

Banks in the monetary policy transmission mechanism II

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The views presented here do not necessarily agree with or reflect those of Norges Bank

- **Credit channel** of monetary policy: meeting point for microeconomics (financial markets/IO) and macroeconomics (monetary policy).
- In order to understand a **financial crisis**, you also need both fields.
- New thinking about **goals** for monetary policy, linking the two.
- New research and policy area between micro and macro: "**Macro Prudential Policy**".

Macro and Micro aspects of financial markets meet in Central Banks:

- Web sites of the Fed and Bank of England :

<http://www.federalreserve.gov/> and <http://www.bankofengland.co.uk/>

- Macro: Crisis met by extreme monetary policy measures:

<http://www.federalreserve.gov/newsevents/speech/yellen20110225a.pdf>

- Micro: Demand for research on industrial organization and systemic risk:

<http://www.federalreserve.gov/newsevents/speech/tarullo20110915a.htm>

Financial intermediation and the transmission mechanism of monetary policy: today's lecture

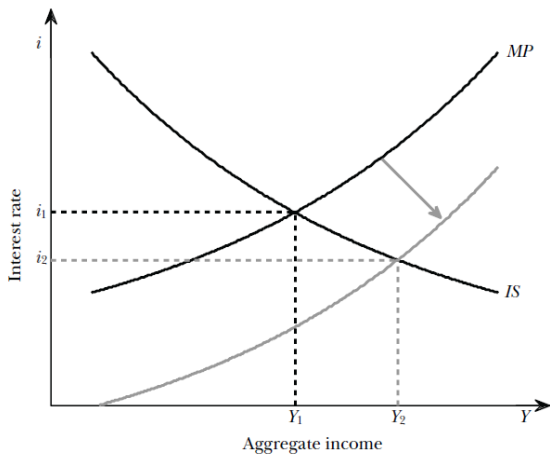
- ① Financial Intermediation and Macroeconomic Analysis (Woodford)
- ② Monetary Policy and Financial Stability:
 - ① The effects of "Quantitative Easing" and "Credit Easing"
 - ② Haugland and Vikøren. Macro-prudential policy. The goal(s) for monetary policy.

Starting Point: Standard model of aggregate demand.

- IS-LM or New Keynesian macro models. Two assets, three markets: Money, Bonds and Output.
- IS-LM: "Equilibrium" in market for output and money (sticky prices).
- New-Keynesian/IS-MP-model: Policy rate i instead of any monetary aggregate.
- But interpretation in terms of "M" (or R) and B easy also with NK-model, if we define some money demand $M^d = M(i, Y)$, and leave M to be demand determined, given i and Y .

IS-MP aggregate demand. No financial intermediation, one interest rate:

B: Effect of a Loosening of Monetary Policy on Interest Rates and Output



A simple macro model:

- Intersection of IS and MP determine aggregate demand, for a given inflation rate.
- Need to add some relationship between output and inflation (Phillips curve, or supply curve). Not covered here.
- The **shift** in MP illustrates new policy: a lower nominal interest rate for every level of output.
- Movement along MP , on the other hand, is standard response in nominal rate to change in output, according to the monetary policy reaction function.....

Monetary Policy (MP)-reaction function

$$i_t = \lambda_\pi \pi + \lambda_y Y$$

- Response to inflation and output, often called "Taylor Rule"
- Upward sloping in i, Y space ($\lambda_y > 0$), given fixed π .

Loan supply:

$$L_S = L_S(Y, i)$$

+ +

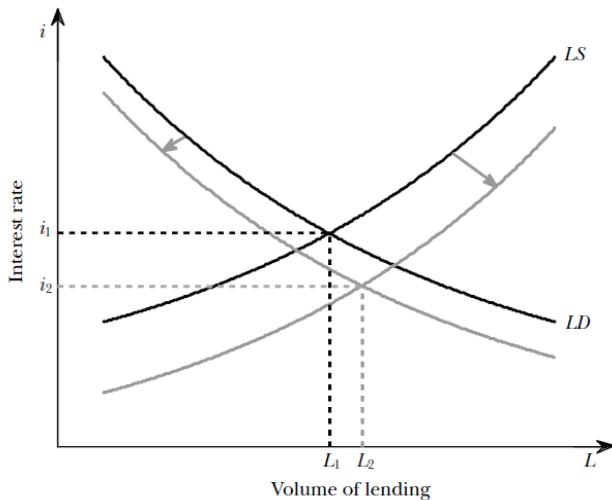
Loan demand:

$$L_D = L_D(\underline{Y}, \underline{i})$$

Find equilibrium L and i for given Y in L, i space.....

