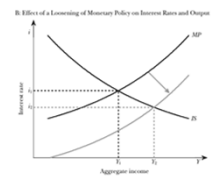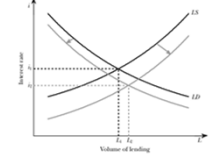# Woodford's model with "financial intermediation and frictions"

- Extend the basic model with intermediation
- Introduce spreads
- Study different effects of financial distress
- Monetary policy and financial stability

- Note. Buiter's housing no wealth and aggregation

Figure 2
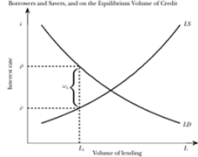**Interest-Rate and Output Determination in the Standard Model**

Figure 3
Credit Market Equilibrium with Credit Supply Frictions

Figure 4
Effects of a Disruption of Credit Supply

Policy environment

- Legislation (commitment)
- Central bank independence (Sweden, UK)
  - Credibility
    - Transparency, information to the public (Sweden, ECB)
    - Commitment
    - Evaluation
      - by central bank
      - independent
      - loss function?
  - Accountability
    - responsible to the parliament
    - official target, measurable

Legislation

- Example: Sweden
- Central bank law
  - Price level stability, + others in preparatory work
  - Independent central bank
- Target 2% determined by the central bank
- Flexible inflation targeting determined by the central bank

Different in other countries

- UK
  - ultimate target and specific target by parliament
- USA
  - only ultimate targets in Federal Reserve Act
- ECB
  - ultimate target and specific target set by governing council of ECB

Legislation, Swedish example

- Legislation
- Interpretation by the central bank (Riksbank)

Independence

The independence of the Executive Board is also emphasized in the Sveriges Riksbank Act, which states that the members of the Executive Board may neither seek nor take instructions when fulfilling their monetary policy duties.

Legislation

Price stability remains the overriding objective for monetary policy under the flexible exchange rate.

The Riksbank will, through monetary policy, defend the results achieved in the struggle against inflation. The Riksbank specifies that the objective of monetary policy is to limit the annual increase in the consumer price index in 1995 and onwards to 2 per cent, with a degree of tolerance of ± 1 per cent.

This objective corresponds to the current underlying rate of inflation.

also said

Price stability is a prerequisite for sustained economic growth as well as full employment and it prevents an arbitrary redistribution of income and wealth.

Law & CB July 2008

The statutory objective of monetary policy is to maintain price stability.

Monetary policy acts with a lag and is normally focused on achieving the inflation target within a two-year period. The two-year time horizon also provides scope for taking fluctuations in the real economy into consideration.

The Riksbank routinely takes into consideration changes in asset prices and other financial variables (exchange rates, house prices, share prices, household and corporate indebtedness, etc.) in monetary policy decisions.

Flexibility

- The two-year horizon can be interpreted as a restriction as to how much consideration can normally be given to real economic developments, a restriction which – like the specified inflation target – the Riksbank has imposed on itself to make the target of maintaining price stability credible

and…

The Riksbank's forecasts are based on the assumption that the repo rate (the Riksbank's policy rate) will develop in such a way that monetary policy can be regarded as well-balanced. Normally, a well-balanced monetary policy means that inflation is close to the inflation target within two years while inflation and the real economy are not showing excessive fluctuations.

1993 & 2008

Price stability is a prerequisite for sustained economic growth as well as full employment and it prevents an arbitrary redistribution of income and wealth.

Also, monetary policy does not have the task of, and cannot be used for, achieving lasting higher employment or growth. What monetary policy can achieve, however, is to ensure an inflation rate which over a number of years is well in line with the inflation target and to contribute to dampening the fluctuations in the real economy. In this way, monetary policy can create good conditions for an efficiently functioning economy and a favourable, stable macroeconomic development.

and recently…

- Risk that housing prices increase too fast
- Unbalanced increase in asset prices
- => change policy rate
- Not in contradiction with other targets (inflation and real target)
- Confusion…

Inflation targeting in practice

- Inflation measure, different aspects
- Theory: depends on price stickyness
- Practice
  - CPI
  - GDP deflator
  - other indexes
    - asset prices
    - wages

Target variables: Inflation

- Inflation measure
  - CPI or CPI-X or?
  - Wages?
  - Producer prices?
- CPI deficiencies
  - Too narrow measure
  - Quality changes, 2% is stable price level?
  - Interest rates, capital gains, durables

