Some thoughts on money, credit, capital requirements and aggregate demand

By Jørn I. Halvorsen [1]

[1]Norwegian Business School (BI)

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Background

- From 1. july 2013 new and stricter capital requirements were implemented for Norwegian commercial banks.
- Most banks increases lending before this date.
- This response provoked some anger at the Ministry of Finance Svein Gjedrem:

> *- Det den nevnte banken sier, det er i forhold til et tenkt system. Det er ikke dekning for si at det blir en tredobling, sa Gjedrem til E24 fredag, med finansminister Sigbjrn Johnsen (Ap) ved sin side.*

- Further regulations on banks capital ratio is underway, since proposals for countercyclical capital buffer are now on the table.
- The Norwegian economy is now perhaps at the start of a mild recession(?).

May case

- Announcement of a higher capital ratio should indeed lead to higher lending rates.
- The introduction of higher capital requirement is primarily a microeconomic policy, undertaken to serve two goals:
  1. Remove the distortion in direction of investments that is the result of moral hozard.
  2. Limit the liability of government in the case of bank failure.
- A side effect of such a regulation, is its ability to change aggregate demand.
- The countercyclical Norwegian capital buffer opens up the possibility that the interest rate setting of Norges Bank can be hijacked by other government institutions.

The bank lending channel

In the research literature, two somewhat different views exist on the role banks play in the transmission mechanism of monetary policy.

- Bernanke and Blinder (1998):
  Reserves determine deposits which changes the amount of loan (exogenous money supply)
  - No equity (-)
  - Two assets (bonds and loans) (+)
- Disyatat (2011):
  Loan demands drive deposit (endogenous money supply)
  - With equity (+)
  - One asset (bank loan) (-)

Here we seek to combine elements of the two models. In addition, we also discuss the effect of introducing higher capital requirement.

Main assumptions

- The real economy
  - Closed economy.
  - Sticky prices.
  - Production of a single consumer good.
- The financial system
  - Loans and bonds not perfect substitutes for banks.
  - Some households and firms are bank dependent:
    i.e. loans and bonds not perfect substitutes for borrowers.
  - Banks they want to minimize their equity ratio.

The model

Households

Loan demand (e.g. housing)

$$L^{d,h} = L^{d}(\underset{(-)}{\rho}, \underset{(-)}{i}, \underset{(+)}{y})$$

Money demand

$$D^{d} = D(\underset{(-)}{i}, \underset{(+)}{y})$$

Firms

Loan demand (e.g. investment)

$$L^{d,f} = L^{f}(\underset{(-)}{\rho}, \underset{(-)}{i}, \underset{(+)}{y})$$

Total loan demand in the economy

$$L^{d}(\rho, i, y) = L^{f}(\rho, i, y) + L^{d}(\rho, i, y)$$

Banking sector (provide loans and offers transaction services)

Aggregate balance sheet

$$L^s + B + R \equiv EQ + D$$

Total Reserves

$$R = \tau D + ER$$

Excess reserves (inelastic to the nominal interest rate)[1]

$$ER = \epsilon D(1 - \tau)$$

Capital ratio

$$cr \equiv \frac{EQ}{L^s + B + R}$$

Loan supply

$$L^s = \lambda(i, \rho)(EQ + D(1 - \tau))$$

[1] See Disyatat (2009) for a further discussion.

The role of the central bank

- Traditional approach (Bernanke and Blinder, 1998):
  CB controls the supply of reserves/money H.
  Government controls the reserve requirement, τ, for the banks.
- Modern approach (Disyatat, 2011):
  CB controls the short term interest rate, i.
  Government controls the capital requirement, cr, ratio.

