Money creation and financial instability – An agent-based credit network approach –

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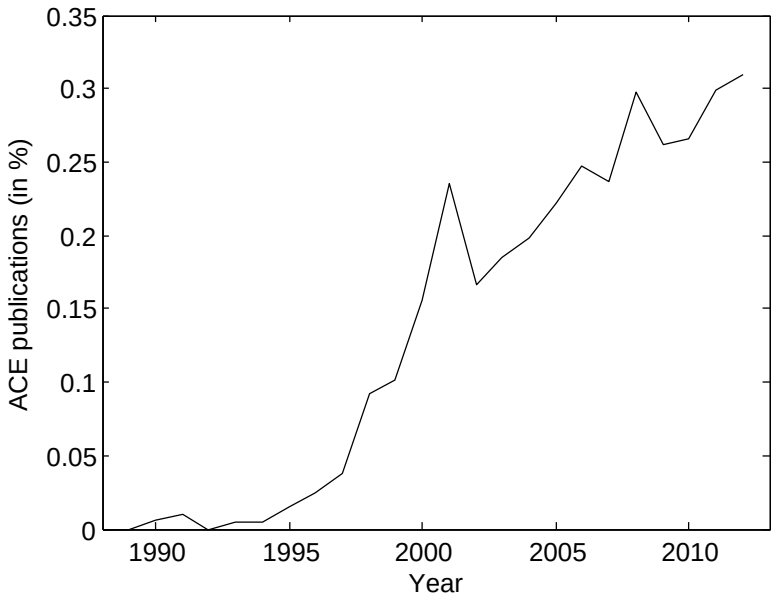