Target variables: Output gap

- Measure of potential or trend
- Mechanic or based on theory
- Different mechanical measures
  - Hodrick-Prescott (HP gap)
- Theoretical measures model dependent
  - Production function approach
    - $F(K,H) = F(K,(l*pop)*(1-u)*m)$
  - UC-gap
  - Flex-price gap
- No consensus

Transmission mechanism

- Policy rate
  - Short & long market rates
  - Credibility & expectations
  - Interest rates and demand
    - Consumption
    - Investments
    - Asset prices
    - Exchange rates and trade
- Public sector & fiscal policy
- Effects with considerable delay
  - 2 year foresight

Decisions based on forecasts

- Models
  - NK model, general equilibrium
  - Riksbank as example
    - RAMSES, NK interpretation
    - Supported by other models, time-series models (VARs), "without interpretations", sectoral experts
  - Forecast horizon
    - RAMSES long horizon
    - Supporting models shorter horizon
- Model uncertainty
  - What model?
  - Rational expectations and changing models
  - Different opinions

RAMSES – DSGE model

- NK model
- Bayesian econometrics
- Small model – 12 data variables
- Open economy
- Sticky prices, wages, import prices, different markups
- Hours worked, no unemployment
- Simple fiscal policy, no policy rule
- Estimated Taylor rule

Extensions in RAMSES

- Habit formation, backward-looking consumption
- Phillips curve backward and forward looking
- Adjustment costs in investments (capital stock adjustment)
- CPI-X ("core") inflation
- Taylor rule for policy
- Ongoing research

Major alternatives

- 2nd generation neokeynesian models with rational expectations, forward-looking behavior, not fully microfounded big size
- NK models, fully microfounded small size
- time-series models, no theory
- alternative theories

Sectoral experts and judgement

- Sectoral experts, needed to answer many questions
- Inconsistency in forecasts by sectoral experts => check with model
- Judgement
  - By decision maker
  - By staff

Decision unit

- Governor (New Zealand)
- Board (Sweden)
- Governor + committee (UK)
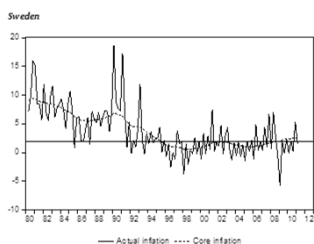
Policy evaluation

- Forecast error
  - Biased forecasts
  - Completely unforeseen
  - Sequence of shocks => inflation persistently below target

Policy evaluation

- Inflation close to target?
  - What inflation measure
    - Confusion in Sweden
- Alternative measure to determine interest rate (CPI-X)
- Loss function?
  - What measures?
  - What loss function? Should measure consumer's welfare

Country/region	Estimated parameters		Estimated p-value
	β	κ	Lagged inflation (p-value)
Australia	0.987	**0.225**	0.956
	(0.015)	(0.057)	
Euro zone	0.937	**0.102**	0.217
	(0.015)	(0.035)	
South Korea	0.972	**0.071**	0.176
	(0.025)	(0.008)	
Sweden	0.991	**0.156**	0.111
	(0.032)	(0.032)	
UK	0.973	**0.092**	0.087
	(0.084)	(0.026)	
Canada	0.980	0.017	0.660
	(0.053)	(0.010)	
Norway	0.966	**0.043**	**0.003**
	(0.032)	(0.018)	
New Zealand	0.958	**0.055**	0.092
	(0.064)	(0.014)	

Table 1. Estimated new Keynesian Phillips curves based on (2) and estimated with GMM. Note: Estimated p-values is for the hypothesis that lagged inflation is independent of inflation (old or backward-looking Phillips curve). Standard errors in parentheses

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Policy evaluation

- Target not so explicit
- How to interpret "flexible targeting"? Bring in more targets => harder tradeoffs => more difficult to evaluate
- Inflation target: CPI but including wage inflation advantageous: should one ignore wage inflation in evaluation?
- Accountability
  - Who evaluates and how?

Problems with accountability

- Specific targets not determined by principal but by agent
- Targets difficult to measure
- Decisions by board or individual
  - Independent decisions by board members
  - Majority decisions
- Evaluation ex post or ex ante

Inflation targeting era

- Inflation low
- Inflation less volatile
- Output growth high
- Output volatility lower
- Does this depend on inflation targeting?
  - Compare countries
    - Denmark vs Sweden
- Experts on Sweden, Giavazzi & Mishkin, 2006 and Goodhart & Rochet 2011

Time to write essay

- Deadline 20/1 for both essays and extra assignments
- Advise by e-mail or by appointment