Scoring for Microfinance

Mark Schreiner

(c) 2004

Microfinance Risk Management

http://www.microfinance.com

June 18, 2004

Microenterprise Development Institute, New Hampshire

Agenda

- **What is scoring?**

- **Scorecards**

- **Use of scoring**

- **Benefits and costs**

- **Steps in a scoring project**

What is scoring?

- **Scoring forecasts risk based on historical links between risk and characteristics**
  - **Example risk definition: Arrears >30 days**
  - **Example characteristics:**
    - **Borrower (Age, type of business)**
    - **Loan (Amount of loan, # installments)**
    - **Lender (Branch, loan officer)**
- **Forecasts % chance (like weather forecast)**

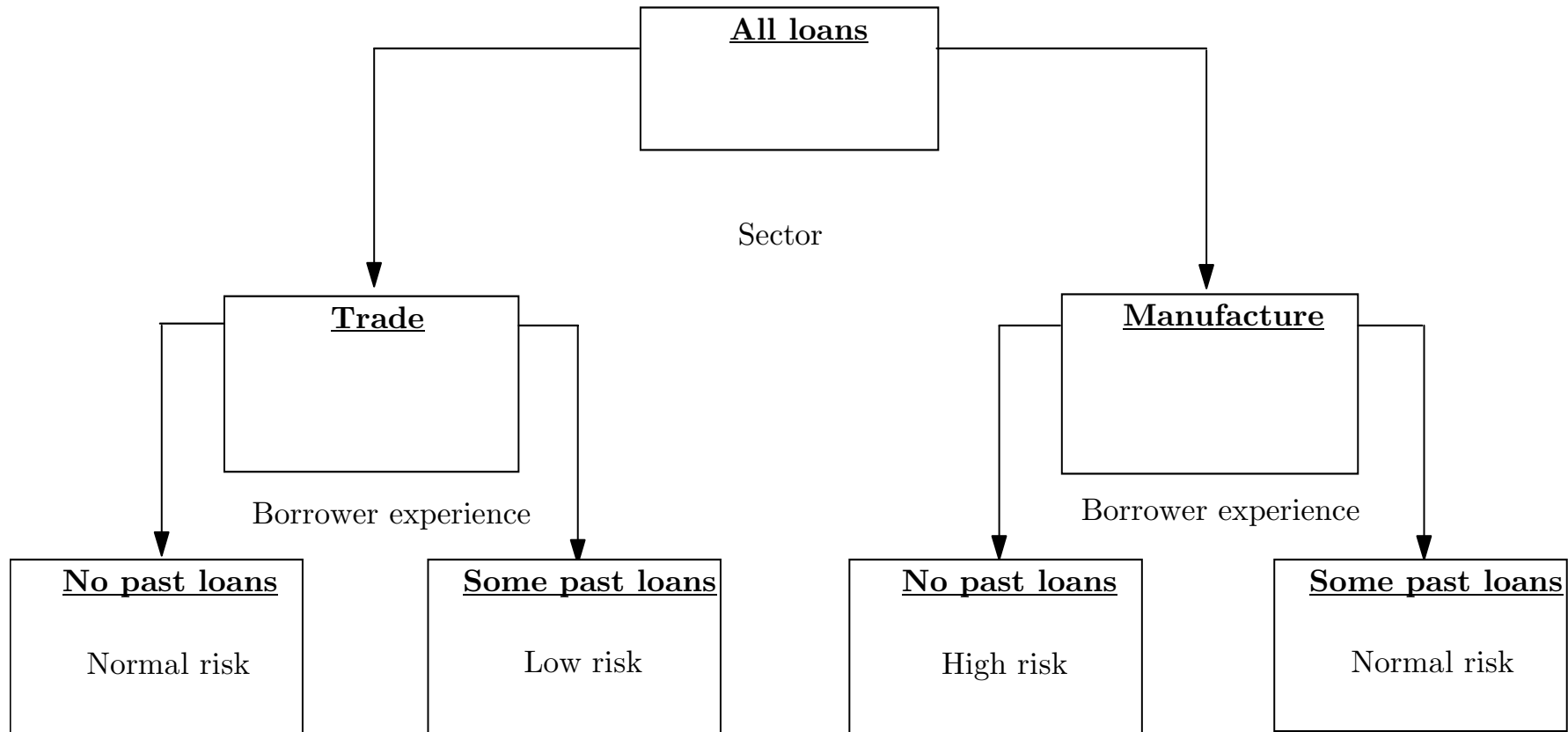˄ **Scoring links risk with characteristics.**

What is scoring? (cont.)