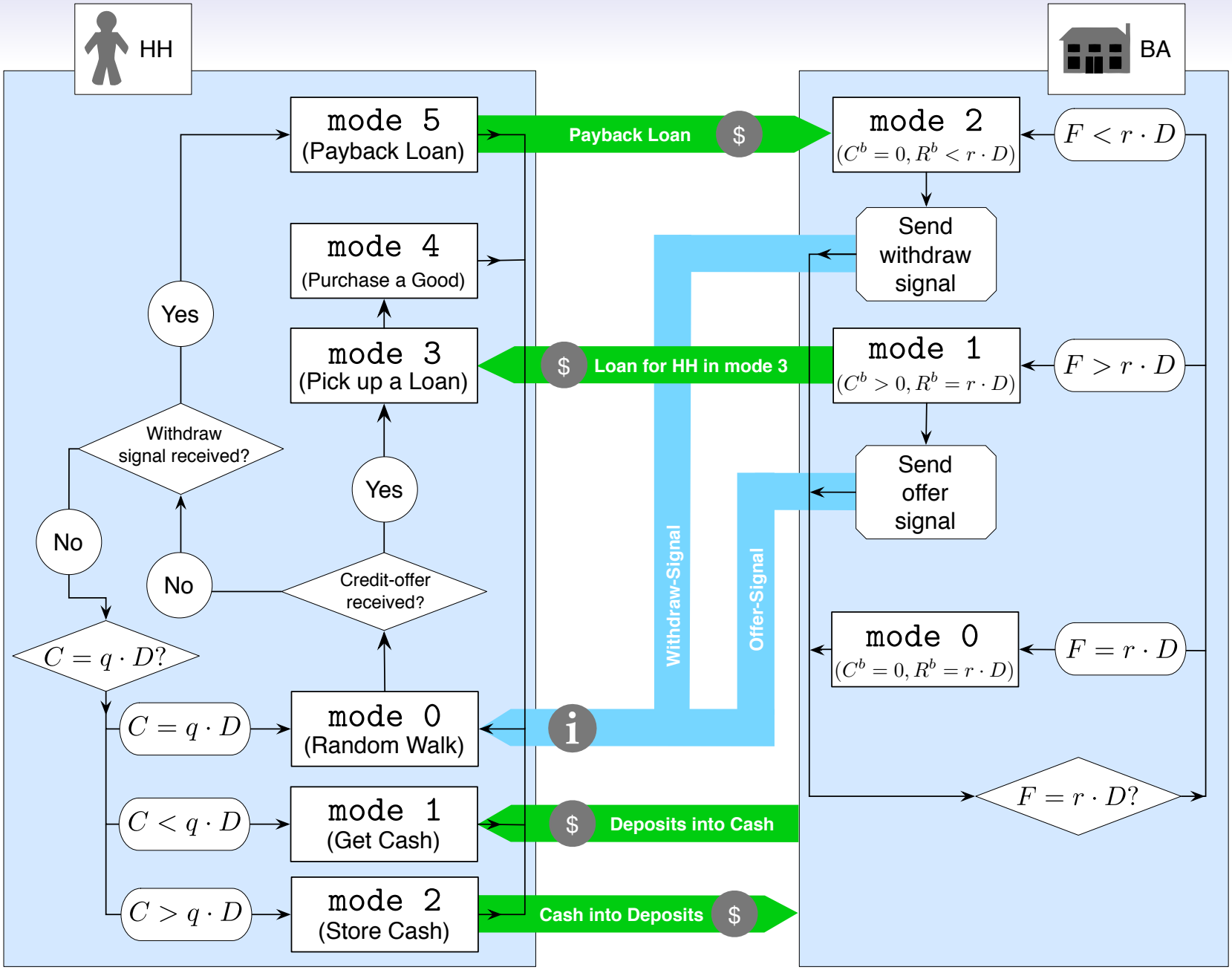
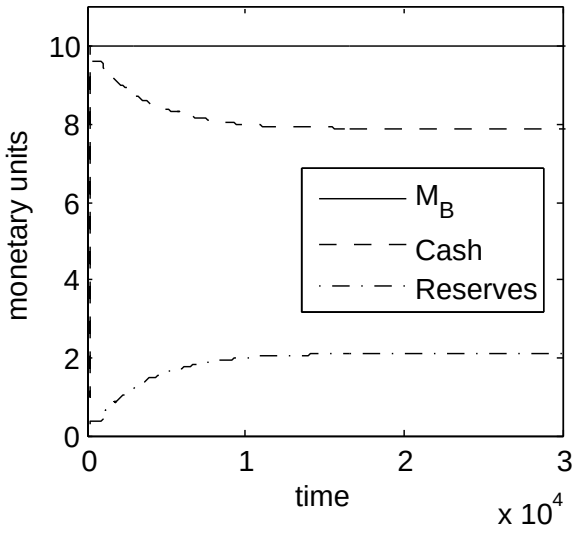
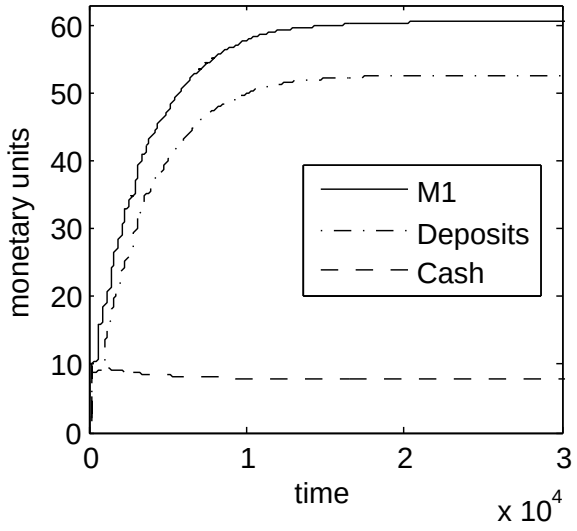
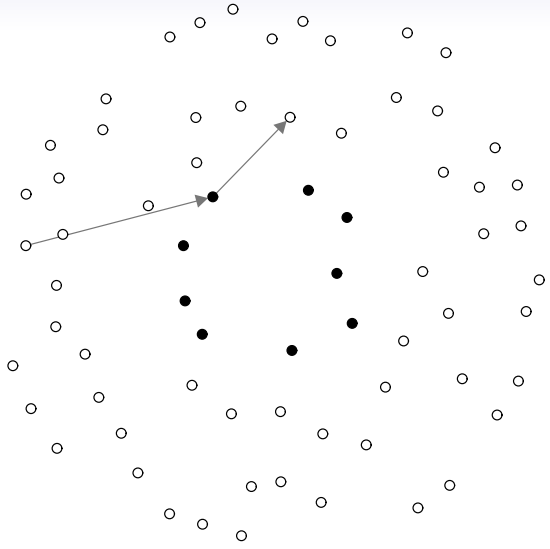