Loan supply and demand. Shifts with change in Y .

A: Effect of an Increase in Aggregate Income on Loan Supply and Demand



Slope of curves.

$$L_s = L_s(Y, i)$$

Total differentiate:

$$dL_s = \partial L_s / \partial Y \cdot dY + \partial L_s / \partial i \cdot di$$

Keep Y fixed ($dY = 0$) in order to find slope in i, L space

$$dL_s = \partial L_s / \partial i \cdot di$$

Slope:

$$\frac{di}{dL_s} = 1 / (\partial L_s / \partial i) > 0$$

Shift of curves.

$$dL_s = \partial L_s / \partial Y \cdot dY + \partial L_s / \partial i \cdot di$$

Keep i or L fixed in order to find size of shift in i, L space when Y changes:
 L fixed \Rightarrow we find the vertical shift:

$$di = -dY \frac{\partial L_s / \partial Y}{\partial L_s / \partial i}$$

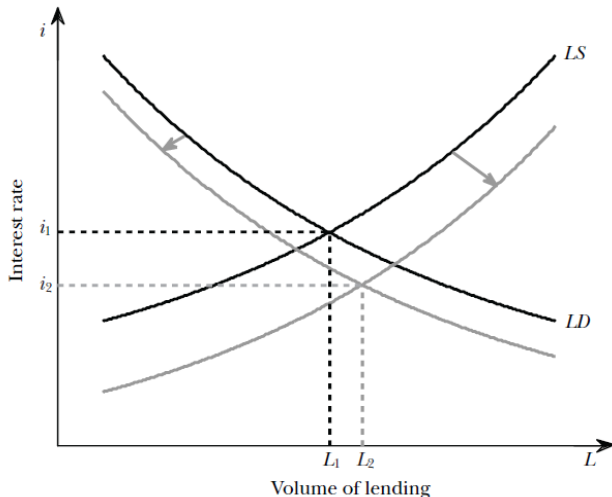
$\Rightarrow L_s$ shifts down with $dY > 0$. The shift is larger when loan supply (=savings) is less interest elastic. Same for borrowers (practice: find vertical shift in loan demand curve when income changes)

Assume expenditure of lenders (and hence savings) less interest elastic than expenditure (and hence borrowing) of borrowers $\Rightarrow L_s$ shifts more than L_d

Shifts: Higher Y gives lower equilibrium interest rate in loan market

given interest elasticity assumptions

A: Effect of an Increase in Aggregate Income on Loan Supply and Demand



The IS curve

The equilibrium demand and supply of loans for different combinations of Y and i is traced out by the IS curve, where $E(\pi)$ is taken to be a fixed parameter:

$$Y = A - B * (i - E(\pi))$$

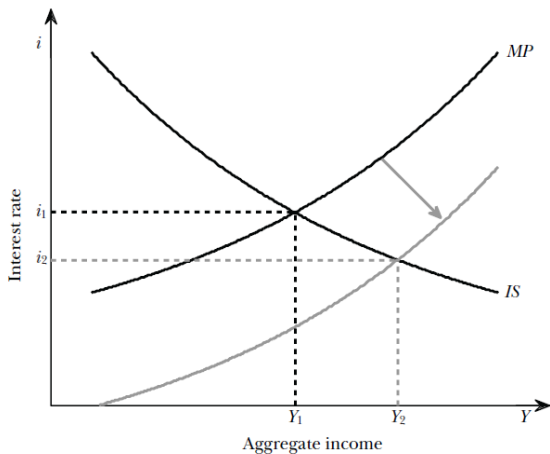
Can interpret this as consumption Euler equation in simple micro-based macro model (like the New Keynesian model); consumption today down relative to tomorrow, when real rate goes up:

$$y_t = E_t y_{t+1} - \gamma(i_t - E_t \pi_{t+1})$$

Let $E_t y_{t+1}$ be a fixed number (steady state) and let $E_t \pi_{t+1}$ be fixed by the monetary policy target for π .

IS-MP aggregate demand. No financial intermediation, one interest rate:

B: Effect of a Loosening of Monetary Policy on Interest Rates and Output



- Banking crisis via lack of money in this model, as argued to be the case in the 1930s? No!

