Trends and best practices in Credit Management

A journey through recent findings

Ludo Theunissen

Credit Expo
14th October 2015

Academics & credit management

Academics

What are academics actually doing ?

Do they know the real world ?
                Some of them do !

Hard to get there

Academics

The turkey and the bull

Academics

The turkey and the bull

Academics

What are academics actually doing ?

Do they know the real world ?
           Some of them do !

Hard to get there
Even harder to stay

Education
Research
Services

Academics

Education

Hardly any specialized credit management courses on bachelor / master level – some in UK, France,....
Part of 'risk management' , treasury management, Econometrics

Education is mainly organised by professional bodies, such as Credit management associations

Credit management as a topic in education of Economists?
    Limited ....

→ Credit management is – despite the obvious importance - not really a hot item in university education

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Research on Credit Management

So much has changed

- Credit crisis
- Credit crunch
- Availability of financial data
- Global world
- Outsourcing , SSC
- e-business
- Impact of credit insurance
- Legislation : payment terms, data protection
- Power shift ?

Do we find it in academic research

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Academics

Research

Very high pressure on publications

A1 ! Peer reviewed, very selective !

Often very theoretical, high quality research that sometimes lacks connection wit the real world

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Academics

Research

IGNobel Price

NEUROSCIENCE PRIZE: Craig Bennett, Abigail Baird, Michael Miller, and George Wolford [USA], for demonstrating that brain researchers, by using complicated instruments and simple statistics, can see meaningful brain activity anywhere — even in a dead salmon.

LITERATURE PRIZE: The US Government General Accountability Office, for issuing a report about reports about reports that recommends the preparation of a report about the report about reports about reports.

ECONOMICS PRIZE: The executives and directors of Goldman Sachs, AIG, Lehman Brothers, Bear Stearns, Merrill Lynch, and Magnetar for creating and promoting new ways to invest money — ways that maximize financial gain and minimize financial risk for the world economy, or for a portion thereof.

ECONOMICS PRIZE: The directors, executives, and auditors of four Icelandic banks — Kaupthing Bank, Landsbanki, Glitnir Bank, and Central Bank of Iceland — for demonstrating that tiny banks can be rapidly transformed into huge banks, and vice versa — and for demonstrating that similar things can be done to an entire national economy.

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Academics

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Some research topics

- Credit rating and scoring, failure prediction
- Organisation of credit management
- CM as an important element of WC
- ....

Changing a university ?