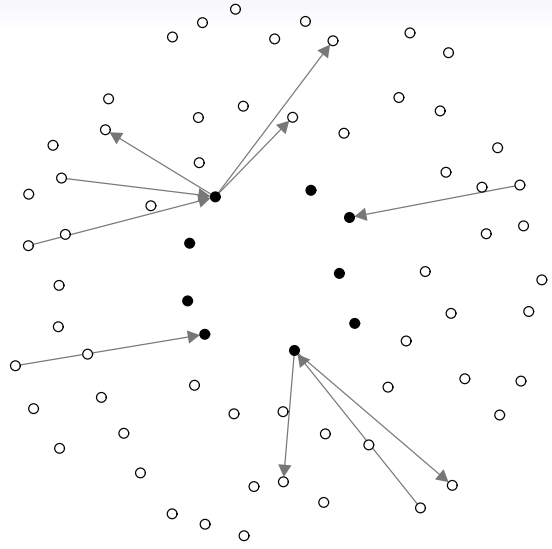
- ACE & SFC
- Simple: useful for teaching
- Similar to mainstream
  - Nested as special case
  - Fits curriculum
- Crisis Analysis
  - Bank runs
  - Contagion / systemic risk
- Policy Analysis: Basel III

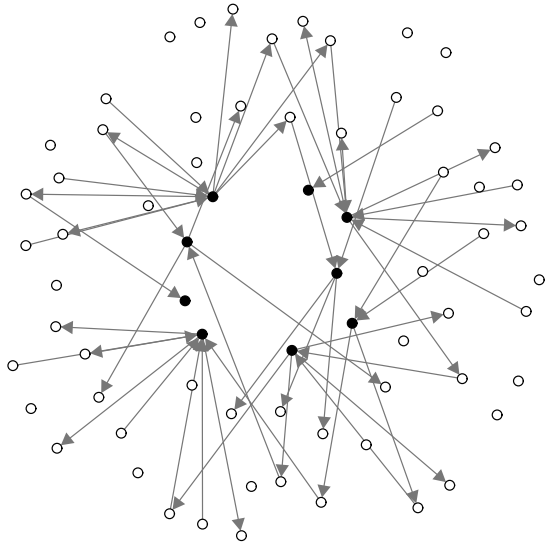

HH
BA
mode 5
(Payback Loan)
Payback Loan
$
mode 2
$(C^b = 0, R^b < r \cdot D)$
$F < r \cdot D$
Send
withdraw
signal
mode 4
(Purchase a Good)
Yes
mode 3
(Pick up a Loan)
$
Loan for HH in mode 3
mode 1
$(C^b > 0, R^b = r \cdot D)$
$F > r \cdot D$
Withdraw
signal received?
Send
offer
signal
Yes
No
No
Credit-offer
received?
Withdraw-Signal
Offer-Signal
$C = q \cdot D$?
mode 0
$(C^b = 0, R^b = r \cdot D)$
$F = r \cdot D$
$C = q \cdot D$
mode 0
(Random Walk)
i
$C < q \cdot D$
mode 1
(Get Cash)
$
Deposits into Cash
$F = r \cdot D$?
$C > q \cdot D$
mode 2
(Store Cash)
Cash into Deposits
$