In old type model, Friedman/Scharz story about Great Depression:

- reserve requirement $\alpha \Rightarrow D \leq \frac{R}{\alpha}$
- Shock makes people withdraw deposits D , "Money supply", or broad money $M_s^{broad} \approx D \downarrow$
- Same amount of R no longer creates enough M_s^{broad} , given i , Y
- Money demand characterized $M_d^{broad} = M(i, Y)$, $\frac{\partial M}{\partial i} < 0$, $\frac{\partial M}{\partial Y} > 0$
- In new equilibrium, lower Y and/or deflation in order to make $M_d^{broad} = M_s^{broad}$.

The IS-MP model and financial crisis

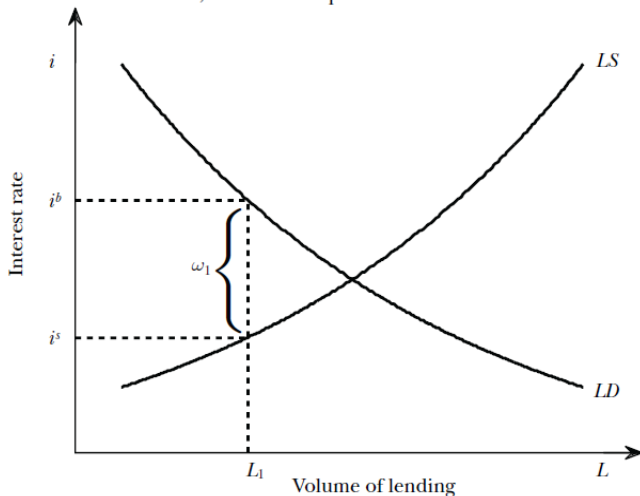
- Today, R endogenous, central bank provides whatever R necessary to establish desired interest rate when shock hits \Rightarrow movement along MP curve when IS curve shifts....
- \Rightarrow "automatically" lower i that (partly) counteracts lower Y . **But** constraint on monetary policy: nominal rate cannot go below zero.
- **And** frictionless borrowing/lending assumed, no margin between borrowing rate and lending rate.

Introduce Financial frictions and multiple interest rates in simple model:

- Funding rate for banks (or, in general: financial intermediaries) = i^s . This is the same rate that the savers get on their lending to banks (deposit rate for private customers). L_s (=lending to banks) now depends on i^s .
- Lending rate for banks = interest rate that final borrowers pay = i^b . Demand for borrowing, L_d , now depends on i^b .
- Equilibrium in market for loans now **not** given by intersection between lending supply and borrowing demand; there is a **wedge, or credit spread**.

Wedge between lending supply and borrowing demand

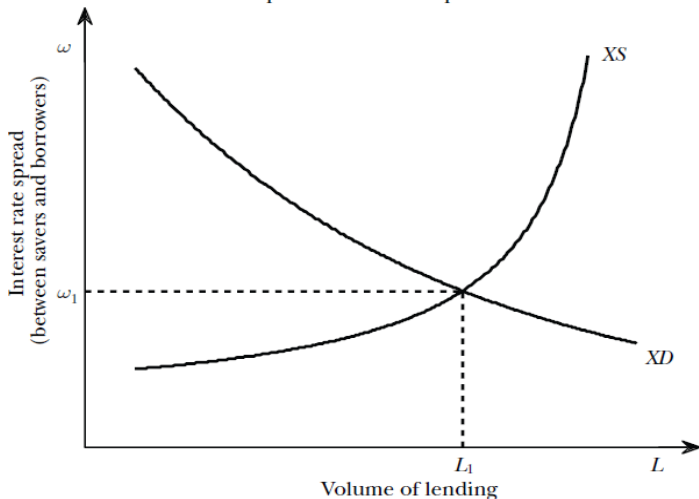
A: Effect of a Credit Spread ω_1 on the Equilibrium Interest Rates for Borrowers and Savers, and on the Equilibrium Volume of Credit



Market for intermediation

Supply of intermediation XS : more intermediation is more expensive, e.g. due to bank capital requirement

B: Determination of the Equilibrium Credit Spread



The slope and shifts of X^S = supply of intermediaton

Slope:

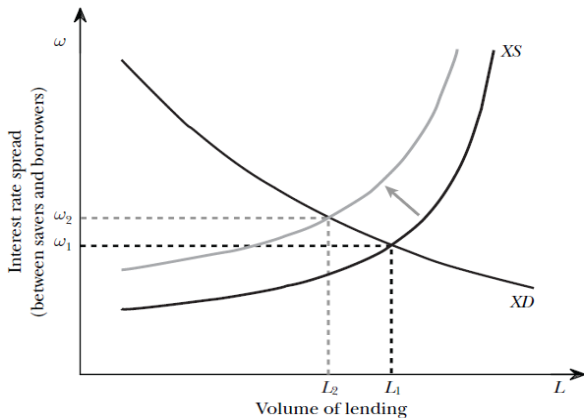
- No friction: X^S -curve flat, $\omega = 0$. Level of L as in IS-MP model.
- Scarce human capital/specialized lending in banking sector $\Rightarrow X^S$ upward sloping
- Net worth of banks fixed in short run $\Rightarrow X^S$ upward sloping

Shifts:

- Uncertainty \uparrow or bank capital (loss on assets) $\downarrow \Rightarrow$ agency costs $\uparrow \Rightarrow X^S \uparrow$
- Bank capital requirement $\uparrow \Rightarrow X^S \uparrow$

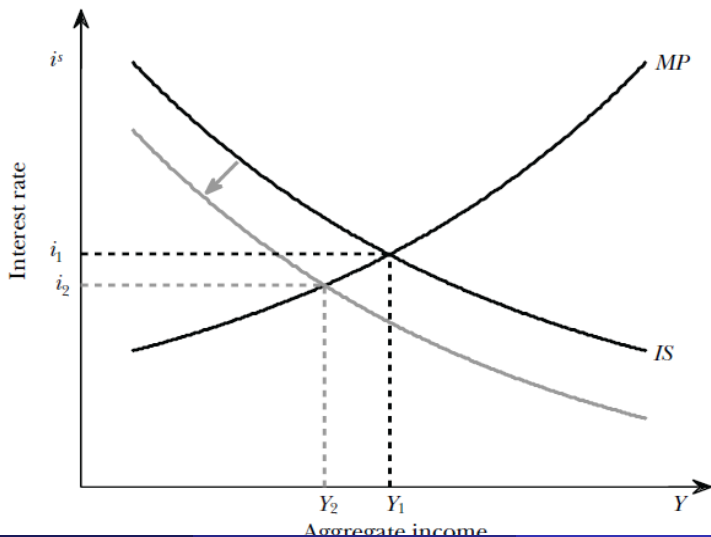
Shift in the supply of intermediation (Credit Crunch) 1.

A: Effects on the Equilibrium Credit Spread ω and Volume of Lending L for a Given Level of Aggregate Income Y



Shift in the supply of intermediation (Credit Crunch) 2.

B: Effects on the Equilibrium Policy Rate and Aggregate Income, Taking into Account the Monetary Policy Reaction



Woodford's interpretation of the financial crisis

- Before the crisis: risk premia fell = perception of a "Great Moderation" = shift down in X^S , IS-curve shifted out. Movement along MP curve, policy rate \uparrow . Credit expansion (high volume of intermediation), but ω low and market rates for risky investment not high.
- Crisis started in the housing market: Suppliers of short term financing required more collateral when values of housing loans were questioned. Binding collateral constraints (= liquidity problems) resulted in deleveraging/sale of securities linked to housing loans. Lower value of those securities.
- Institutions who owned those securities made losses, and hence net worth of financial institutions \downarrow . Supply of intermediation (X^S) shifted up (= more expensive for banks to fund themselves.)
- IS curve shifted left, production $Y \downarrow$, and $i \downarrow$ with movement along MP. But $\omega \uparrow \Rightarrow$ funding for risky investment still expensive and/or rationed.

A debate about the role of the Fed's policy rate before the crisis

- Other theorists have other stories than Woodford.
- John Taylor argues that policy rate in US was kept too low before crisis, see e.g. "Commentary: Monetary Policy After the Fall", Jackson Hole Conference, August 28, 2010. See also his "Macroeconomic Lessons from the Great Deviation", both under "Recent Papers", <http://www.johnbtaylor.com/>
- The Fed has argued that the policy rate was increased largely in line with the "Taylor rule" before the crisis, see <http://www.federalreserve.gov/newsevents/speech/bernanke20100103a>. "Monetary Policy and the Housing bubble"

The crisis and the macro policy response

- In Woodford's terminology, X_S shifted up. Movement along MP curve corresponds to easier monetary policy.
- Nominal rate cannot be lower than zero. With sticky prices, a zero nominal rate may not be enough to create a low enough real interest rate.
- Fiscal policy used, but has encountered constraints.
- Unconventional monetary policy:
 - Direct intervention in credit markets, to counteract shift in X_S : Public Lending to financial institutions on easier terms, capital injections into financial institutions, and direct purchases of private debt (= "Credit Easing").
 - Purchases of long term government bonds, in order to directly affect long term interest rates (=Quantitative Easing, or QE). (UK; US)

Unconventional monetary policy ("QE" and "Credit Easing")

- Both involve open market operations, affect both what kind of assets the private sector holds, and the amount of R .
- Now, back to R potentially playing a role, money demand equation and the **volume** of R a policy variable after all?
- Probably not. But first, recap, balance sheets...