- **Scoring assumes that cases approved today will behave like cases approved in the past with similar characteristics**

- **Example: In the past, 10% of taxi drivers had arrears >30 days. Risk forecast for a loan approved today to a taxi driver is 10%**

- **Scoring does not replace loan officers nor joint-liability groups; it is an additional tool, a third voice in the credit committee**
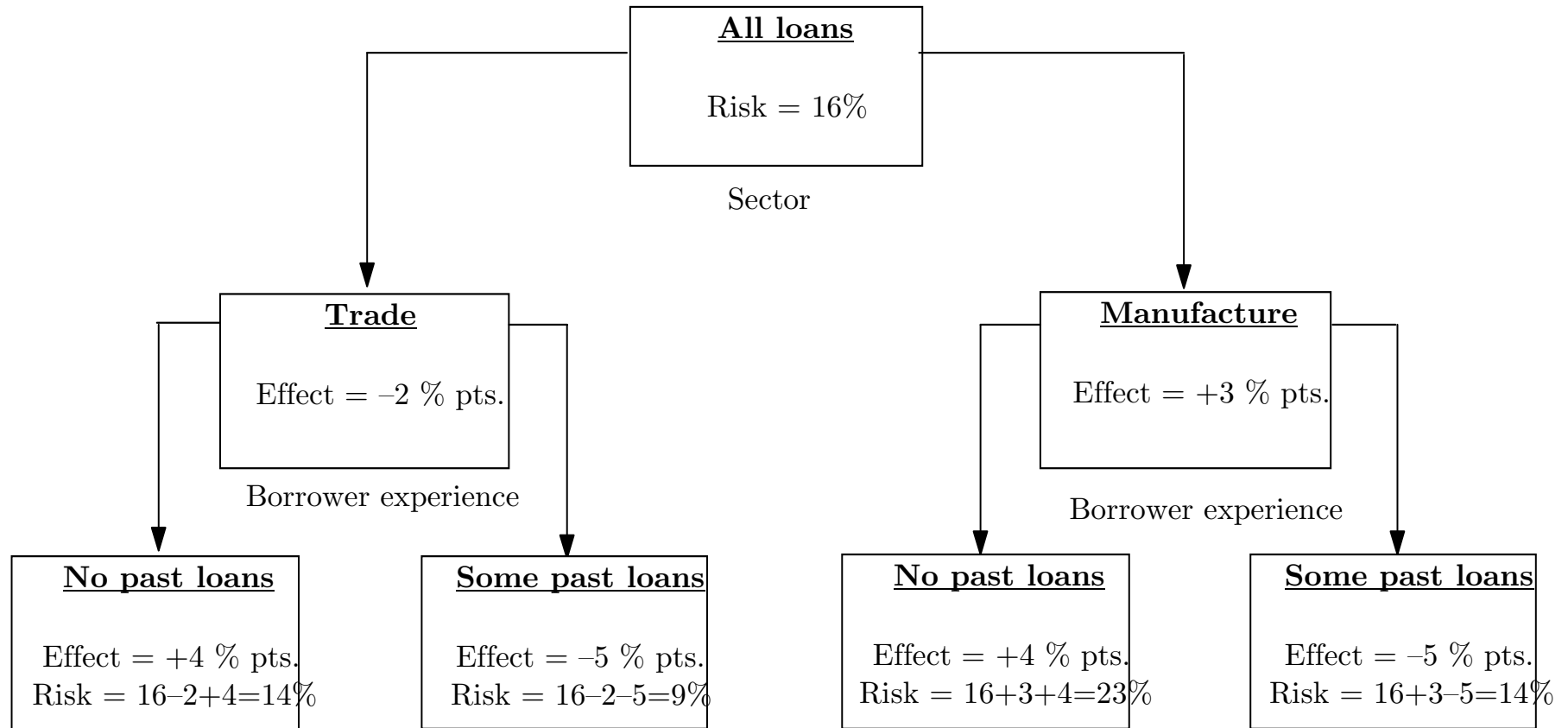
Scorecards

- **Trees**
  - **— Unweighted**
  - **— Judgment-weighted**
  - **— Data-weighted**

- **Formula**
  - **— Judgment-weighted**
  - **— Data-weighted**

Unweighted trees

```
                              ┌─────────────┐
                              │  All loans  │
                              │             │
                              └─────────────┘
                     ┌──────────────┴──────────────┐
                            Sector
         ┌─────────────┐                    ┌─────────────┐
         │    Trade    │                    │ Manufacture │
         │             │                    │             │
         └─────────────┘                    └─────────────┘
      ┌────────┴────────┐               ┌────────┴────────┐
   Borrower experience             Borrower experience
```

No past loans	Some past loans	No past loans	Some past loans
Normal risk	Low risk	High risk	Normal risk

- **"More" or "less" risk, not % risk**
- **May be inaccurate**

Judgment-weighted trees

All loans

Risk = 16%

Sector

Trade

Effect = –2 % pts.