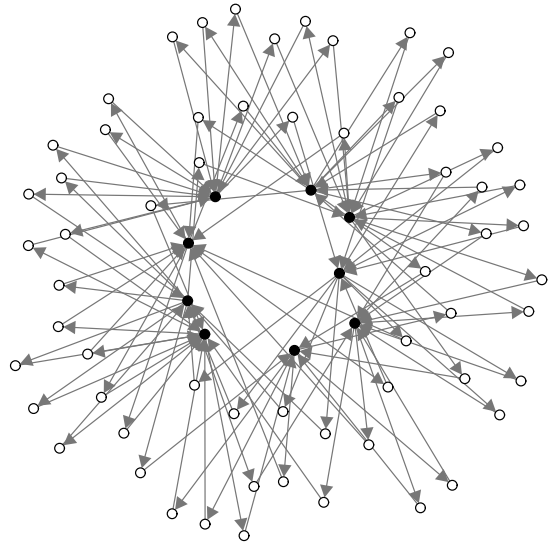

monetary units
time
x 10^4
M_B
Cash
Reserves


monetary units
time
x 10^4
M1
Deposits
Cash



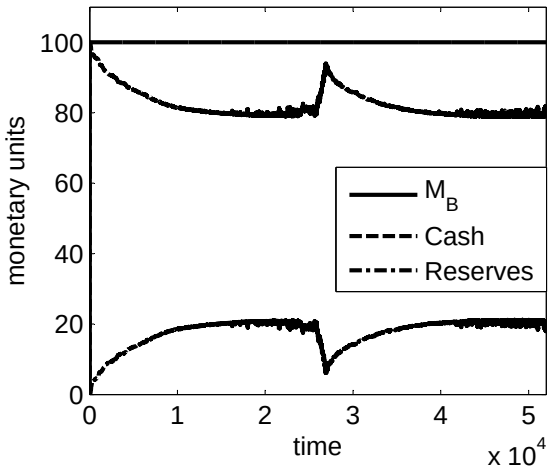


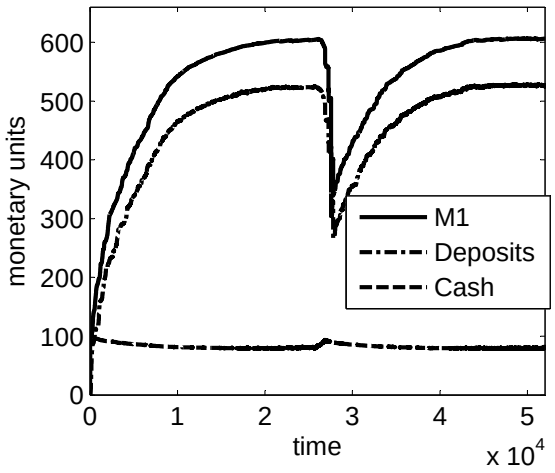




Add three new assumptions

1. Real market transactions (randomly)
2. Interbank market
3. RePo opperations





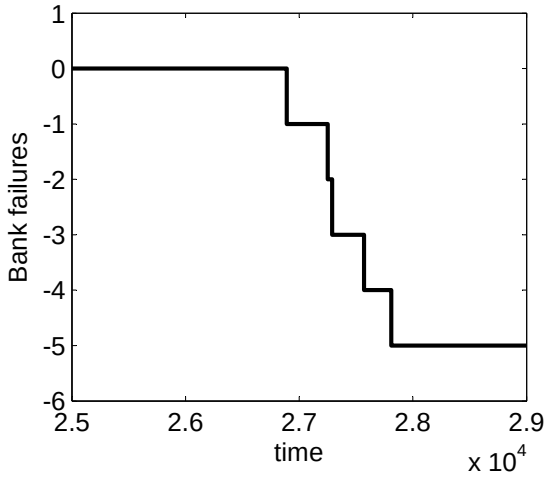


Table : Conditional probabilities of bank failure

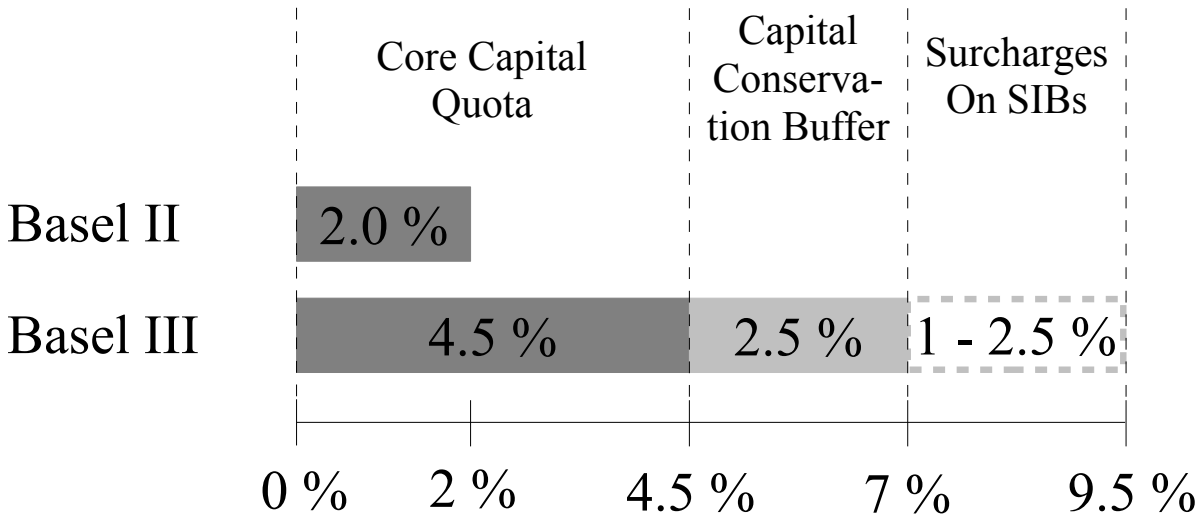
		Recent BA Breakdowns					
IB Market	start	1	2	3	4	5	> 5
Off	0.04	0.14	0.23	0.22	0.09	0.00	0.00
On	0.02	0.78	0.9	0.8	0.72	0.59	0.4

