Speed Reading:
Portfolio Tracking in a Recession

Conference paper
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Gerard Scallan - Scoreplus
gerard.scallan@scoreplus.com

Speed Reading:
Structure of Presentation

What happens in Recession?

Vintage Reports

Designing MI

Policy and Experiments

Using portfolio tracking in a recession
What happens in a recession?

- **New business**
  - Volume declines
  - Reduction in demand
  - Score profile improves

- **Account management**
  - Increased balances – bad risks
  - De-leveraging – especially good risks
  - Reduced appetite for credit
  - Average Balances go down

- **Pre-delinquency**
  - Deterioration in cure rates
  - More entries to collections
  - Drivers: unemployment
    - ... and underemployment
  - Interest rates remain low
  - Different from previous recessions
  - Certain parts of population unaffected
    - E.g. public sector

- **Collections**
  - Payments slow down
  - Slowest to come out

- **Recoveries**
  - Drivers: unemployment
  - ... and underemployment
  - Interest rates remain low
  - Deterioration in cure rates
  - More entries to collections
  - Drivers: unemployment
    - ... and underemployment
  - Interest rates remain low
  - Different from previous recessions
  - Certain parts of population unaffected
    - E.g. public sector

Portfolio mix in recession

- Earliest effect on unsecured loans
- Poor performance of consolidation loans
  - And re-financing
- Most serious on mortgages
  - But hits later in time
- Credit cards less affected
  - Balances grow on bads

Position for resilience
Management Actions

**Mitigate risks**

- **New business**
  - Price changes
  - Reduce marketing spend
  - Cut-offs
  - Sustainability of income
  - Change scorecards?

- **Account management**
  - More selective limit increases
  - Improve margins - selectively

- **Pre-delinquency**
  - Create priority relationships
  - Reduce limits on high risks
  - Assess longer-term prospects
  - Update LTV estimates

- **Collections**
  - Intensify early collections
  - Use payment plans
  - Consolidate onto mortgage

- **Recoveries**
  - Partial settlements
  - Bear the pain

Management Balance

**Limit losses <-> Preserve potential**

- **Portfolio Mix**
  - Grow margins to cover losses
  - Build customer loyalty
  - Position for recovery
  - Cheap to buy market share in recession

- **Design products to reduce volatility**
  - Fixed/variable rates
  - Link savings to future borrowing rights
  - Next challenge: inflation

**Key Competitive Factor: Speed of Corporate Response**
Scoring and Competition
... speed of response

**COMPETITIVE**
- INNOVATIVE
  - new products
  - delivery channels
- CONTROL
  - centralised
  - communication

**INDIVIDUAL**
- adapt to niches
- automated

**INFORMATION**
- analytic
- complete

**EFFICIENT**
- low cost delivery
- open to change

**RESPONSIVE**

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Speed Reading:
Structure of Presentation

- What happens in Recession?
- Vintage Reports
- Designing MI

Using portfolio tracking in a recession
### Actual Vintage Matrix: UK Recession 1990

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### Lifecycle Effect

**Overview of portfolio development**

**Distortion when portfolio is expanding/contracting**

**Dominant effect in delinquency**
### New Account Effect: Graphical representation

**How soon can you spot the difference?**

Change in recruitment: product, marketing, underwriting
Vintage Graph: 
Cohort representation

Hides lifecycle effect – highlights new account effects

Vintage Matrix Specifications

- Frequency: Monthly
  - Establish more detailed patterns than quarterly
- Bad Definition: Currently Arrears 2+
  - not “maximum delinquency” or Basel definitions
  - see improving trends faster
- Denominator: Accounts opened
  - Same across row – avoid distortions with closed accounts
- Rows: Open month x product type
  - E.g. Loan Purpose: Debt Consolidation, New Lending
- Design to get fastest, clearest feedback
  - KEY FOR MANAGEMENT DIRECTION
Vintage Index Matrix:  
Allows early comparisons

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Index number:  
delinquency rate in cell  
rate in reference period (with same exposure)  
e.g. 1990/Q3, 10 - 12 m exposure: 4.0%/4.1% = .96
Portfolio Effect – onset of recession

*Diagonal term*

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- Change in shape of lifecycle curve
- Vintage starts on one trajectory, moves to another
- Corresponds to change on observation date (diagonal)
- Due to economy, collections system, ....