Manufacture

Effect = +3 % pts.

Borrower experience

Borrower experience

No past loans

Effect = +4 % pts.
Risk = 16–2+4=14%

Some past loans

Effect = –5 % pts.
Risk = 16–2–5=9%

No past loans

Effect = +4 % pts.
Risk = 16+3+4=23%

Some past loans

Effect = –5 % pts.
Risk = 16+3–5=14%

- **Forecasts risk as % chance**
- **May not be very accurate**

Data-weighted trees

All loans
Bads / All cases
= 31,964 / 200,181
= 16.0%

Sector

Trade
Bads / All paid-offs
= 17,294 / 123,999
= 13.9%

New
Bads / All paid-offs
= 14,670 / 76,182
= 19.3%

Borrower experience

Borrower experience

No past loans
Bads / All paid-offs
= 5,868 / 34,753
= 16.9%

Some past loans
Bads / All paid-offs
= 11,426 / 89,246
= 12.8%

No past loans
Bads / All paid-offs
= 5,316 / 23,787
= 22.3%

Some past loans
Bads / All paid-offs
= 9,354 / 52,395
= 17.9%
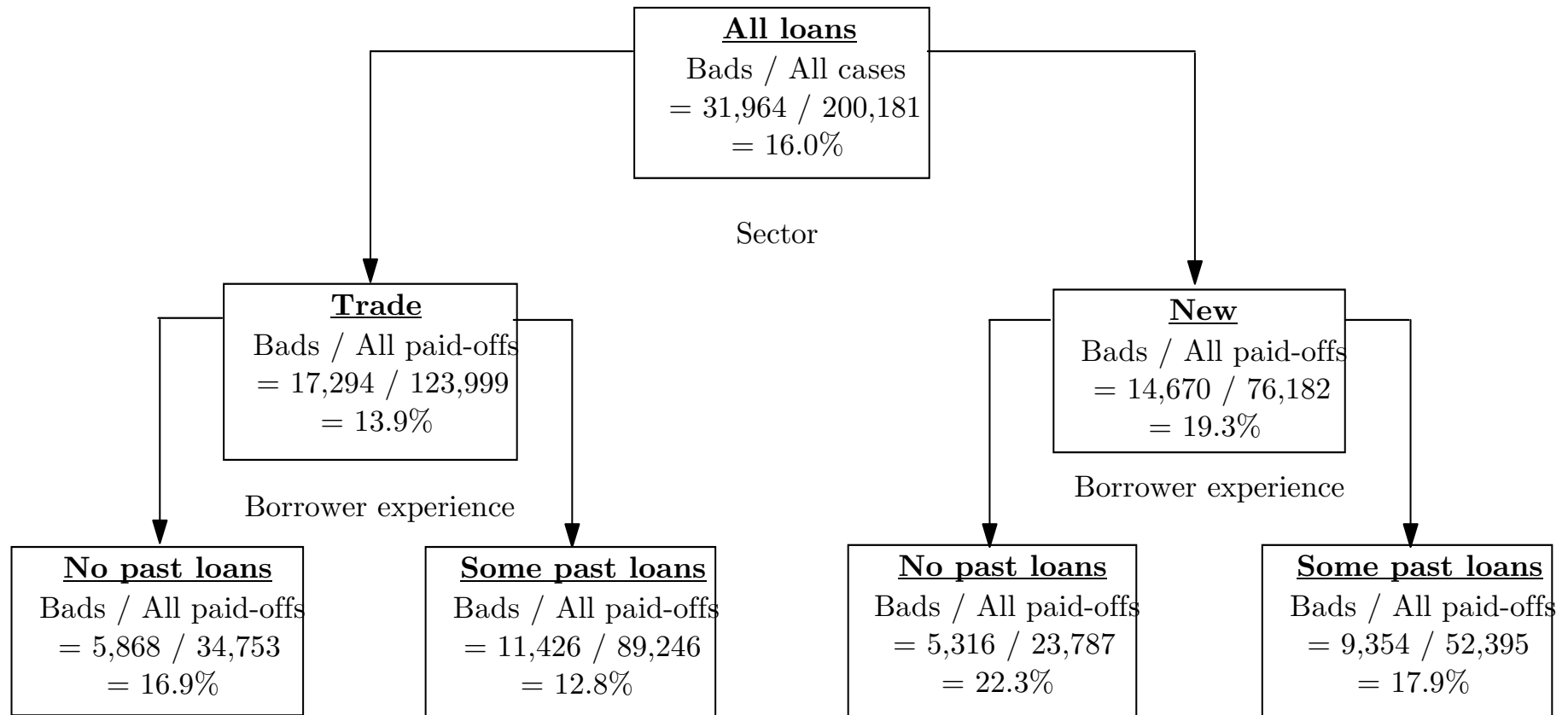
- **Forecasts risk as % chance**
- **Most accurate type of tree scorecard**