Microprudential

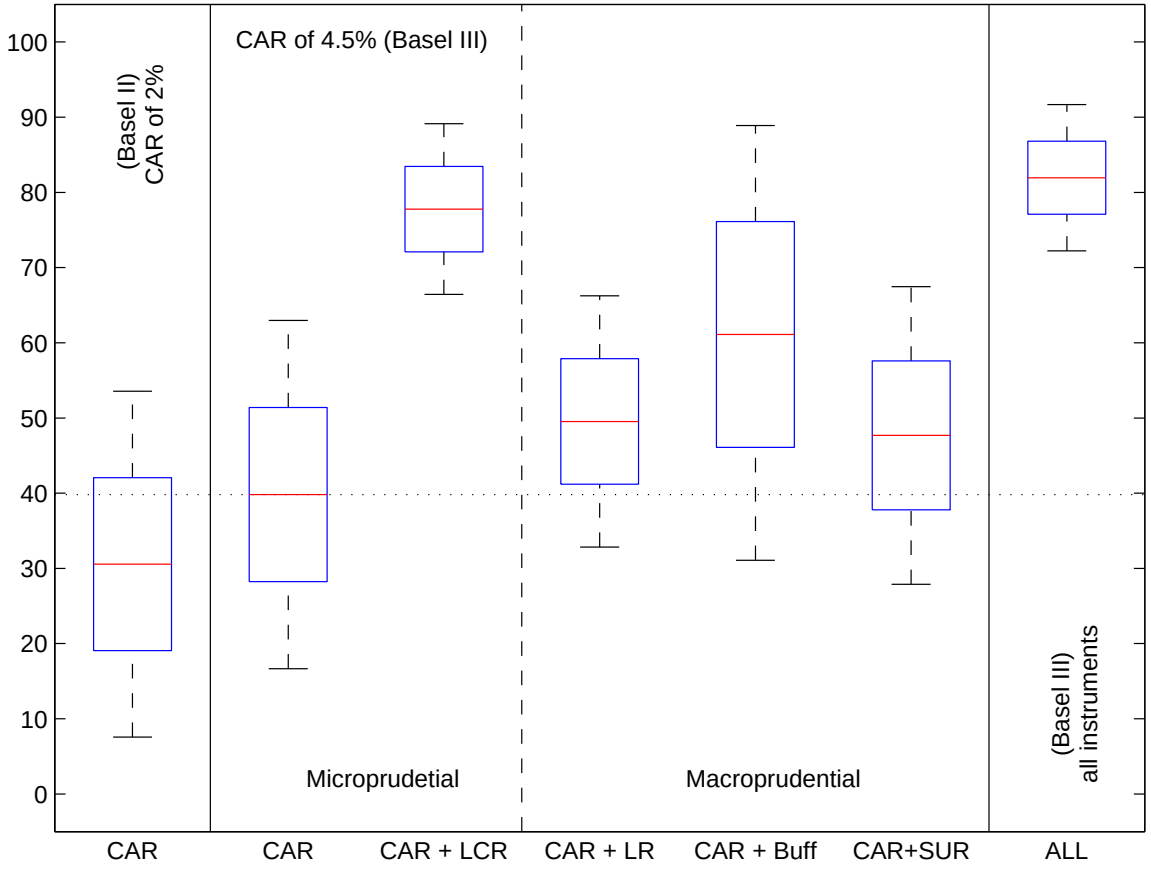
- Capital adequacy requirement
- Liquidity coverage ratio