*Most difficult to spot – key in recession*

Timely Policy Modification

*Index numbers give better focus*

**Lifecycle Curves**

**Index Numbers**

*Faster Response -> Competitive Edge*
Exit from Recession

Spot green shoots

- Recession duration
  - Example portfolio: 9 mos
  - 2 years on economic statistics
  - Consumer credit leads economy
- 1\textsuperscript{st} sign: improvement in applicant profile
  - \( K-S = 4\% \)
  - Average PD 6.4\% \( \rightarrow 6\% \)
- 2\textsuperscript{nd} sign: default rates < PDs
  - Default Rate = 3.8\%
- Collections: reacts more slowly
- Recoveries: reacts more slowly

**Leading Indicator: Population PD**

- Vintage matrix applications
  - Account openings
    - By open date and time on books:
      - Delinquency
      - Average balance
      - Cross-selling
      - Attrition
  - Collections
    - By date entered collections
    - Outcome in weeks
    - Cure rate
    - Balance growth
    - Transfers to recovery
  - Recoveries
    - By date entered
    - Cash recovered

**Management must be able to explain fluctuations**

Group reporting tool
**Collections Cure rates**

**Key performance indicator**

![Graph showing cure rate over months of entry to collections]

**Differences in performance visible 3-4 weeks after entry**

**Default Rate/Average PD at opening**

**Understand departures from expectations**

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*Explains most new account effects – e.g. scorecard cut-off*
Vintage relative to PD

*Actual vs. Expected*

Concentrates on incremental information – What is not in the budget?

**Vintage Matrix Projections**

*Key budgeting tool*

- “Fill in lower half of vintage matrix”
- Regression time series techniques
  - Scoreplus course “Financial Portfolio Modelling”
- Formalizes the monitoring of the budget
- Facilitates stress test

*Portfolio tracking <-> Portfolio Budget*
**Vintage Matrix Summary**

**Design Principles**
- Key structures
  - Lifecycle Effect
  - New Account Effect
  - Portfolio Effect
- Frequency: monthly
- Express default rate as % of average PD
- Vintage graph to track outcomes
  - Not lifecycle graph

**Best Practice Use**
- Discussed at monthly credit committee
- Used for review with Group
- Commentary required on all new account and portfolio effects
- Major changes can be spotted ~4 months after happening
- Leading indicator in recession
  - on entry
  - on exit

**Key report for executive management of portfolios**

---

**Speed Reading: Structure of Presentation**

- Speed Reading
- What happens in Recession?
- Vintage Reports
- Designing MI
- Policy and Experiments

**Using portfolio tracking in a recession**
Tracking Principles

- Actual vs. Expected
  - Match outcome vs. assumptions underlying policy
  - Assumptions correspond to budget
- Report Early (... and Often)
  - Timely policy modification
  - Speed of change is key to competitive positioning
  - Most changes can be identified within 4 months of occurrence

Understand Portfolio
- Develop conceptual picture of dynamics of portfolio

Evaluate policies
- not just scorecards

Reliability of Rating Tools
- Can we believe the numbers?
- Relevant information missing?

