BANCO CENTRAL DO BRASIL

Credit Scoring Conference - 2009

From default rates to default matrices: an application to Brazilian consumer credit

August 2009

Presentation short version

Ricardo Schechtman
Research Department
Central Bank of Brazil

ricardo.schechtman@bcb.gov.br

BANCO CENTRAL DO BRASIL

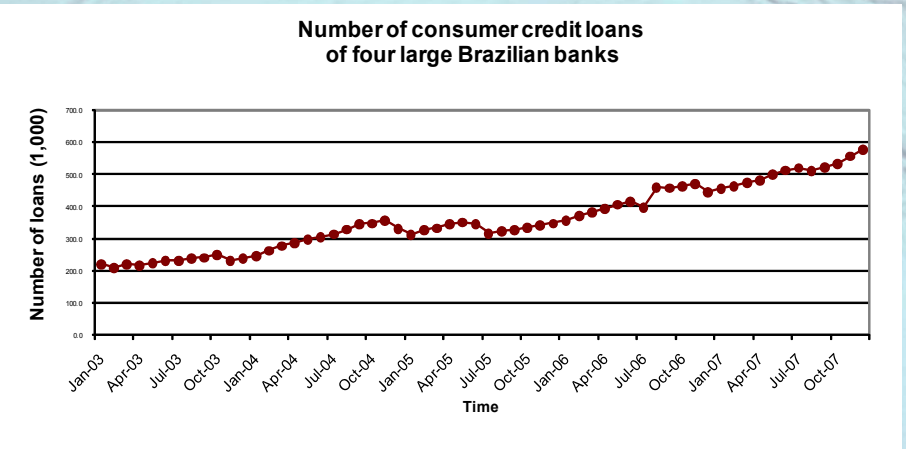
Introduction

- **Why is it important to measure and monitor credit delinquency ?**
  - To explain delinquency (e.g. relating to credit cycles)
  - It's a significant part of Brazilian bank credit spreads (c.f. BCB, 1999)
  - Related to the problem of PD estimation in internal models (Basel II)
  - Monitoring the financial stability of the system.
- **In Brazil during the last years:**
  - Economic expansion ⇒ Credit growth ⇒ **Delinquency ?**
  - Type of credit studied: **consumer credit**

Ricardo Schechtman – Research Department – Central Bank of Brazil

BANCO CENTRAL DO BRASIL

Consumer credit growth



BANCO CENTRAL DO BRASIL

Introduction

- **How to measure delinquency ?**
  - **Flow X Stock**
    - E.g. percentage of borrowers that default along a fixed time period X …that are defaulted in a particular point in time.
  - **Univariate X Multivariate**
    - E.g.: a single default criterion X various criteria.
    - **Default matrices** = transition probability matrices between different default criteria !

BANCO CENTRAL DO BRASIL

Introduction

- **Goal:** to measure delinquency in a multivariate flow form through transition matrices ⇒ complete picture
- Methodological aspects:
  - How our results differ from those found for rating agencies' matrices ?
  - Comparing different estimation methods in the case of default matrices.
- Policy aspects:
  - Comparison between different default severities.
  - Time evolution of Brazilian consumer credit delinquency.
  - Comparison between different banks.

BANCO CENTRAL DO BRASIL

Data

- Consumer credit loans active between January 2003 and January 2008
- Data drawn from the Brazilian Public Credit Register
  - Four large Brazilian banks
  - Small loans to individuals
- Default criteria based on reclassifications of regulatory classifications.
  - Classifications ≅ past-due ranges

Classification	A	AR	B	C	D	E	F	G	H
Arrears (days)	-	reneg.	15-30	31-60	61-90	91-120	121-150	151-180	>180 or written-off