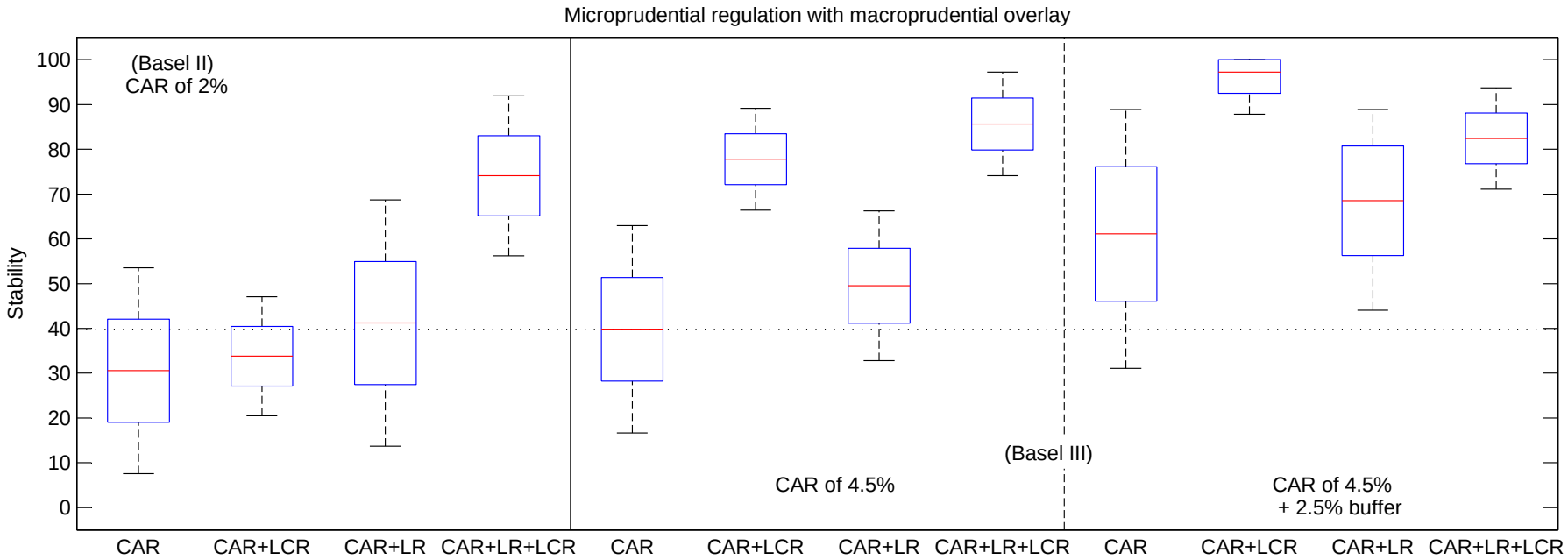
Macroprudential

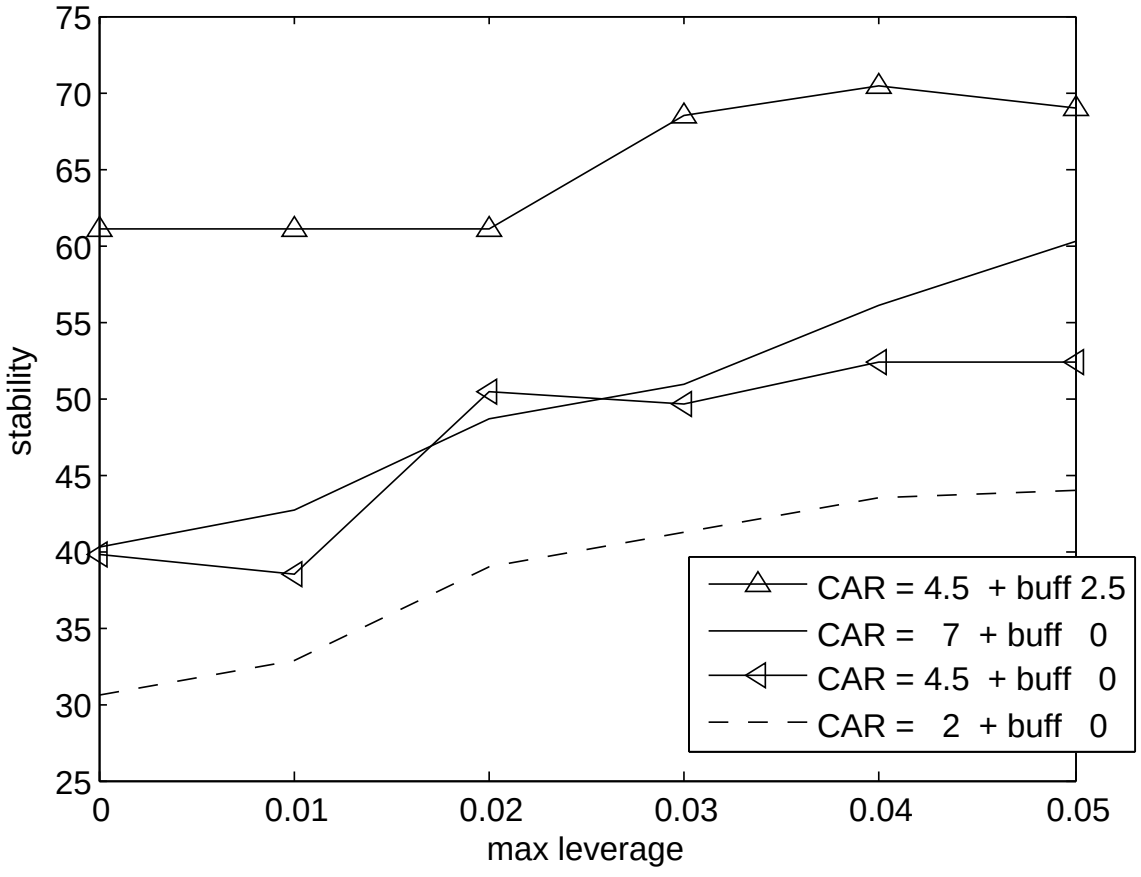
- Leverage ratio 3%
- CAR Conservation buffer
- CAR Surcharges on SIBs


Core Capital Quota
Capital Conserva- tion Buffer
Surcharges On SIBs
Basel II
2.0 %
Basel III
4.5 %
2.5 %
1 - 2.5 %
0 %
2 %
4.5 %
7 %
9.5 %

(results shown in this section are preliminary)




Microprudential regulation with macroprudential overlay
(Basel II)
CAR of 2%
(Basel III)
CAR of 4.5%
CAR of 4.5%
+ 2.5% buffer
Stability
100
90
80
70
60
50
40
30
20
10
0
CAR
CAR+LCR
CAR+LR
CAR+LR+LCR
CAR
CAR+LCR
CAR+LR
CAR+LR+LCR
CAR
CAR+LCR
CAR+LR
CAR+LR+LCR