Regulatory Requirements
- By-product of good management practice

Tracking → Learning → Change

Actual vs. Expected Principle
Fundamental to policy management

- Policy is based on assumptions
- Are assumptions met?
  - Policy Environment
  - Policy Application
  - Subsequent Performance
- Are consequences what we expected?
- Adjust assumptions
  - e.g. PD-Default Rate relationship
- Change in policy
  - e.g. Acceptance cut-off
- Set expectations for future

Tracking must be used to be useful...
**Goal: Accelerate Policy Evolution**

- Example: Timeline from new lending policy
  - Jan 2007 - Loan solicitation policy for credit card holders
  - Mar 2007 - Response rate
  - Mar 2007 - Population profile
  - Jun 2007 - Balance Levels
  - Jun 2007 - Early delinquency
  - Jan 2008 - Revenue
  - Jun 2008 - Full delinquency
  - Dec 2008 - Attrition
  - Dec 2009 - Secured Loan Cross-sell

- 3 year full evaluation
  - But get intermediate feedback

---

**Early Outcome Measurement**

*Example: Gini Coefficient*

- Recession data
  - Accepts only – ignore rejects
- Strategy based on Gini = 36%
- Actual Gini at 17 m. = 32%
  - Based on 827 bads
- Significant deterioration in scorecard
  - Requires change in strategy
- Gini at 5 m. = 33%
  - Based on 136 bads
- Modify limit policy?
- Important features emerge fast

---

**Can credit risk move as fast as marketing?**

---

**Gini on Accepts**

---

**Faster reaction -> More appropriate policies -> More profit**
Portfolio Risk Overview
Do strategies meet profit goals?

- Analyse return by strategy
- Concentrate on marginal cases
- Reconcile to portfolio budget
- Concentrate on financials

Strategy trades-off risk and reward
- Keep strategies simple
- <= 20 nodes!

Example: Network Pricing Behaviour
Branch small business portfolio

Use tracking to understand portfolio drivers
Statistical Tests

**Why? What?**
- Fast results = small samples
- Small samples = Uncertainty
- Statistical tests quantify certainty
- Margin for error around expectations ...
  - Confidence intervals
- Conclusion:
  - Data inconsistent with assumption
  - Must change cutoff

Could the difference be random?

---

Can you believe your eyes?

---

Report Design Criteria

- PD – not score
  - If scores didn’t exist we wouldn’t bother inventing them
- Focus on financials
  - Marginal Cases
  - RAROC measurement
- Early performance benchmarks
- Policies are more important than rating tools
  - Need to make policy assumptions explicit
- Statistical Tests

**Information Design <— Structure of Policies**
Using portfolio tracking in a recession

Complexity: the enemy ...

The decision bush

Does complexity add value? Can you prove it?

Conference paper: Speed Reading © Scoreplus SARL 2009

134

135
Profit Pyramid:
Difficult to see the top!

... complex to measure effects of policies

What is a good policy?

- Based on portfolio analysis and experience
  - Discussed and analysed throughout business
- Quantified targets
- Measurable Results - Set standard for performance
- Coherent - Think through overall consequences

**Policy Elements**
- Sources of Business
- Recruitment Strategy
- Acceptance Cut-off
- Pricing
- Override Procedures

**Targets for Tracking**
- Population Profile
- Override Level
- Acceptance Rate
- Default Rate
- EVA/Contribution Level
- Attrition Rate

Keep it Simple!
Credit Policy: Example

Set scorecard cutoff for personal loans

**Inputs**
- Tracking Results
  - Population Profile
  - Actual vs. Expected PD
  - Scorecard Model Performance
  - Policy Rule Evaluation
- Economic Outlook
  - Interest Rates
  - Unemployment
- Market Analysis
  - Competitors
  - Product Ideas

**Outputs**
- Point in Time Assumptions
  - Reference PD
  - Scorecard Gini
- Operating Policies
  - Scorecard Cutoff
  - Pricing Policy
  - Lending Limits
  - Policy Rule changes
- Portfolio Budget
  - New Lending
  - Outstanding Balances
  - Expected Losses
  - Return on Capital
- Expected Tracking Results
  - See above

---

**Experiments**

**Basic idea**
- Treat randomly chosen customers differently
- Measure the effect on customer behaviour
- Quantify trade-offs
Original approach: horse race

1980s

- Champion: previous strategy - 80%
  - even if clearly inferior to new approach
- Challengers: new strategies - 20%
  - improve treatment for some customers
  - restrict treatment for others