Page 8, "Scoring for Microfinance", M. Schreiner

Formula scorecard

Forecast   = 0.16 x 'Basic risk'

+ 0.05 x Manufacturer

– 0.02 x Years in business

+ 0.01 x Days late last loan

- **'Manufacturer'=1 if manufacturer, 0 if not**
- **Weights based on judgment or on data**
- **Characteristics and weights in the formula vary by lender; one size does not fit all**

Example 1: Formula risk forecast

= 0.16 x 1   (Basic risk)

+ 0.05 x 0   (Retailer)

– 0.02 x 5   (5 years in business)

+ 0.01 x 0   (No arrears last loan)

= 0.06   = Forecast risk of 6%

Example 2: Formula risk forecast

= 0.16 x 1   (Basic risk)

+ 0.05 x 1   (Manufacturer)

− 0.02 x 1   (1 year in business)

+ 0.01 x 5   (5 days late last loan)

= 0.24   = Forecast risk of 24%

Example link, risk and borrower age
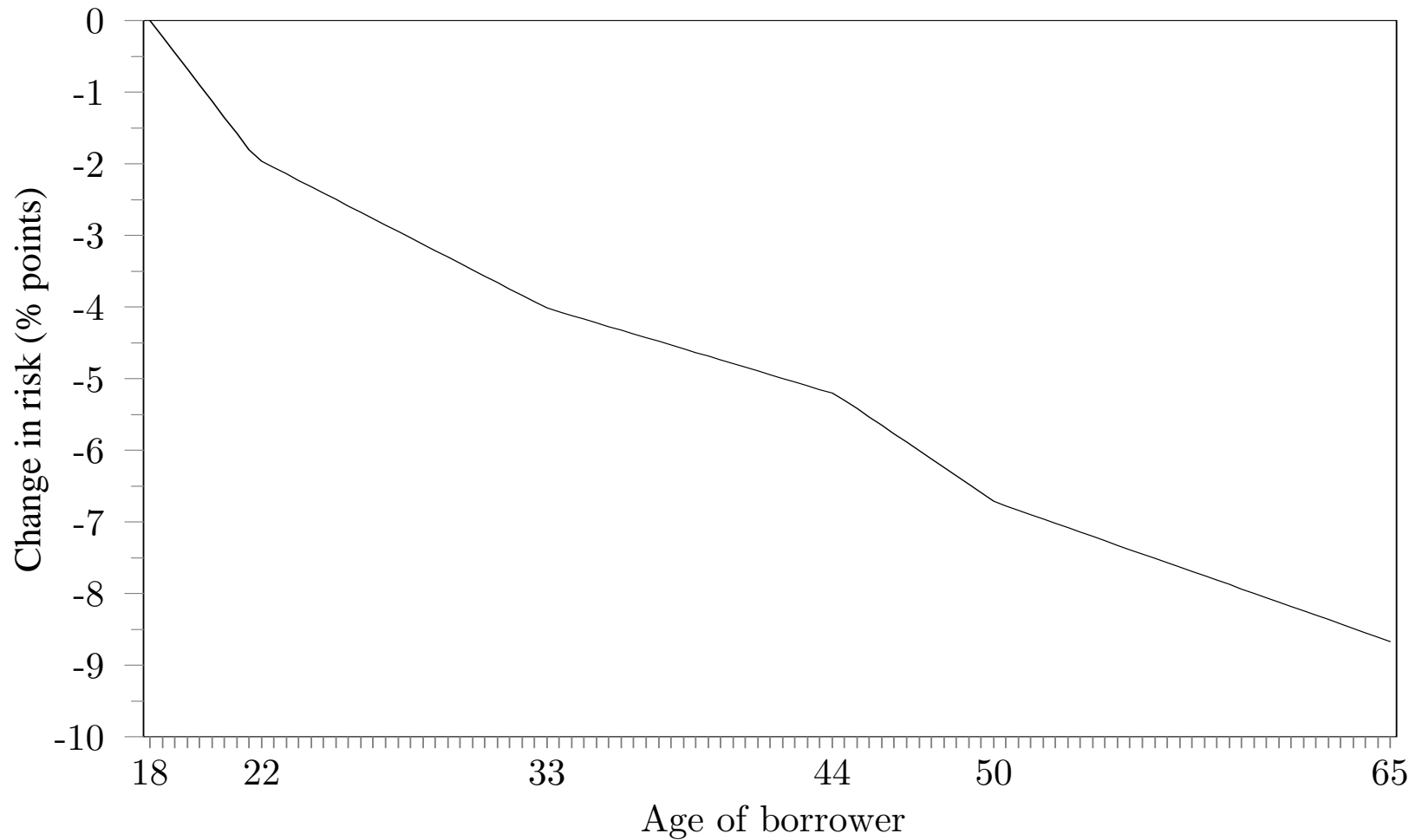
Worst spell of arrears, last three loans