75
70
65
60
55
50
45
40
35
30
25
stability
0
0.01
0.02
0.03
0.04
0.05
max leverage
CAR = 4.5 + buff 2.5
CAR = 7 + buff 0
CAR = 4.5 + buff 0
CAR = 2 + buff 0

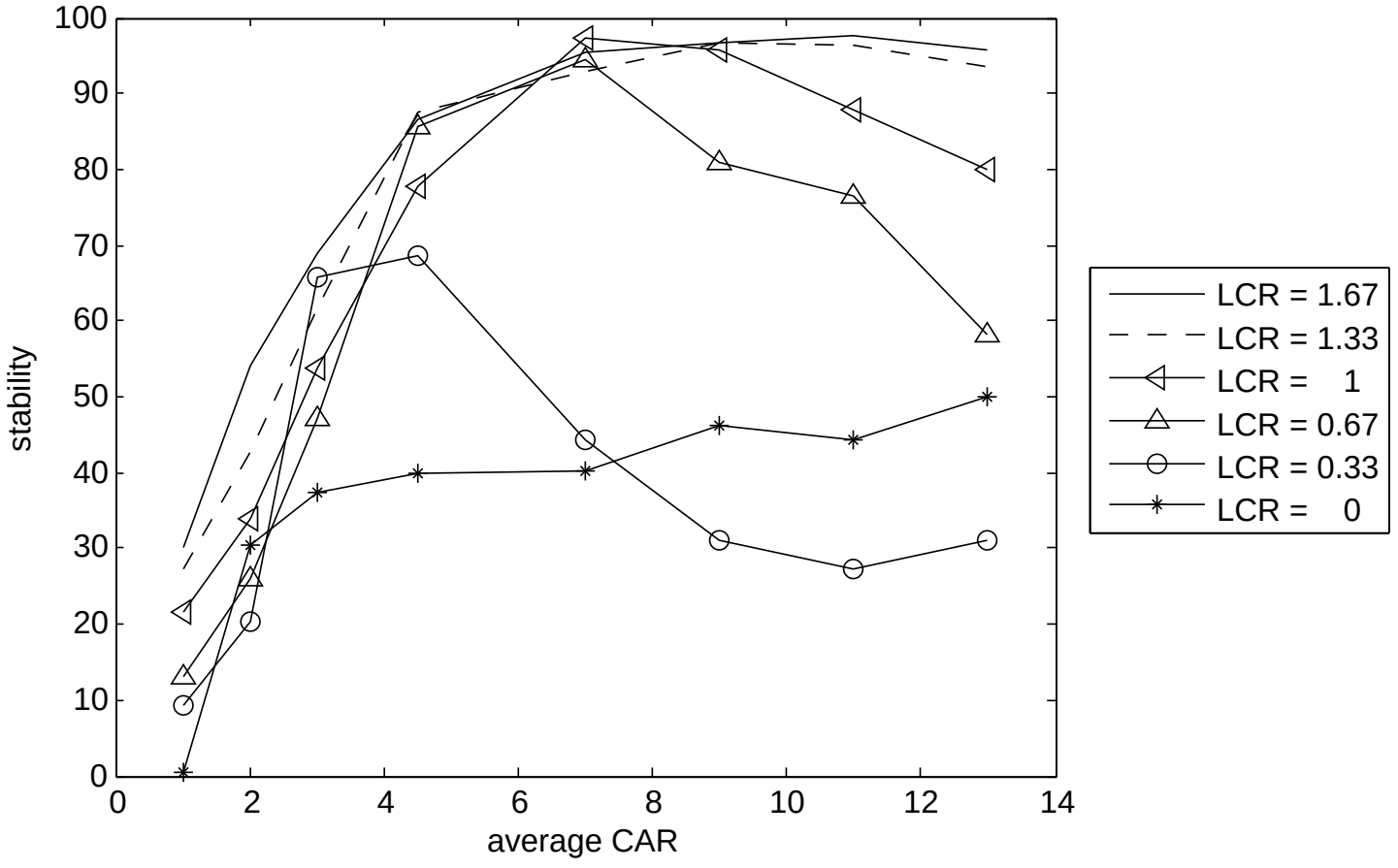

stability
average CAR
0
10
20
30
40
50
60
70
80
90
100
0
2
4
6
8
10
12
14
LCR = 1.67
LCR = 1.33
LCR = 1
LCR = 0.67
LCR = 0.33
LCR = 0