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Academic research

Credit risk

Loss = PoD * LGD * Exposure

B2B : LGD (Loss given default) : close to 100 %

Exposure : controlled (?)
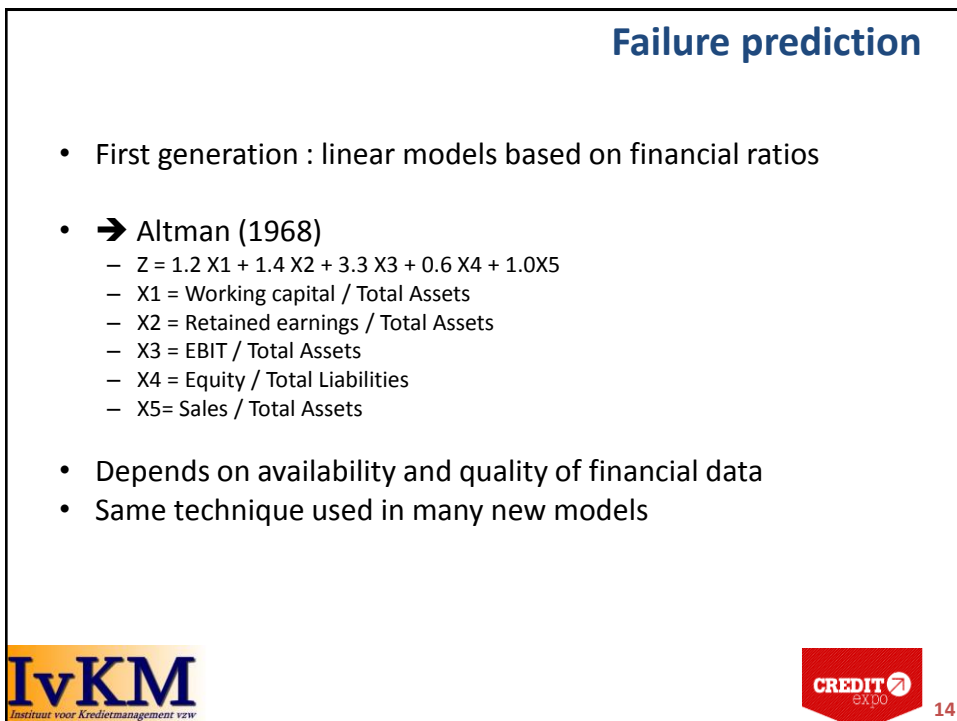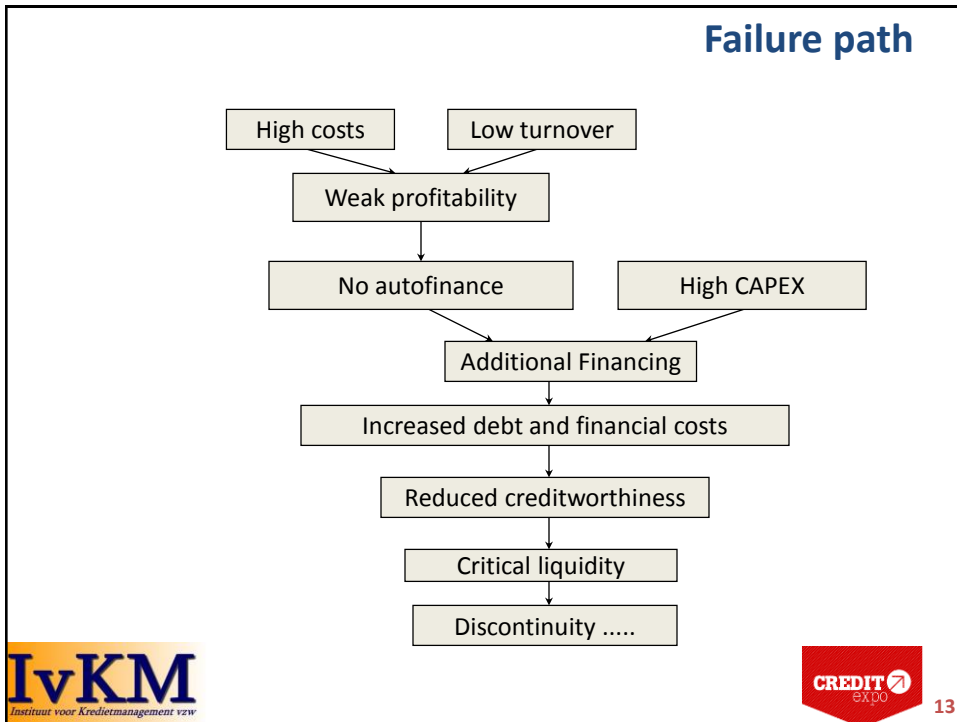
➔ Emphasis on Probability of default

Traditional techniques :
linear models : Altman and others
Logit models
Other techniques

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Failure path

```
┌────────────┐   ┌────────────┐
│ High costs │   │ Low turnover│
└────────────┘   └────────────┘
        │             │
        └──────┬──────┘
      ┌─────────────────┐
      │ Weak profitability│
      └─────────────────┘
              │
    ┌──────────────┐        ┌────────────┐
    │ No autofinance│        │ High CAPEX │
    └──────────────┘        └────────────┘
            │                     │
            └──────────┬──────────┘
        ┌─────────────────────┐
        │ Additional Financing │
        └─────────────────────┘
                  │
    ┌─────────────────────────────┐
    │ Increased debt and financial costs│
    └─────────────────────────────┘
                  │
        ┌─────────────────────┐
        │ Reduced creditworthiness│
        └─────────────────────┘
                  │
          ┌──────────────────┐
          │ Critical liquidity │
          └──────────────────┘
                  │
          ┌──────────────────┐
          │ Discontinuity ..... │
          └──────────────────┘
```

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Failure prediction

- First generation : linear models based on financial ratios

- ➔ Altman (1968)
  - $Z = 1.2\ X1 + 1.4\ X2 + 3.3\ X3 + 0.6\ X4 + 1.0\ X5$
  - X1 = Working capital / Total Assets
  - X2 = Retained earnings / Total Assets
  - X3 = EBIT / Total Assets
  - X4 = Equity / Total Liabilities
  - X5 = Sales / Total Assets

- Depends on availability and quality of financial data
- Same technique used in many new models

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	Actual situation	
Classification by model	Running	Default
Running	Correct n_{11}	Type I error n_{12}
Default	Type II error n_{21}	Correct n_{22}
Error rate running	$n_{21}/(n_{11}+n_{21})$	
Error rate default		$n_{12}/(n_{12}+n_{22})$

Total error rate = $(n_{21}+ n_{12})/(n_{11}+n_{21})$

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	Actual situation	
Classification by model	Running	Default
Running	98	2
Default	2	0
Error rate running	0	
Error rate default		2