Page 13, "Scoring for Microfinance", M. Schreiner
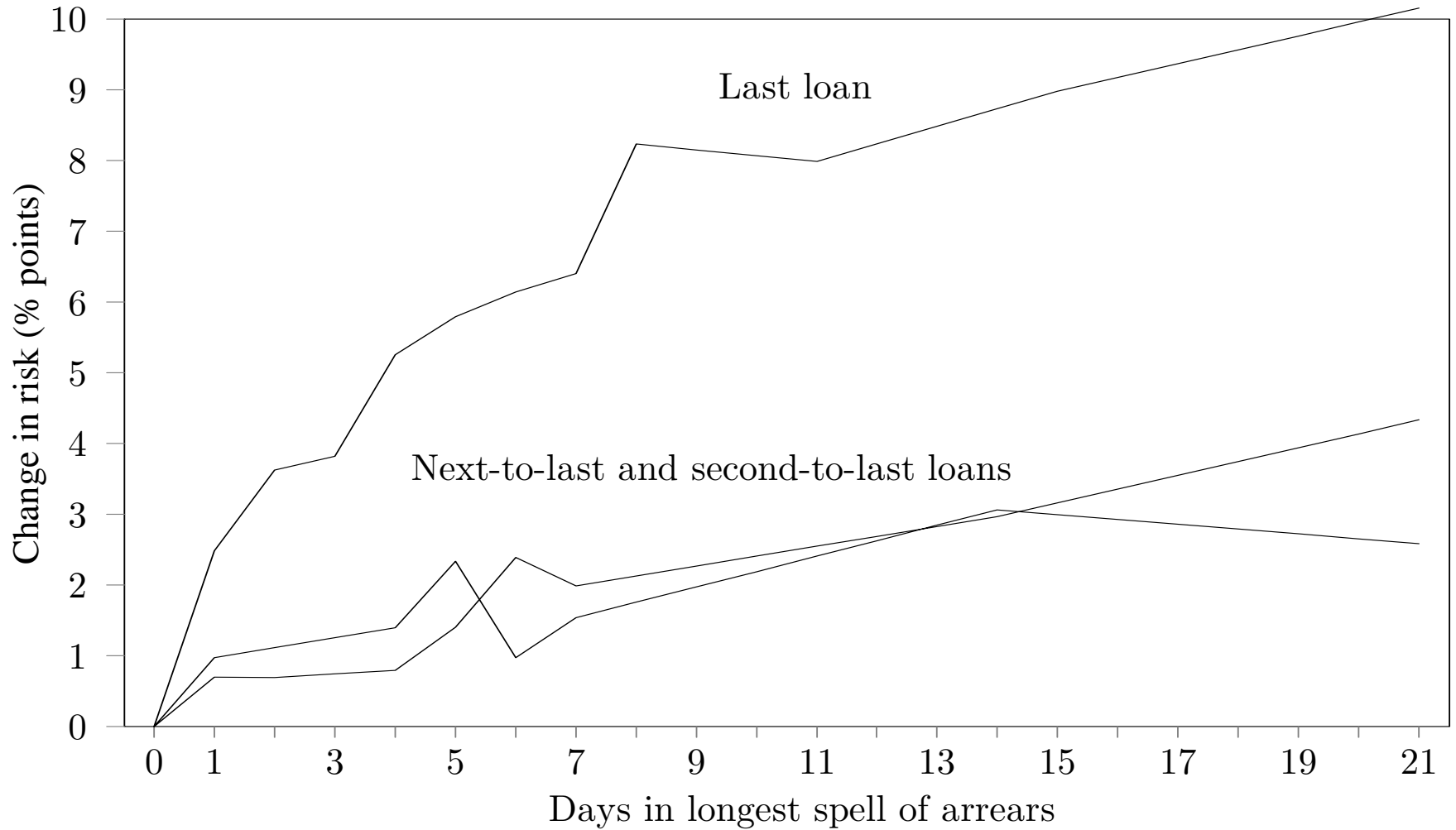
Type of business

Business	Weight (%pts.)
Taxi	–3.6
Corner store	–2.1
Fried street food	–1.2
Others	0
Beauty salon	+0.5
Clothesmaking	+1.4
Farming	+1.7
Construction	+2.3
Carpentry	+4.0

Which type of scorecard is best?

