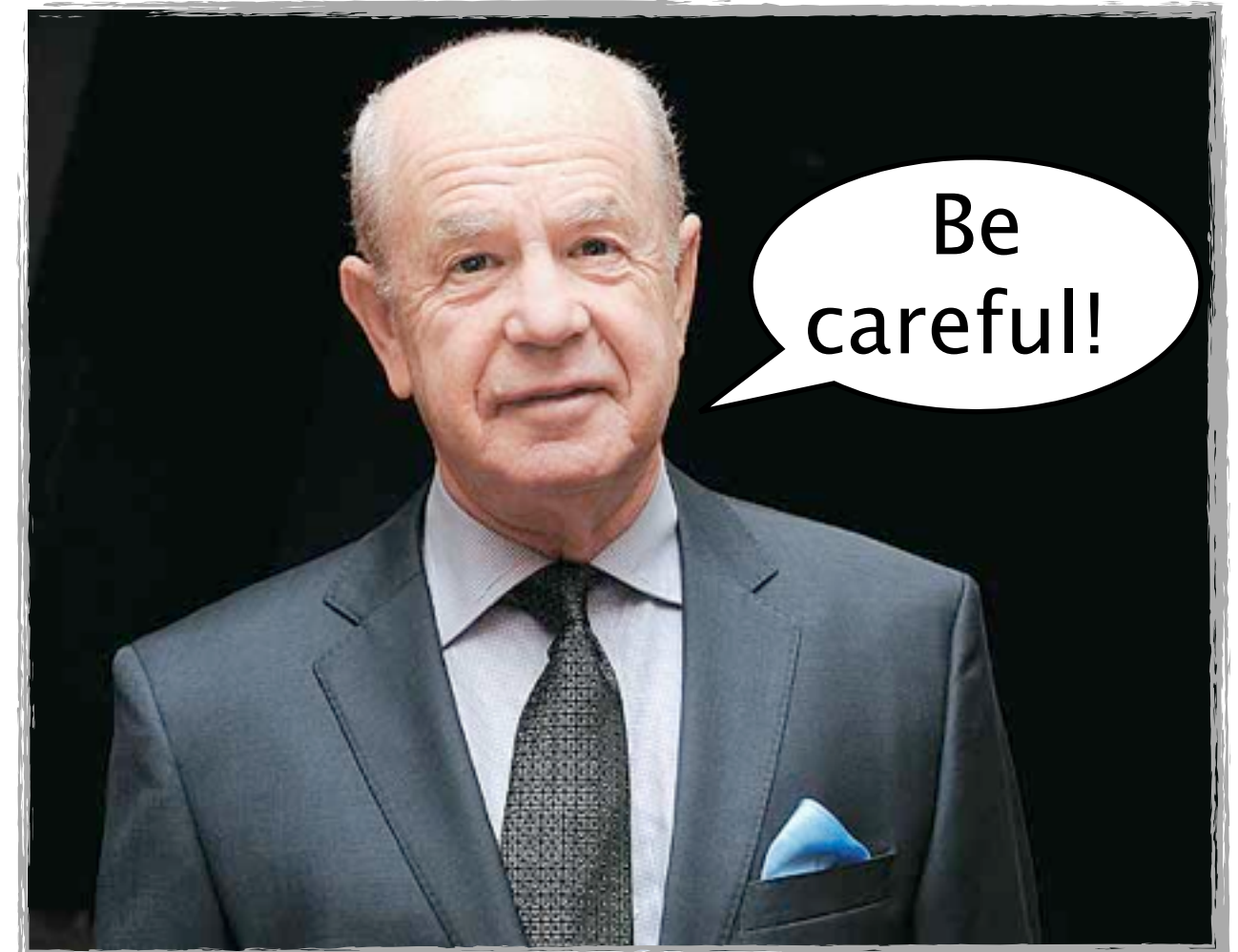


http://cms.outlookindia.com/images/articles/outlookbusiness/2011/10/1/edward_altman_20111001.jpg