BANCO CENTRAL DO BRASIL

Results: default matrices

- Multinomial estimate of bank 1 one-semester default matrix

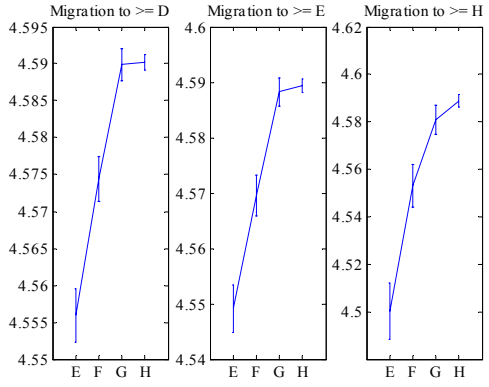
	A	AR	B	C	D	E	F	G	H
A	87,6	1,2	2,3	3,2	1,9	1,5	1,3	0,9	0,2
AR	22,4	46,6	0,5	1,4	3,7	3,0	3,2	2,4	16,8
B	34,6	1,3	18,7	11,4	5,7	4,7	4,5	16,0	3,2
C	23,2	3,0	2,8	12,2	6,0	4,5	4,1	6,0	38,3
D	5,6	3,1	1,0	2,6	4,0	2,9	3,4	3,5	74,0
E	1,7	1,5	0,6	1,1	0,6	1,7	1,5	1,3	90,1
F	1,0	1,3	0,2	0,5	0,5	0,4	0,7	0,5	94,9
G	0,4	0,7	0,2	0,2	0,2	0,3	0,0	0,4	97,6
H	0,3	1,1	0,1	0,1	0,1	0,0	0,0	0,0	98,4

- Some important migrations:
  - A $\Rightarrow$ A = 87,6%, A $\Rightarrow$ H = 0,2%, A $\Rightarrow$ >=E = 3,9%, A $\Rightarrow$ >=D = 5,8%

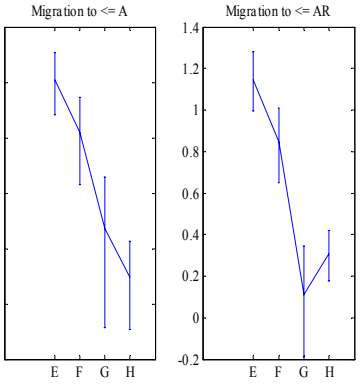
BANCO CENTRAL DO BRASIL

Results: default classifications

Worsening



Improvement

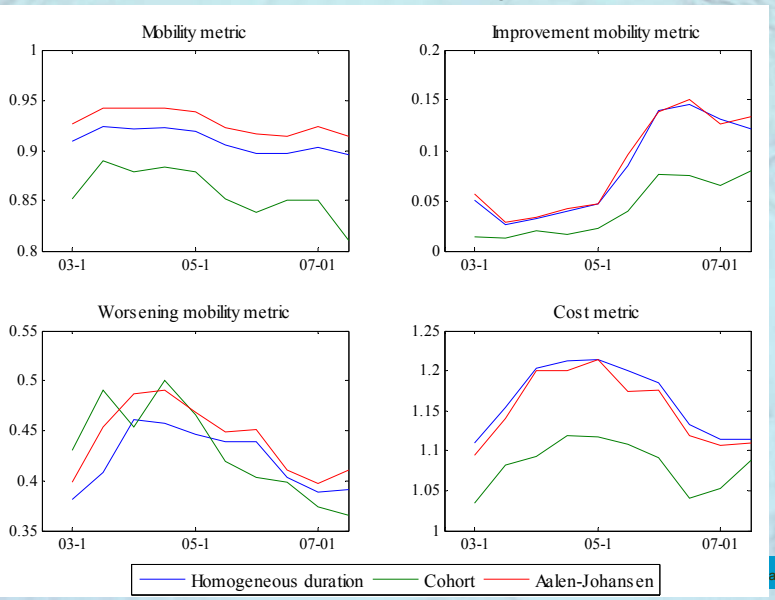


Results for bank 1, probabilities estimated by the multinomial estimator, analytical CIs based on the normal approximation to the binomial distribution, y-axes in log scale.