Criteria	Tree	Formula
Acceptance by users	+	–
Ease of implementation	+	–
Robust to "dirty data"	+	–
Requires external consultant	+	–
Integration in MIS	=	=
Predictive power	–	+

Trees are simpler, formulae predict better, so make your own tree, but use a formula if you can

Use of scoring

- **Evaluate application same as always**
- **After approval by traditional standards, look at risk forecast and apply 4 ranges of policy actions:**

| Range	Action
'Low-risk'	Reward
'Regular'	Disburse as always
'Risky'	Review and adjust
'High-risk'	Reject

How do managers set policy ranges?

- **'Dead' test (Dominican Republic)**
  - **— Define 'Bad' (*e.g.*, >60 days later)**
  - **— Build scorecard, cases 1/99 to 12/01**
  - **— Apply scorecard, cases 1/02 to 12/02**
  - **— Compare forecasts made before disbursement with risk realized after**
  - **— Check how scoring would have worked (and how it probably will work)**
- **Managers can test policies before use**

Risk forecast and realized, 'dead' test

Page 18, "Scoring for Microfinance", M. Schreiner
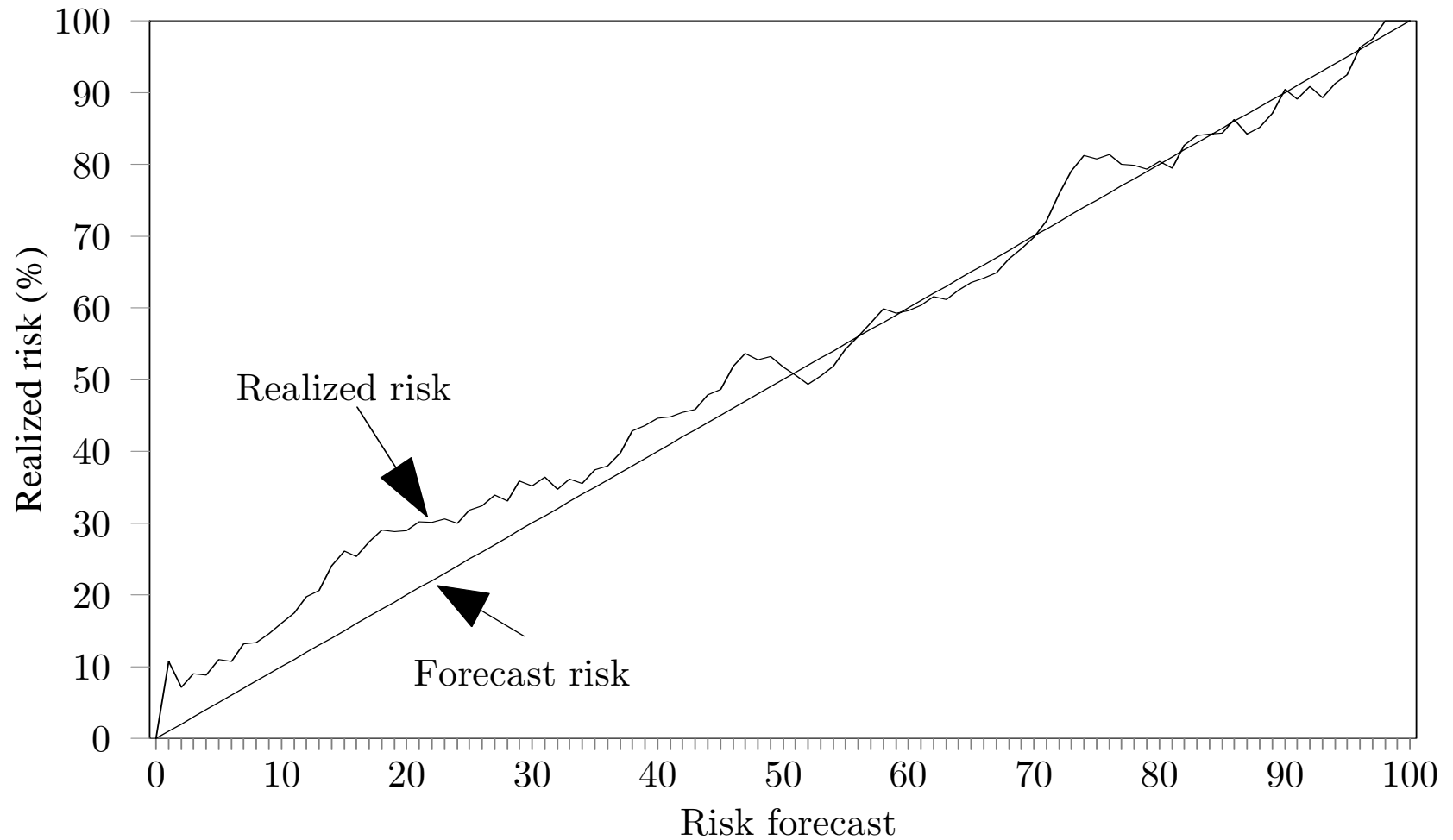
Effects on arrears and portfolio size