Solving the model

- Equilibrium conditions:
  Goods market

$$y = Y(\underset{(-)}{i}, \underset{(-)}{\rho}) \tag{1}$$

  Money market

$$M^b \equiv \frac{(H - EQ)}{(\tau + \epsilon(1-\tau))} = D(i, y) \tag{2}$$

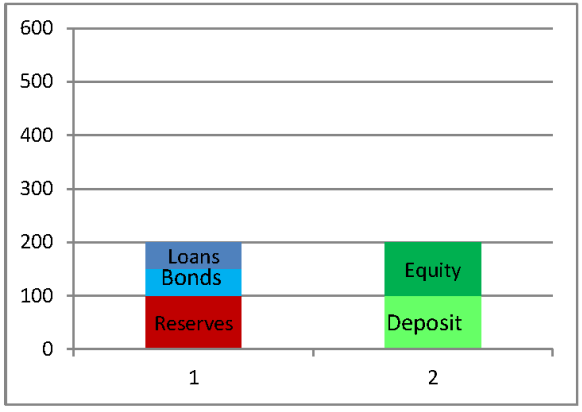
  Lending market

$$\lambda(i, \rho)(EQ + D(1-\tau)) = L^d(\rho, i, y) \tag{3}$$

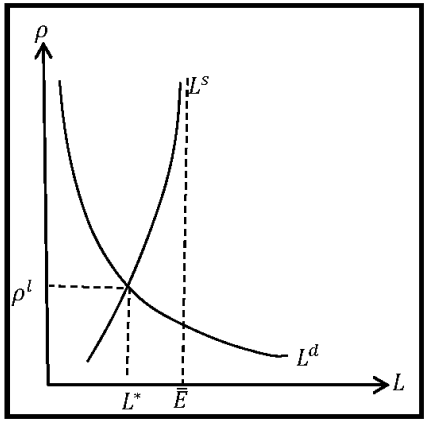
- Traditional approach (Bernanke and Blinder, 1988)
  Endogenous variables :y, ρ, i.
  Policy variables:H, τ.
- Modern approach (Disyatat, 2011)
  Endogenous variables :y, ρ, H.
  Policy variables: i, cr.

1. Loanable fund economy

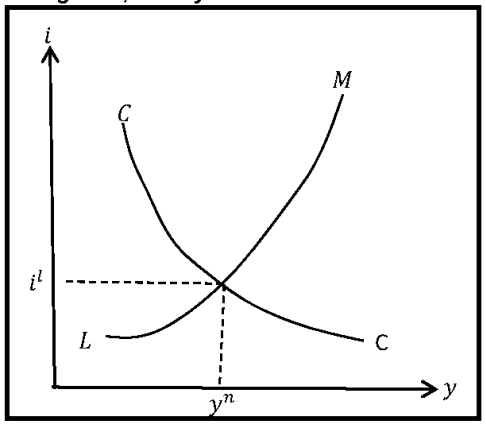
Aggregate balance sheet bank sector



The loan market



The goods, money and loan market

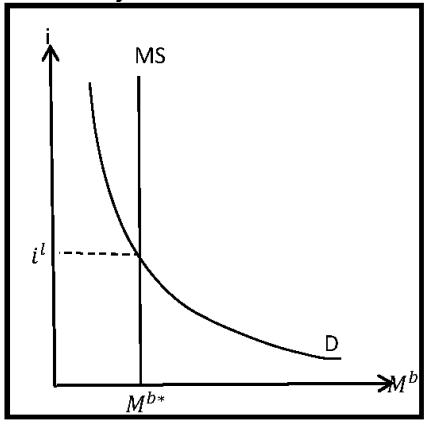


Numbers (illustration)

	Assets	Liabilities	
Loans	50	100	Equity
Bonds	50	100	Deposit
Reserves	100	0	
	200	200	