Recap, balance sheets

BANKS	
R	F
B	D
L	B_{banks}
	Net Worth

PRIVATE	
M	L
D	
B_{banks}	Net Worth

CB	
B_{CB}	M
F	R_G
V	R
	Net Worth

GOVERNMENT(G)	
R_G	B
	B_{CB}
Other	Net Worth

Recap, questions

- How does $R \downarrow$ when $R_G \uparrow$, e.g. due to tax payment by people?
- How does $R \downarrow$ when people want to hold more M ?
- What happens when the central bank runs a surplus?

- QE: Central bank buys more B_{CB} (from private sector/banks) $\Rightarrow B \downarrow, B_{CB} \uparrow, R \uparrow$
- Credit Easing: Central bank extends more F , or buys L from Private, or buys $B_{banks} \Rightarrow R \uparrow$
- Neither involve any increased public debt $B + B_{CB}$. But both involve increased R .
- Reference: ECB working paper no 1253, "Monetary Policy in exceptional times", Michele Lenza, Huw Pill and Lucrezia Reichlin.
- In Norwegian:
<http://www.norges-bank.no/no/om/publisert/publikasjoner/aktuell-kommentar/2011/78179/>

QE: moves the yield curve. Affects liquidity premium?

- In describing the effects of QE (see e.g. <http://www.federalreserve.gov/newsevents/speech/yellen20110225a.pdf>), the effects on longer term interest rates have been stressed. The effect is **not** expected to go through higher R , but $R \uparrow$ (beyond what is needed in order to keep i at desired level) is a side effect.
- When the short term rate is as low as it gets, lowering the yield curve (\simeq expected future short rates) may have expansionary effects. Corresponds to lowering the announced interest rate path in Norway: we work (also in normal times) through announcing plans (conditional on economic development) for the path of short rates, not only through the current short rate.
- Central bank transactions push down yield curve by making average public debt maturity shorter, but what if the government counteracts this, by its issuing more long term debt?

Credit easing: shifts XS down.

- Open market operations could also be conducted through lending (such as F -loans) against a wider range of collateral than usual, or by purchases of B_{banks} or L (private debt). This has been called "credit easing", and corresponds to policy directed at shifting XS down.
- This would increase R , like standard open market operations, as a side effect. It would also change the riskiness of the asset side of the CB. Could leave this to fiscal authorities, then no side effect on R .
- Because of higher risk, this has a fiscal side to it: implications for future expected taxes (when CB profits go down, transfers to the government go down, and hence taxes must increase or expenditures go down).

Concluding remarks, Unconventional Monetary Policy

- Credit easing may be conducted by either government or CB.
- **Credit easing** is usable also when policy rate is above zero. Can be used whenever the financial system is under stress, X^S needs push down. **Not a substitute for conventional monetary policy, but a supplement in a crisis.**
- The strength of the effect of QE = **purchases of long term government debt** is uncertain. Consensus view: **any effect that there is, goes via reduced long term interest rates/lower liquidity premia, not via increased R . Recall that interest rate does not fall below floor, or below Zero Lower Bound, even when R increases a lot.**
- Concern: risk to central bank net worth. Will it be costly for central banks to raise rates, when inflation picks up and warrants higher policy rates?
- Concern: public sector major player in financial markets. Will it be hard to scale down?

Conventional Monetary Policy and Financial Stability

- Concern in emerging markets: Large capital inflows and outflows, beyond what the domestic financial system and the domestic real economy can handle efficiently. "Sudden Stop": the problem is not when the capital comes in, but when it suddenly stops coming.
- Led to accumulation of reserves as insurance against sudden stop. Policy focussed on limiting current account deficits/limiting capital inflows (e.g. China).
- As for more mature economies, financial stability not on top of the agenda for macro-economists during Great Moderation.
- But macro after the crisis: New discussion of the goals for (conventional) monetary policy; and Macro prudential policy.