- **Policy**: Reject if risk forecast > 70%
  - — 'Goods' approved: 4,907 (97%)
  - — 'Bads' avoided: 794 (19%)
  - — 'Bads' approved: 3,367 (21%)
  - — 'Goods' lost: 164 (3%)
- **Sacrifice 1 'Good' to avoid 4.8 'Bads'?**
- **Shift time from chasing late payers to finding and lending to new clients?**
- **Test thresholds of 80%, 90%, etc.**

Effects on profits

- **Rejecting 'high-risk' cases means:**
  - **—Avoiding some 'Bads' (Benefit)**
  - **—Losing some 'Goods' (Cost)**
- **When is avoiding 1 'Bad' worth losing 1 'Good'? For example, suppose:**
  - **—Benefit of avoiding 1 'Bad' = $150**
  - **—Cost of losing 1 'Good'   = $150**
- **Effect on profits =   +$94,500 (794 'Bads' – 164 'Goods') x $150**

Summary: Use of scoring

- **Keep standard underwriting process; consult scoring only after provisional approval**
- **Scoring is a powerful tool, not a magic wand**
  - **Credit committee approves or rejects, not scoring**
  - **Exceptions OK (but don't let them become rules)**
  - **Track how overrides perform**
- **Use 'dead' test to set policy ranges; no need to guess effects on portfolio, arrears, and profits**
- **Constant, systematic performance tracking**
  - **Continuous tests and follow-up**
  - **Reports for branches and loan officers**

Benefits of scoring

- **Finance is risk management, and scoring facilitates risk management**
  - **— Quantifies risk as the % chance that something 'bad' will happen**
  - **— Makes risk evaluation explicit, consistent (not just loan officers' 'gut feeling')**
  - **— Quantifies risk's links w/ characteristics**
- **Better risk management ° More loans with same effort, deeper outreach, more market share, greater profits, more sustainable**

Benefits of scoring (cont.)

- **Focus evaluation where it counts:**
  - — **Reward 'low-risk' applicants**
  - — **Adjust contracts of 'risky' applicants**
  - — **Reject 'high-risk' applicants**
- **Manage risk after disbursement:**
  - — **'Preventive' visits to 'risky' clients**
  - — **Prioritize collections efforts**
    - ■ **Visit 'risky' clients after first day late**
    - ■ **Let 'low-risk' clients cure themselves**
- **Less time collecting° More time marketing**

Benefits of scoring (cont.)

- **Predictive power testable before use**
- **Facilitates portfolio management:**
  - **Precisely loosen/tighten credit policy**
  - **Foresee effects of new policies**
  - **Detect shifts in portfolio risk profile before crisis hits**

ˆ **Biggest benefit: Strengthen culture of explicit, conscious risk management**

Costs of scoring

- **Sharp organizational/cultural change:**
  - **Change is never easy**
  - **Power shifts from Credit to IT, and from loan officers to scorecards**
  - **Users must believe scoring works. To believe, they must understand. To understand, they require training, tests, and continuous follow-up**
- **Scoring must be integrated in the MIS**

Costs of scoring (cont.)