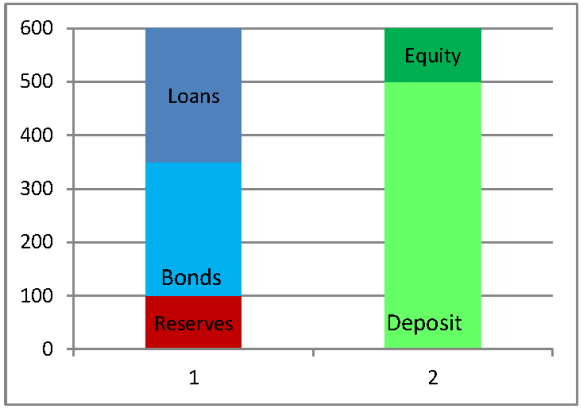
M0	200
M1	200
RES	100 %
CAP	50,00 %

The money market

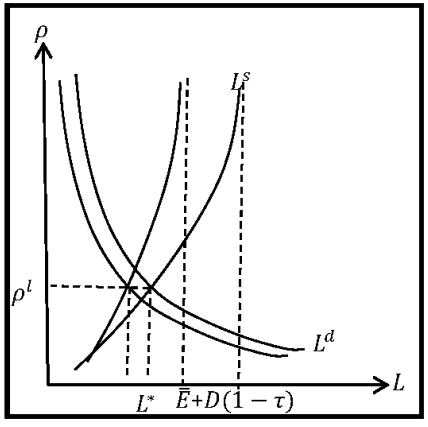


2. Fractional reserve banking with reserve requirement

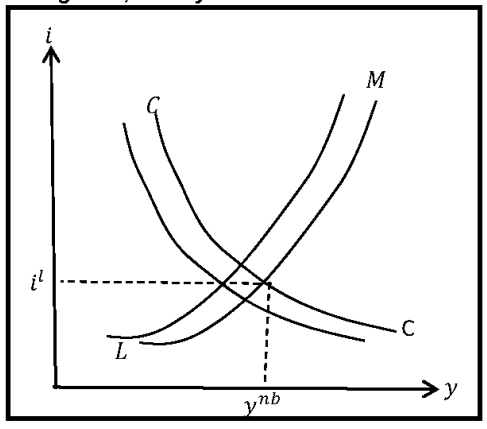
Aggregate balance sheet bank sector



The loan market



The goods, money and loan market

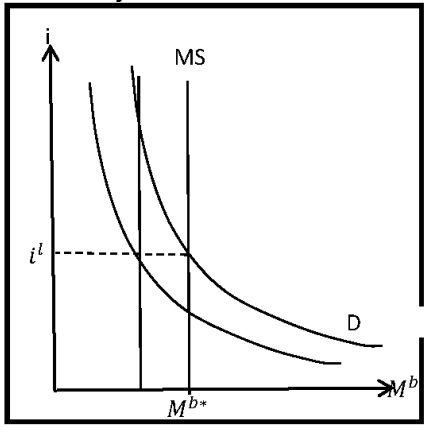


Numbers (illustration)

	Assets	Liabilities	
Loans	250	100	Equity
Bonds	250	500	Deposit
Reserves	100	0	
	600	600	