BANCO CENTRAL DO BRASIL

Results: comparison between estimation techniques

- Comparison between estimation techniques through metrics for bank 1



BANCO CENTRAL DO BRASIL

Results: static comparison between banks

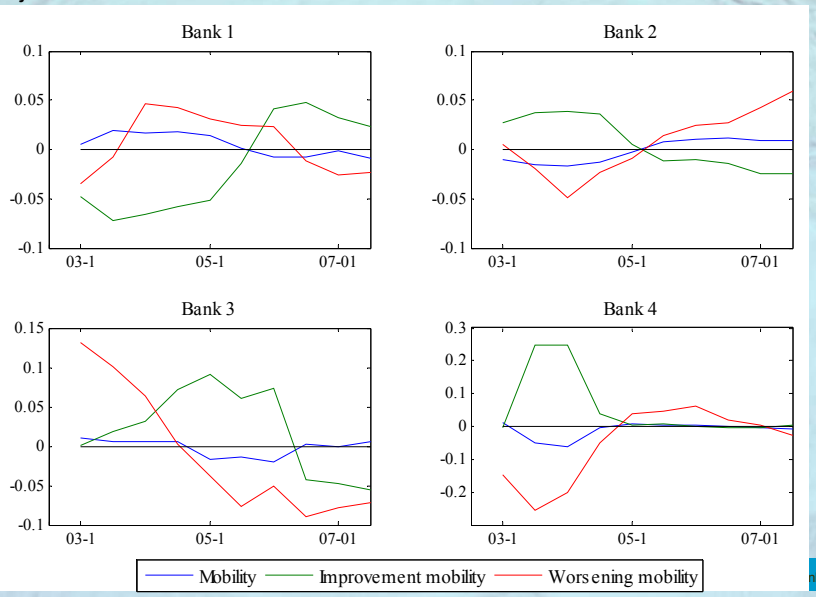
- Metric distances between banks' default matrices

		Bank 1	Bank 2	Bank 3	Bank 4
Mobility	Bank 1	-	-	-	-
	Bank 2	0,01	-	-	-
	Bank 3	0,04	0,05	-	-
	Bank 4	0,02	0,01	0,06	-
Improvement mobility	Bank 1	-	-	-	-
	Bank 2	0,03	-	-	-
	Bank 3	0,03	0,06	-	-
	Bank 4	0,06	0,02	0,08	-
Worsening mobility	Bank 1	-	-	-	-
	Bank 2	0,01	-	-	-
	Bank 3	0,07	0,08	-	-
	Bank 4	0,12	0,11	0,18	-
Cost metric	Bank 1	-	-	-	-
	Bank 2	0,03	-	-	-
	Bank 3	0,11	0,14	-	-
	Bank 4	0,15	0,12	0,26	-

BANCO CENTRAL DO BRASIL

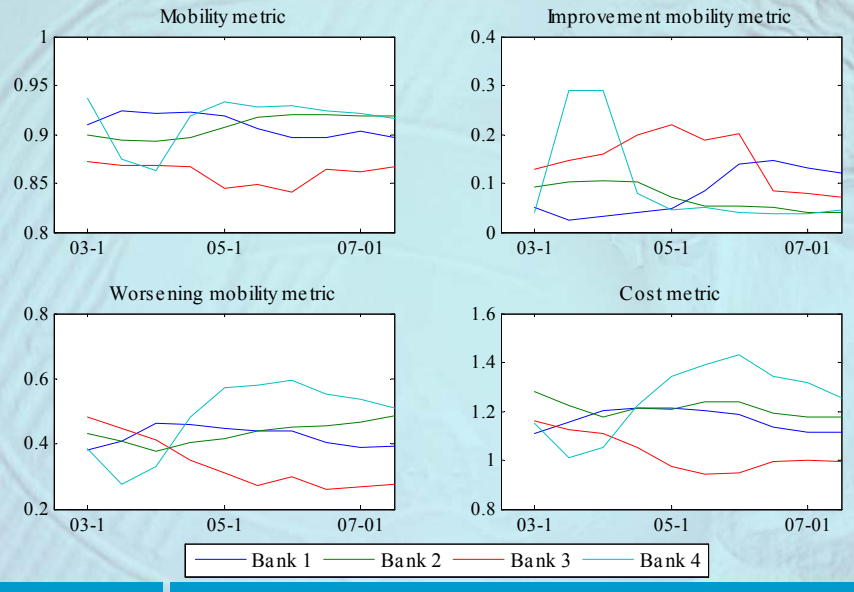
Results: dynamic comparison between banks

- Trajectories of banks' distances between semester-restricted and unrestric. matrices



BANCO CENTRAL DO BRASIL

Results: dynamic comparison between banks



BANCO CENTRAL DO BRASIL

Conclusion

- Main results:
  - Large time heterogeneity and among banks of consumer credit delinquency in 2003-2007.
  - Problematic risk discrimination between classifications related to high past-due ranges.
  - Within-semester homogeneity assumption in general less important than efficient gains of survival estimation.
  - Proposal of new metrics for comparing matrices: useful in static and dynamic comparison between banks.
  - Results produced, coupled with specific knowledge of the banks themselves, are important input to banking supervision.
- Thanks !