- **Loan officers, managers are key. Scoring:**
  - — **Does not approve nor reject**
  - — **Counts characteristics, ignores character**
  - — **Predicts risk, but does not manage risk**
  - — **Supposes the future will be like the past, but in fact everything changes (economy, competition, credit policy itself)**
  - — **Requires careful data collection**
  - — **Requires tracking overrides**
  - — **Requires a local 'Scoring Manager'**

Steps in a scoring project

1. Make sure you are ready

2. Define 'Bad'

3. Plan to improve data quality

4. Build scorecard

5. Integrate scoring in MIS

6. Pilot

7. Expand, monitor, maintain

1. Make sure you are ready

- **Efficient, stable lending technology? (Scoring won't do the hard work for you)**
- **Are MIS and data base adequate?**
- **Get upper management 'buy-in'?**
- **Manage like any large change project:**
  - **— Form a strategic plan**
  - **— Convene an Advisory Committee**
  - **— Involve leaders from Credit and IT**
  - **— Designate a local 'Scoring Manager'**
  - **— Build-in feedback processes**

2. Define 'Bad'

- **When do arrears become 'costly'?**
  - **— When do arrears preclude repeat loans?**
  - **— Read 'Credit Manual', but also talk with loan officers and examine incentives**
- **Choose a risk that policy can affect:**
  - **— Not borrower death**
  - **— Loans become unprofitable long before they become uncollectible**
- **Start simple, but think big**
- **Defining 'Bad' is useful even w/o scoring**
- **Estimate cost of 'bad' and benefit of 'good'**

3. Plan to improve data quality

- **If data weights are not possible at first, use judgmental weights and start to collect better data**
- **Minimize 'extra' work for loan officers**
- **Train loan officers and key-punchers:**
  - **—** *Why* **data matters**
  - **— Quality-control processes**
- **Take advantage of loan officers' '6th sense'**
- **Rationalize codes for 'type of business'**
- **Never throw data away!**

3. What data to collect? (cont.)

- **Date due and paid, each installment**
- **All aspects of loan contract**
- **Credit-bureau reports (in MIS)**
- **Loan officers' subjective judgments**
- **Aspects of type of business**
- **Saving behavior**
- **Aspects of borrower's residence and other assets**
- **Demographic characteristics**
- **Rough business financials**

4. Build scorecard

- **Make your own or hire consultant**
- **If possible, use data-based weights; otherwise, use judgment weights**
- **Ask users to review weights**
- **Whether trees or formulas with weights based on data or experience, *always cross-check w/'dead' tests***

5. Integrate scoring in the MIS

- **Goal**: Make scoring easy for users to use
  - — **MIS computes and displays forecast risk and realized risk in standard screens and reports already familiar to users**
    - ■ **Grafts scoring onto the daily routine**
    - ■ **Avoid 'extra' work for user**
  - — **Helps managers and loan officers to see:**
    - ■ **Scoring's predictive power (how well predicted risk matches realized risk)**
    - ■ **Why a case has high or low risk**

5. Ways to integrate in the MIS (cont.)

- **Buy a stand-alone package**
- **Integrate scoring system in MIS:**
  - **— Program from scratch**
  - **— Connect a purchased modular system**
- **Integration is better and more flexible**
  - **— Enter data once, not twice**
  - **— Integrate forecast in standard reports**
  - **— Automatic, instant, invisible to user**
  - **— Canned systems not for microfinance**

5. Integration in MIS (cont.)

- **If possible, customize modular system**
- **Scoring is not about IT but rather about Credit and Risk Management. First stages deal more with IT, so be sure to keep Credit Dept. in the loop**
- **When scoring projects fail, fault usually lies not with scorecards but with MIS integration and with training and follow-up with users**

6. Pilot

- **Management (with consultant) drafts 'Scoring Manual', sets policy ranges based on 'dead' test**
- **Train loan officers and branch managers**
  - **— Concepts of scoring, 'dead' and 'live' tests**
  - **— Risk forecasts in MIS screens and reports**
  - **— Affects on performance incentives**
- **Pilot in 2–3 branches for 6–12 months**
  - **— Hold hands on all cases for a few days**
  - **— Provide weekly (then monthly) follow-up**
  - **— Plan formal opportunities for feedback**

7. Expand, monitor, maintain

- **After feedback from users, adjust MIS implementation and 'Scoring Manual'**
- **Second round of training in branches**
  - **— Testimonials from pilot users**
  - **— Show fall in arrears, jump in profits**
- **Weekly follow-up (then monthly)**
  - **— Track overrides**
  - **— Constantly test predictive power**
  - **— Manage stubborn branches, officers**

Summary: Challenges of Scoring

- **Computers are simple; people are complex**
  - **— Users must trust that scoring works**
  - **— To trust, they must understand how it works**
  - **— To understand, they require training and constant demonstrations of predictive power**
- **Scoring is not a project but a process**
  - **— Profound changes to central tasks**
  - **— Integration in MIS**
- **Mistakes are costly**

- ***Training and follow-up are the keys***