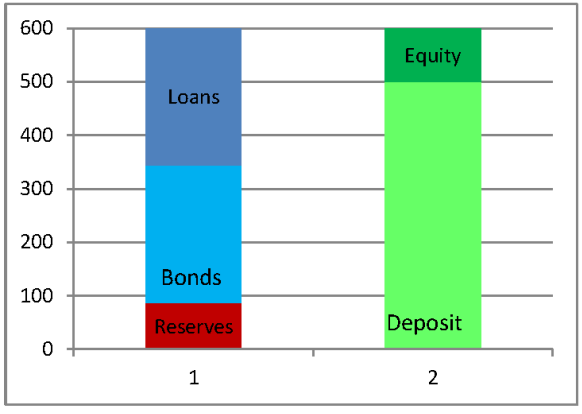
M0	200
M1	600
RES	20 %
CAP	16,67 %

The money market

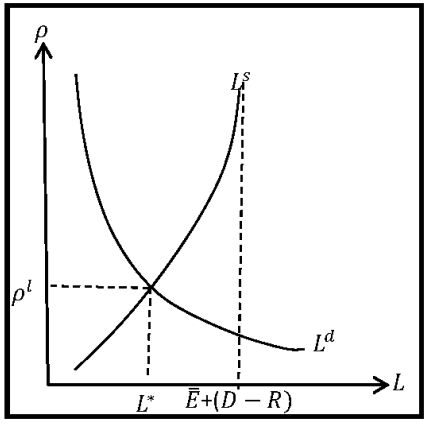


3. Endogenous money economy

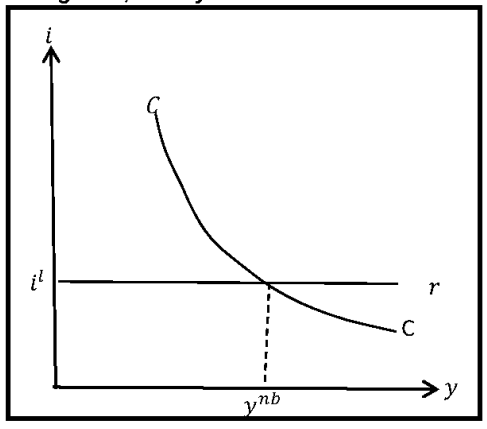
Aggregate balance sheet bank sector



The loan market



The goods, money and loan market

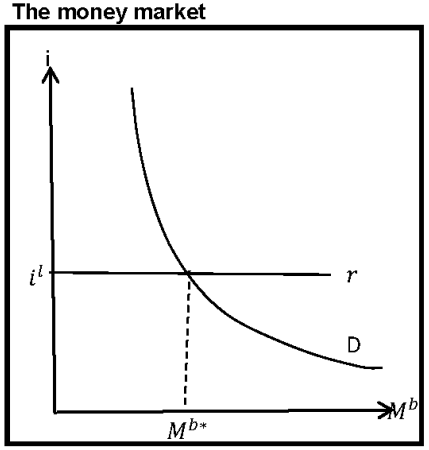


Numbers (illustration)

	Assets	Liabilities	
Loans	257	100	Equity
Bonds	257	500	Deposit
Reserves	87	0	
	601	600	