**Wrong idea**

**Goal: Confirm existing ideas**

Why champion-challenger doesn’t work

*(most of the time)*

- Horse race is fixed
  - Know the winner ahead of time
  - Demonstrating the obvious
- Purpose of experiment badly defined
  - Many experiments have no defined end-point
- Testing too many things at once
- Sample badly chosen - too big/small
- Failed experiments give little information
- Successful experiments don’t help formulate next steps
  - One-shot approach

Champion-challenger has slowed change
Cost of Experiment: example

<table>
<thead>
<tr>
<th>Sample Size</th>
<th>Limit Increase</th>
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<tbody>
<tr>
<td>50,000</td>
<td>€1,000</td>
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<table>
<thead>
<tr>
<th></th>
<th>Goods</th>
<th>Bads</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bad Rate:</td>
<td>10%</td>
<td>5,000</td>
</tr>
<tr>
<td>Utilisation</td>
<td>3%</td>
<td>25%</td>
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<tr>
<td>Extra Balances</td>
<td>€1.35m</td>
<td>€1.25m</td>
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<tr>
<td>Margin</td>
<td>10%</td>
<td>-40%</td>
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<tr>
<td>Profit/Loss</td>
<td>€135k</td>
<td>-€500k</td>
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</table>

Overall Cost of Experiment = -€365k
= c. 8 analysts x 1 year

What return on this investment?

Better approach: horse breeding

- Systematically vary treatment
- Understand how customers react to different policy
- No single policy will be a winner for everyone:
  - identify customers for whom a given policy is most profitable
- “Cross” policies to create a champion
  - takes time to find best policy

Experiments buy information – to add value to portfolio
Measuring Results of Experiments

**Maximum Limit utilisation**

<table>
<thead>
<tr>
<th>PD</th>
<th>&lt; 30%</th>
<th>30 – 59%</th>
<th>60 – 94%</th>
<th>95% +</th>
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<tbody>
<tr>
<td>8% +</td>
<td>-5%</td>
<td>-15%</td>
<td>-21%</td>
<td>-24%</td>
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<td>+5%</td>
<td>-6%</td>
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<td>+12%</td>
<td>+17%</td>
<td>+19%</td>
</tr>
<tr>
<td>&lt; 2%</td>
<td>+0%</td>
<td>+1%</td>
<td>+3%</td>
<td>+5%</td>
</tr>
</tbody>
</table>

- Measures difference in contribution after 9 months
  - limit increase vs. no limit increase
  - contribution = revenue – bad debt cost
- Evaluate for each cell – not on total population

**Build profit-maximising policies**

---

Experimental design

- **Champion:**
  - “best guess”
  - prudent
  - evolves with understanding

- **Control:**
  - freeze champion
  - for duration of test

- **Test:**
  - one dimension of policy
  - for all types of customers

- **Example: increase limits**
  - How does customer behaviour react to limit increase?
    - Balances
    - Delinquency
    - Attrition
Experimental design principles

- Analysis drives experiment
  - experiment is expensive
  - a last resort (when analysis can’t give result)
- Most experiments should fail
  - "obviously" good ideas don’t need experiment
- Maximum information for minimal exposure
  - keep test groups as small as possible
- Fixed time scale
  - Define end of experiment before start
- Unanalysed experiments deliver no value
  - think through analysis before starting test
- Experiments should be part of an ongoing process
  - Not a one-off idea ...

Experiments are a means, not an end

Past vs. Future
Management Process

Past
- Model Focus
- Rank-ordering of risk
  - Score only
- Number of cases
- Scores
- Measure total portfolio
- Once-off Experiments
- Sophistication = Complexity

Future
- Portfolio and Policy Focus
- Accuracy of Estimates
  - PD and other
- Financials – Return on Capital
- PD, EL (and EAD, LGD)
- Concentrate on marginal cases
- Systematic ongoing testing
- Sophistication = Simplicity

Technical Feedback -> Management Feedback
Leveraging the Feedback Loop

Information: the key to competitive positioning