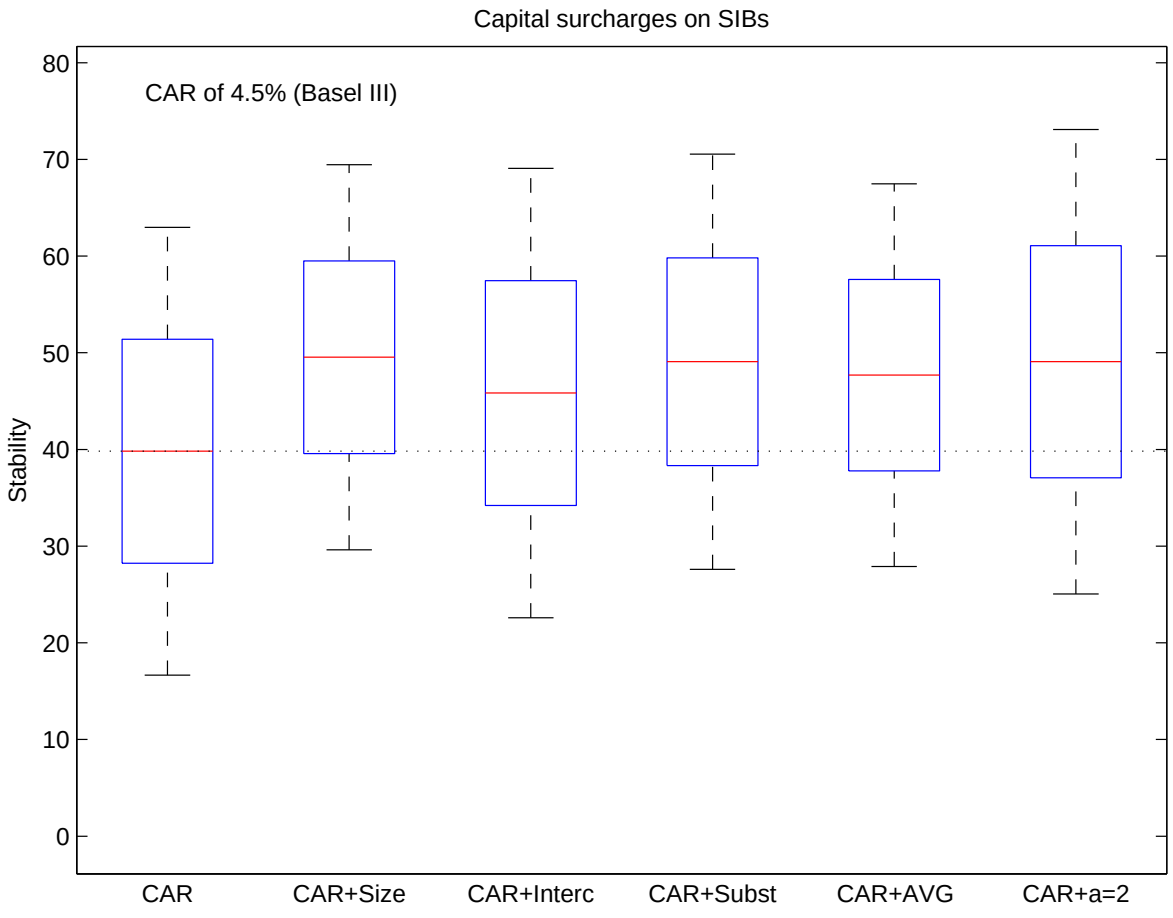
Table : Conditional probabilities to become insolvent (multiplied with 100)

		Recent BA failures					
Regime	start	1	2	3	4	5	> 5
B2	0.57	10.42	16.41	25.76	19.40	13.56	5.26
CAR: 4.5b	0.34	5.63	26.32	22.22	33.33	22.73	6.25
CAR: 4.5b+LCR	0.05	2.86	0.00	0.00	0.00	0.00	0.00
B3 (all)	0.35	2.15	0.00	0.00	0.00	0.00	0.00

- Simple version
  - Mainstream results
    Equilibrium as limiting case (grown endogenously)
  - *http://www.ace-teaching.de* $\rightarrow$ *Macro*
- Extended version
  - Interbank market
  - RePo operations
  - Banking crises: Contagion / systemic risk
- Policy analysis
  - Evaluation of Basel III
  - Impact of different tools (isolated and joined)

Appendix

- $CAR_i = \frac{Equity_i}{Loanes_i^{HH}}$
- $LCR_i = \frac{LiquidAssets_i}{E[Outflows_i] - min\{E[Inflows_i],\ 0.75 \cdot E[Outflows_i]\}}$
- $LEV_i = \frac{Equity_i}{BalanceSheetLength_i}$


Capital surcharges on SIBs
CAR of 4.5% (Basel III)
Stability
80
70
60
50
40
30
20
10
0
CAR
CAR+Size
CAR+Interc
CAR+Subst
CAR+AVG
CAR+a=2

- $Size_i = \frac{BalanceSheetLength_i}{\sum_i BalanceSheetLength_i}$
- $Interc = \frac{FinancialConnections_i}{\sum_i FinancialConnections_i}$
- $Subst = \frac{Payments_i}{\sum_i Payments_i}$