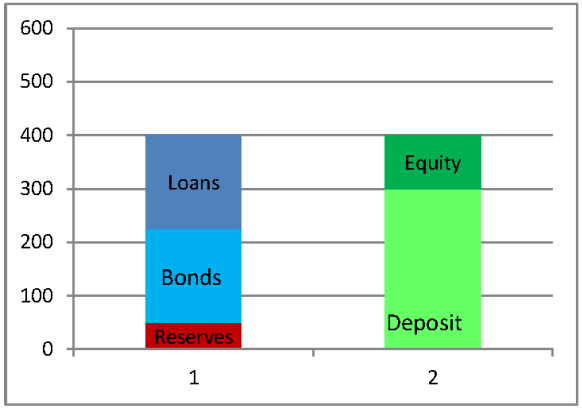
M0	200
M1	600
RES	17 %
CAP	16,67 %

The money market

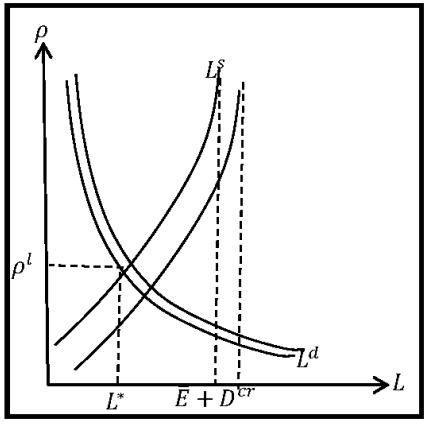


4. Endogoenous money economy with increasing capital requirment

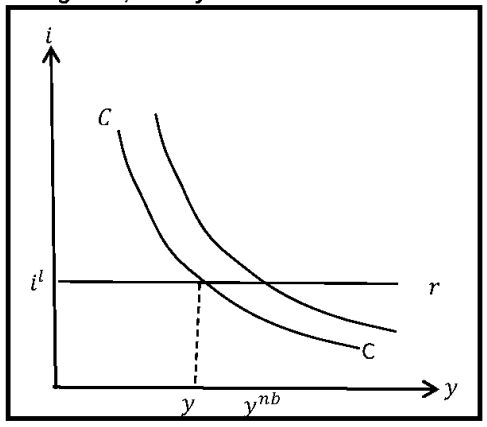
Aggregate balance sheet bank sector



The loan market



The goods, money and loan market

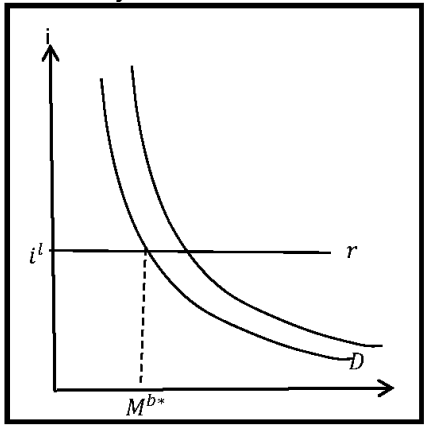


Numbers (illustration)

	Assets	Liabilities	
Loans	175	100	Equity
Bonds	175	300	Deposit
Reserves	50	0	
	400	400	