Total error rate = 2 %

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Linear model

Score per ventile
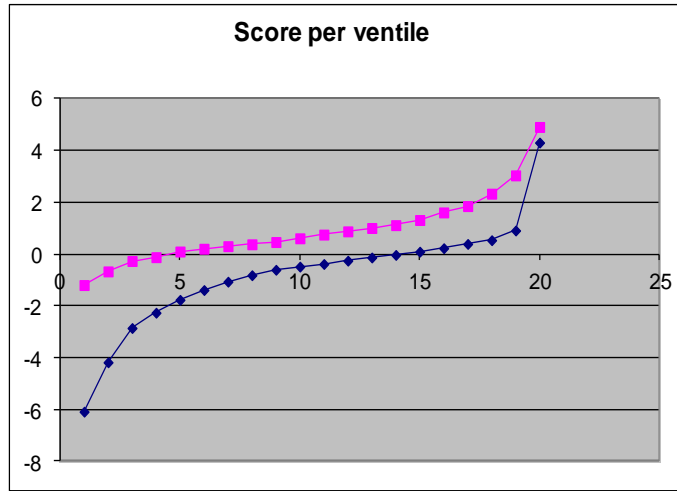
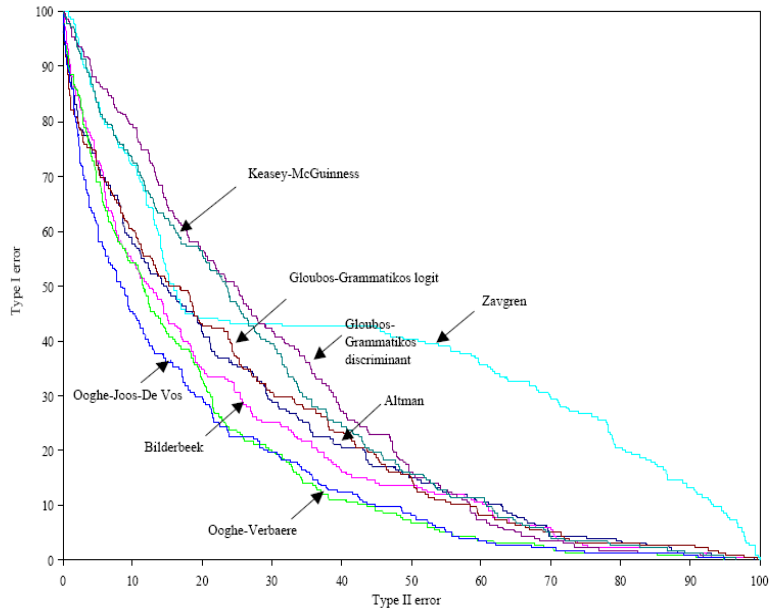Figure 1 : Trade-off function of a model
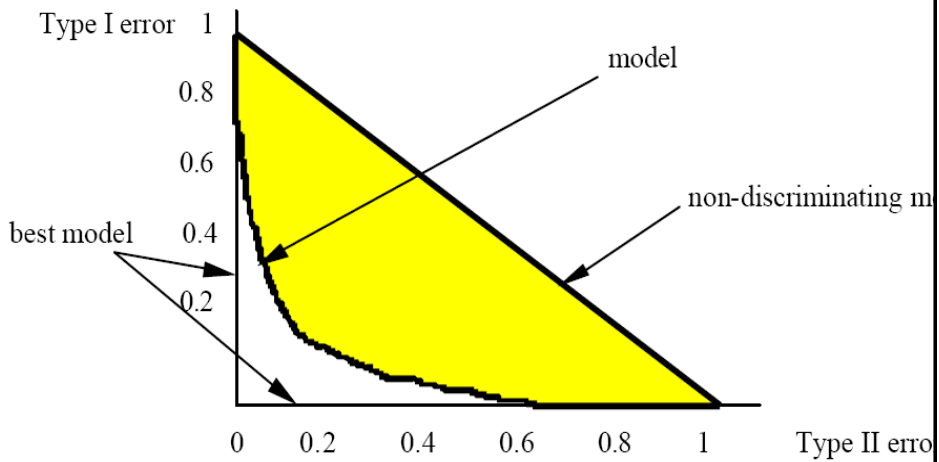
Figure 1 : Trade-off functions of the models 1 year prior to failure with their original coefficients

Logit model

Logit model :

$$\frac{1}{1 + e^{-(b_0 + B_1X_1 + b_2X_2 + \ldots + b_nX_n)}}$$

Less restrictive on variable selection

Comparable results

New models of this kind are developed

20

Expert system

- Purpose : translate expert knowledge and experience in a decision model

- Concept : the more experienced, the higher the expert level
  - the better the decisions
  - the higher the competence and the authority
  - the higher the amounts they can decide on