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Altman's Z-score

- ❖ Using discriminant analysis, over the years Altman (and many other after him) have proposed different ways of computing the Z-score.
- ❖ For example, for publicly traded manufacturing companies, the Z-score reads

$$Z - score = 1.2R_1 + 1.4R_2 + 3.3R_3 + 0.6R_4 + 0.999R_5$$

Working Capital / Total Assets

Retained earnings / Total Assets

EBIT / Total Assets

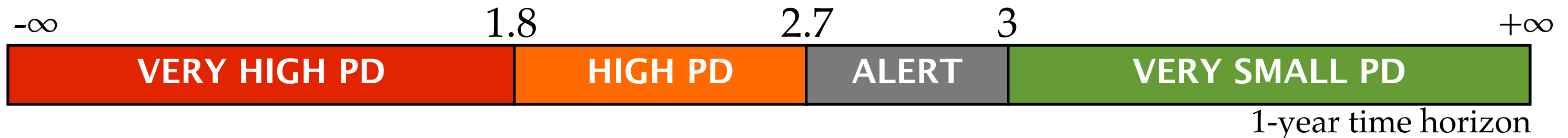
Sales / Total Assets

Market value of equity / Book value of total liabilities

How to read the Z-score?

- ❖ The use of the Z-score is rather simple: you simply plug-in the value of the profitability and balance sheet ratios you need and you get a number.
- ❖ This number must be compared with some specific thresholds, which are obtained by analyzing historical data about the financial distress and the default of companies.
- ❖ These thresholds depend on the type of Z-score you use.
- ❖ For the previous example:

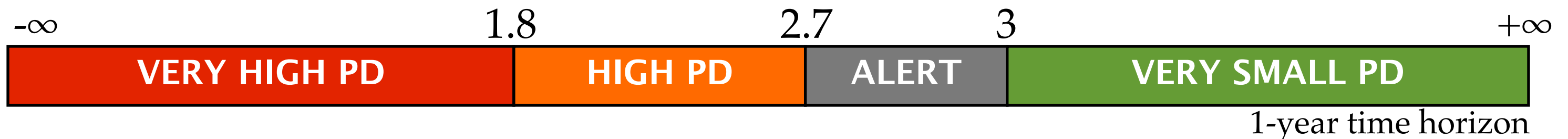
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Exercise

- ❖ Consider a corporate client for which we know the following:

$$R_1 = 0.352, R_2 = 0.448, R_3 = 0.0896, R_4 = 1.233, R_5 = 1.731$$

- ❖ Is this client likely to default within the next year, according to Altman's Z-score?

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- ❖ Consider a corporate client for which we know the following:

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- ❖ Is this client likely to default within the next year, according to Altman's Z-score?

$$1.2 \times 0.352 + 1.4 \times 0.448 + 3.3 \times 0.0896 + 0.6 \times 1.233 + 0.999 \times 1.731 = 3.8143$$

The answer is NO.

Our corporate client seems to be in a healthy condition,
and it will not default in the near future.

The internal tools actually used by banks

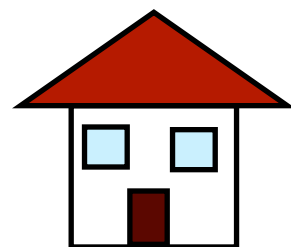
- ❖ Banks use their own formulas and proprietary tools.
- ❖ However, most of these are just modifications of Altman's Z-score, or they are obtained using similar techniques.
- ❖ Alternatively, banks may use instruments they buy from external providers. Some examples are Merton's model, Moody's KMV model, Credit Suisse CR+ and so on.
We will see these models in the next weeks.
- ❖ As we can expect, internal ratings are also used by rating agencies to assign a rating to bonds, especially when they first appear.

Recovery rates

- ❖ Your counterparty goes bankrupt.
- ❖ Do you lose it all?

Recovery rates

- ❖ The recovery rate is “**the amount of credit recovered through foreclosure or bankruptcy procedures in event of a default, expressed as a percentage of face value**”.
- ❖ For a bond it is typically the price at which it trades about 30 days after default, as a percent of the face value. The average recovery rate for bonds is around 35-40%. 
- ❖ For loans and mortgages with first lien on assets, it is usually around 65%.



Recovery rates

- ❖ As one could imagine, recovery rates are very negatively correlated with default rates (% defaults) on the market.
- ❖ This means that during a crisis, when many companies and individuals go bankrupt, recovery rates dramatically decrease.
- ❖ *A paper by Altman et al. (2005) shows that when the default rate on speculative-grade bonds is around 1% per year, then the recovery rate can get as high as 55%. But, if the default rate rises up to 10%, then the recovery rate immediately drops to less than 30%!*

Recovery Rate



Default Rate

Thank You