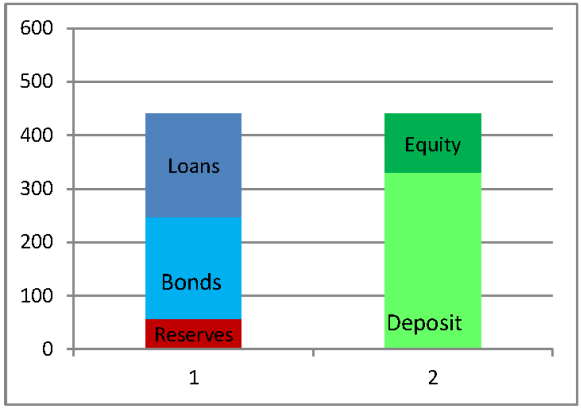
M0	400
M1	500
RES	17 %
CAP	25,00 %

The money market

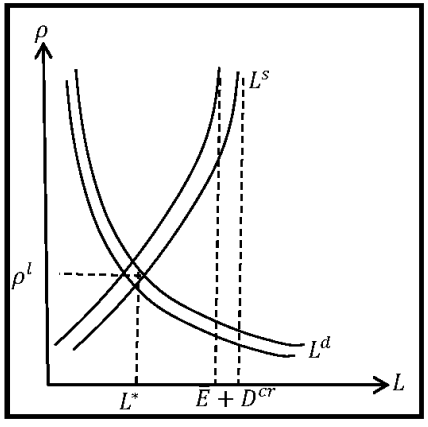


5. Endogoenous money economy with increasing capital requirment and lowering interest rate

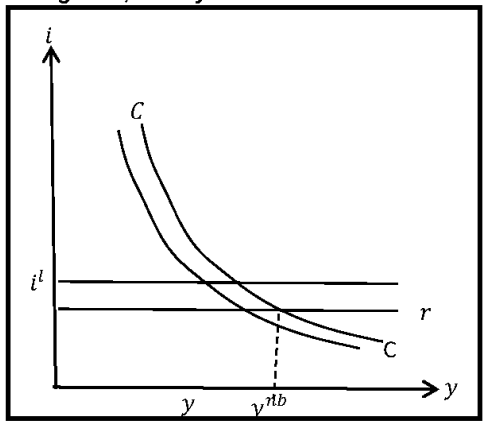
Aggregate balance sheet bank sector



The loan market



The goods, money and loan market

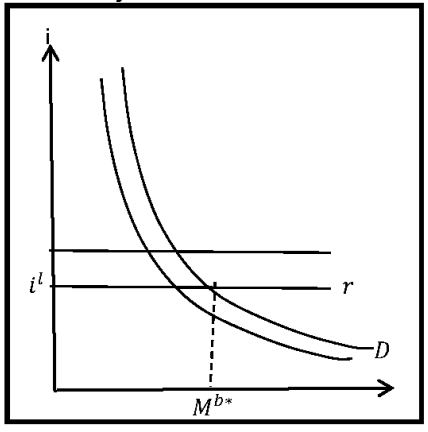


Numbers (illustration)

	Assets	Liabilities	
Loans	192	110	Equity
Bonds	191	330	Deposit
Reserves	57	0	
	440	440	

M0	440
M1	713
RES	17 %
CAP	25,00 %

The money market



So why higher capital requirements?

Business model 1:

Rate of return	State	Probability
$0,05$	1	0,99
$0,05$	2	0,01

$E(\text{BM1}_1) = 0,05 \cdot 0,99 + 0,05 \cdot 0,01 = 0,05$

Business model 2:

Rate of return	State	Probability
$0,0606$	1	0,99
-1	2	0,01

$E(\text{BM2}_1) = 0,0606 \cdot 0,99 - 1 \cdot 0,01 = 0,05$

No bail out guarantee. $\Rightarrow r_b = 0,0606$

	Rate of return	Expected	State 1	State 2
Bond bank 1		94,50,	94,50	94,50
Bond bank 2		95,45	95,45	0
Equity bank 1	5 %	10,50	10,50	10,50
Equity bank 2	5 %	10,50	10,61	0

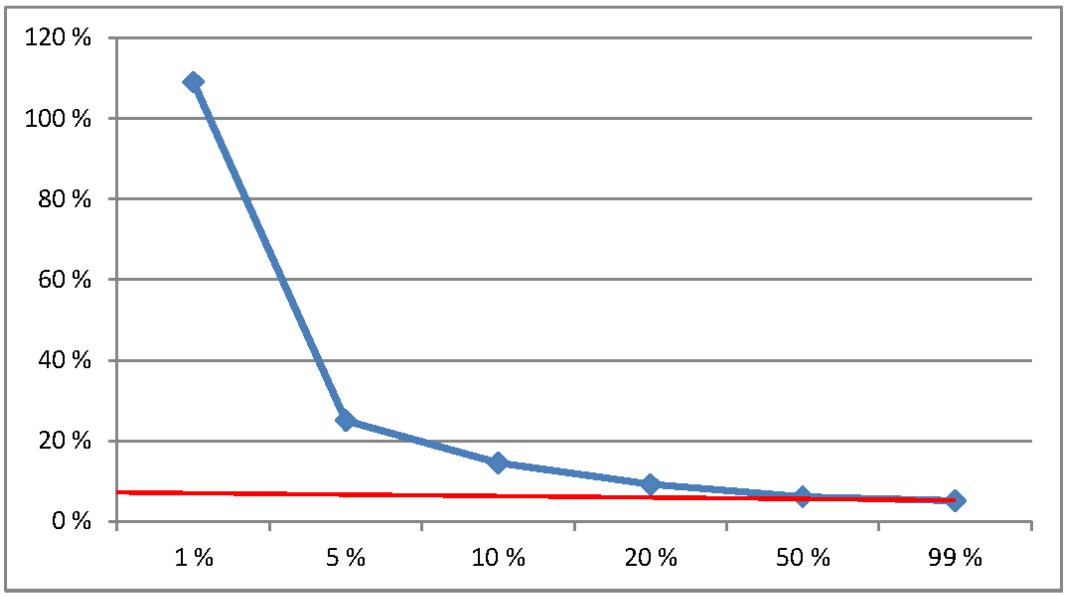
Full bail out guarantee. $\Rightarrow r_b = 0,05$