- Credit decision is a personal decision- sometimes a credit committee

- Some 'minor' Problems
  - Errors in the decision process are built into the model
  - Inconsistent decisions between different experts
  - Knowledge extraction is extremely difficult (and expensive)
  - Programming

- Advantages
  - Considers corporate culture and strategy (if any…)
  - Valuable knowledge of the expert is made available
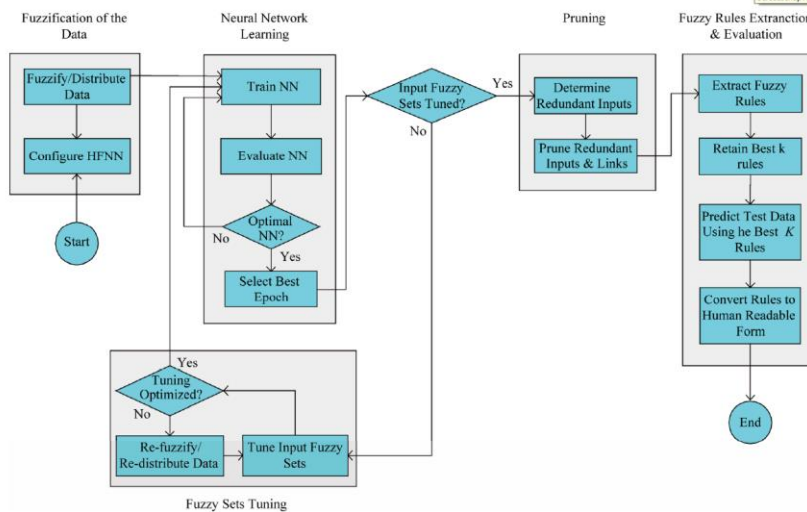
Fuzzy Logic Model

Figure 1. Architecture of the learning stage of the HFNN model.

Markov chains

Markov for discrimination –(biology) : transition between possible situations

$$R^{+} = \begin{matrix} & & X_t \\ & X_{t-1} & 1 & 2 & 3 \\ & 1 & \begin{bmatrix} 0.30 & 0.60 & \boxed{0.10} \\ 0.40 & \boxed{0.45} & 0.15 \\ 0.20 & \boxed{0.10} & 0.70 \end{bmatrix} \\ & 2 & \\ & 3 & \end{matrix} \qquad R^{-} = \begin{matrix} & & X_t \\ & X_{t-1} & 1 & 2 & 3 \\ & 1 & \begin{bmatrix} 0.05 & 0.70 & \boxed{0.25} \\ 0.20 & \boxed{0.35} & 0.45 \\ 0.10 & \boxed{0.40} & 0.50 \end{bmatrix} \\ & 2 & \\ & 3 & \end{matrix}$$

$$S(x) = \log \frac{P(x \mid population+)}{P(x \mid population-)}$$

S(1 → 3 → 2 → 2) =
   log (0.1/0.25) + log (0.1/0.4) + log(0.45/0.35) = - 0.08909

Probability of default' is 0.8909 smalller than probability of healthy

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Markov chains

Longitudinal character

Simple scores

Good explanation of the results

However : development is very difficult
   industry related?
          → standardisation per industry: (r – mean(R)) / std R
   eliminate incomplete /inconsistent transition tracks
   discretisation of ratio's : equal frequency binning
          optimal number of bins ? To be determined using logistic regression

Results: promising ……..

Impact of credit crisis

- Obvious impact on payment behaviour

- Credit crunch affected bank loans

- Impact on trade credit : supply decreased, demand increased !

- Both A/R and A/P decreased as % of total assets

- Companies relying more on short term debt in pre-crisis had more severe reduction on both sides

- Confirmation of redistribution theory – although less than pre-crisis

- Negative impact on profitability – less for companies that increased trade receivables

Resarch Ghent University 2012

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Trade credit relations for SME

- Trade credit is extremely important
- Some knowledge on extent (quantitative), few on reasons of granting credit and of payment behaviour (qualitative)
- Trade credit : complex relationship, so also complexity in reasons of late payments
- Size matters : is an important element in payment behaviour, but not the only one
- Need of reconfiguration of business relationships: explicit definition / identification of credit behaviour, customer base, credit policy and place of credit management in the organisation

➔ how to engage with customers and suppliers
➔ need of professional credit management – education !

ACCA Research Salima Paul, UK 2012

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Credit management research

- Academic research is mainly quantitative

- Qualitative elements can be very important

- Some qualitative research covered by commercial partners / industry

- Mostly very relevant and close to reality, but noinsight or guarantee on methodological aspects

- Joining forces would be a good idea ......

Thank you

for your attention

ludo.theunissen@ivkm.be