Credit Scoring, Modelling and Data Issues
What should scoring do?

RETAIL CREDIT RISK:
an overarching concept for credit professionals

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SCOREPLUS

www.scoreplus.com

BBA Retail Credit Management Update
Credit Scoring, Modelling and Data
Structure of Presentation

Scoreplus

Data

Profit

Decisions

Organisation

Portfolio

Scoring
What is Scoreplus?

Rigorous credit management
- analytic base
- practical approach

Analysis
- Scorecards
- Response Models
- Financial Models

Consulting
- Review internal analysis
- Strategy development
- Credit policy

Software
- Call Centre management
- Portfolio forecasting

Training
- Scoring management
- Scorecard development
- Behavioural scoring

Clients
- Barclays Bank
- Royal Bank Card Services
- First USA
- Stannic Bank
- Abbey National
- .......

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Scores structure data

Scores do not add new data - they structure existing data
Focus on one aspect of customer behaviour
- e.g. risk at account opening, or probability of mailing response
Give numerical estimate of expected behaviour
Score-Probability relationship

Score-Probability relationship

Pr(Bad)

0% 1% 2% 3% 4%

Score

Pr(Bad) Actual
Pr(Bad) Fitted

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GIGO: Garbage In - Garbage Out

- Scores can only structure data - not add information
  - scoring can only work if data are adequate to decision
- Quality of data determines value of score
  - corrupted data will lead to less power
- Example: Small business account opening score

<table>
<thead>
<tr>
<th>Data Source</th>
<th>Discrimination (Information Value Contribution)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application data</td>
<td>23%</td>
</tr>
<tr>
<td>Business Account History</td>
<td>37%</td>
</tr>
<tr>
<td>Personal Account History</td>
<td>17%</td>
</tr>
<tr>
<td>Business Credit Bureau</td>
<td>11%</td>
</tr>
<tr>
<td>Personal Credit Bureau</td>
<td>12%</td>
</tr>
<tr>
<td></td>
<td>100%</td>
</tr>
</tbody>
</table>
Do third party data matter?

- Example 1 - Customer Level Behavioural Score
  - Bank account history available -> powerful discrimination
  - Bad rate without 3rd party data: 5.50%
  - Bad rate with 3rd party data: 5.38% (2% loss reduction)
  - Conclusion: - marginal use on these customers

- Example 2 - Mail Order New Customer Score
  - Little information on applications -> heavily dependent on CRA
  - Bad rate without 3rd party data: 14.0%
  - Bad rate with 3rd party data: 12.8% (9% loss reduction)
  - Conclusion: - major impact
    - restrictions reinforce value of existing customer info
    - restrictions raise barriers to entry into market
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Scoring and Profit: Credit card example

- Total portfolio profit: £100m
  - Top 6%: +£100m
  - Next 24%: +£50m
  - Bottom 70%: -£50m

- Profit profile:
  - revolver
  - balance transfer
  - high balance
  - credit insurance
  - delinquent
  - BUT NOT CREDIT LOSS

High Profit ≠ Low Risk
Why is profit modelling difficult?

- **Profit depends on conflicting types of behaviour**
  - Activity (Level of Turnover)
  - Borrower/Transactor
  - Risk

- **Trade-off depends on financial parameters**
  - Interest rates and funding cost
  - Product structure - e.g. late fees, utilisation incentives
  - Operating costs - e.g. collections costs
  - Credit insurance income and costs

- **Profit depends on accounting conventions**
  - Allocation of overheads
  - Timely identification of provision
  - Need different conventions for different purposes
How to model profit ... the 4Rs

- Scoring models to estimate key dimensions of customer behaviour
- Financial model to trade-off the 4Rs
- Time dimension
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Goal is to select lender actions to maximise (long-term) profit
- Linkage between lender actions and profit is complex
- Need to assess customer potential under different actions
Solution: Action-specific scores

- Model 1: collection action: Score 1
  - No action

- Model 1: collection action: Score 2

- Model 3: collection action: Score 3

- Model 4: collection action: Score 4

Build four score models to test outcomes
### Who-to-call example

<table>
<thead>
<tr>
<th>Account</th>
<th>Probability of Payment With a Collection Call</th>
<th>Probability of Payment With no Collection Call</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. 1</td>
<td>20%</td>
<td>18%</td>
</tr>
<tr>
<td>No. 2</td>
<td>25%</td>
<td>5%</td>
</tr>
<tr>
<td>No. 3</td>
<td>30%</td>
<td>15%</td>
</tr>
</tbody>
</table>

![Symbol](image) vs ![Symbol](image)
Decision making: Action-specific scores

- Scores estimate customer behaviour
  - GIVEN LENDER ACTION
- Actions vary change customer treatment
  - collections action
  - lower interest rate
  - credit limit
- Estimate potential profit under different actions
  - FOR EACH INDIVIDUAL CUSTOMER
- Take action which maximises value of customer

Adapt treatment for each individual
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## Scores and Capital Adequacy

<table>
<thead>
<tr>
<th></th>
<th>Balance</th>
<th>Pr(Bad) (from Score)</th>
<th>Expected Loss</th>
<th>Value at Risk (97.5% level)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smith</td>
<td>£5,000</td>
<td>5%</td>
<td>£250</td>
<td>£2,386</td>
</tr>
<tr>
<td>Jones</td>
<td>£15,000</td>
<td>2%</td>
<td>£300</td>
<td>£4,416</td>
</tr>
<tr>
<td>Scallan</td>
<td>£8,000</td>
<td>1%</td>
<td>£80</td>
<td>£1,640</td>
</tr>
<tr>
<td>....</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Portfolio</td>
<td>£28,000</td>
<td>2.3%</td>
<td>£630</td>
<td>£8,442</td>
</tr>
</tbody>
</table>

- Scores translate into expected loss
- Variability of estimates help estimate Value at Risk
- Does not (currently) handle correlation between cases
- Does not look at systemic risk
Information culture:  
... the competitive difference

Increasing returns to effective management
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