	Rate of return	Expected	State 1	State 2
Bond bank 1		94,50,	94,50	94,50
Bond bank 2		95,45	94,50	94,5
Equity bank 1	5 %	10,50	10,50	10,50
Equity bank 2	14,5 %	10,50	11,561	0

Rate of return business model 2 state 1

0,0606

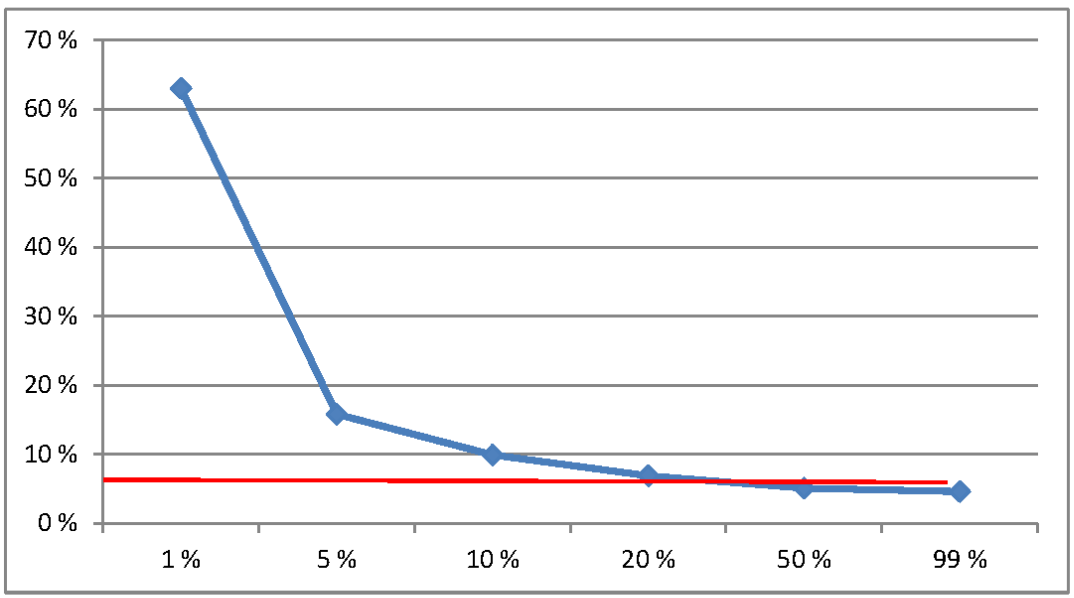
Eq:ratio	1 %	5 %	10 %	20 %	50 %	99 %
Rate of return	109 %	25 %	15 %	9 %	6 %	5 %
Risk free rate	5 %	5 %	5 %	5 %	5 %	5 %
Transfer	1,04	1	0,95	0,84	0,53	0,01



Rate of return business model 2 state 2

0,056

Eq:ratio	1 %	5 %	10 %	20 %	50 %	99 %
Rate of return	63 %	16 %	10 %	7 %	5 %	5 %
Risk free rate	5 %	5 %	5 %	5 %	5 %	5 %
Transfer	1,04	1	0,95	0,84	0,53	0,01



- Krugman (1998), on increased capital requirement

> *The answer is that cleaning up bad banks [imposing higher capital requirements] is a microeconomic policy, undertaken* **to remove the distortion in the direction of investment that results from moral hazard***-and also to* **limit the eventual liability of the government**
>
> *That it* **might reduce aggregate demand as a side effect is of little relevance***. Under normal circumstances, the macroeconomic effects of this or any other move toward microeconomic efficiency that happens to discourage spending* **can simply be offset with a looser monetary policy.**