

Macro Modeling at Norges Bank: NEMO

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Basel

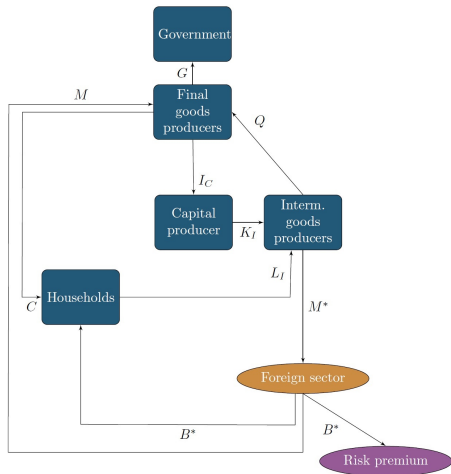
A good model for monetary policy

- ▶ Incorporate the most important channels of monetary policy and identify the main shocks that are driving the economy.
 - ▶ Does NEMO provide a good narrative of economic fluctuations in Norway?
 - ▶ Yes and No! Continuously being developed to analyze the Norwegian economy.
 - ▶ Should we complement NEMO with other models?
 - ▶ Yes! A HANK model can provide a framework to combine micro data with structural analysis of household behavior.

- ▶ Assess the appropriate reaction to shocks to achieve the monetary policy objectives.
 - ▶ Effects of parameter uncertainty and regime-shifts.
 - ▶ Forward guidance puzzle.
 - ▶ Financial stability concerns in monetary policy (LAW policies).

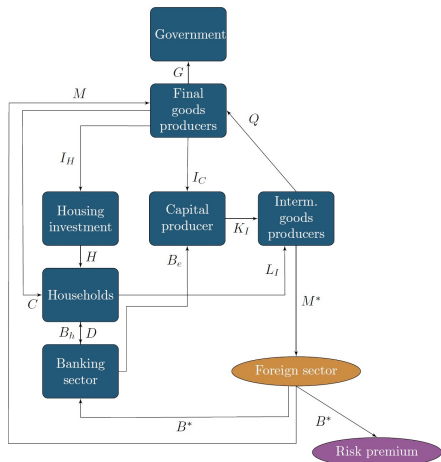
- ▶ Help the central bank to communicate forecasts and policy analysis in a consistent and coherent way.
 - ▶ NEMO: Unifying framework.

NEMO - support inflation targeting



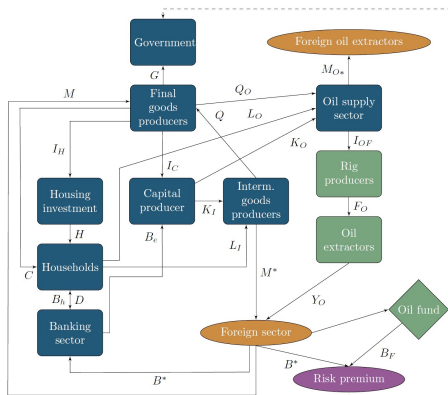
- ▶ First generation of New Keynesian DSGE model introduced in 2006.
 - ▶ Replaced a semi-structural 4-equation model.
- ▶ Contains the real and nominal rigidities as in Smets and Wouters.
- ▶ Basic tradeoffs in monetary policy between output and inflation.
- ▶ The open-economy dimension helps to analyze the effects of shocks stemming from abroad:
 - ▶ shocks to international interest rates, inflation and output abroad.
 - ▶ and how it should affect our monetary policy.

NEMO with financial factors



- ▶ Explicit treatment of the credit market and a role for housing services and house prices.
- ▶ Financial sector introduced in 2013.
 - ▶ Big changes in money market spreads during the GFC.
 - ▶ Financial sector can be an important source of shocks.
 - ▶ It can reinforce or weaken the transmission channel of monetary policy.
- ▶ Long-term debt and simple moving average forecast rules for house prices introduced in 2015.
 - ▶ The model's ability to produce the observed long cycles in house prices and credit in the data improved greatly.

NEMO with oil sector



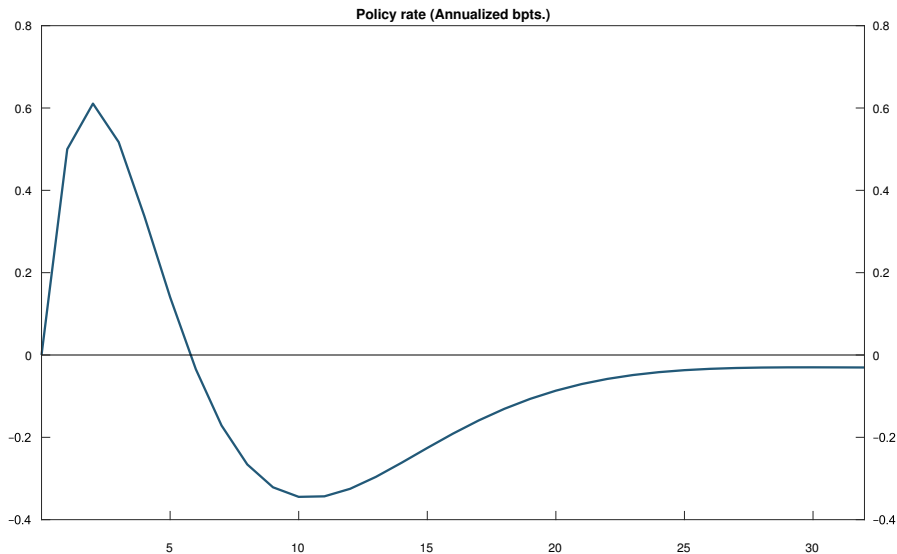
- ▶ Oil sector is introduced in 2017.
 - ▶ Oil production have traditionally been made up about 45 to 50 percent of total export value
 - ▶ and between 20 to 30 percent of total GDP.

- ▶ Increased importance of mainland oil supply sector.

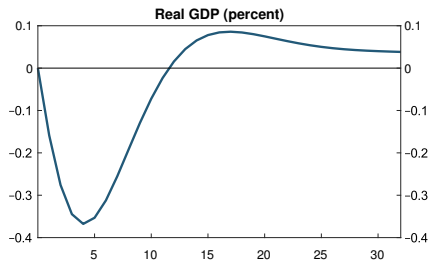
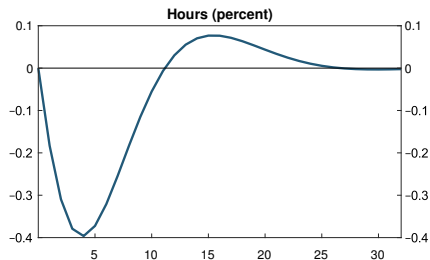
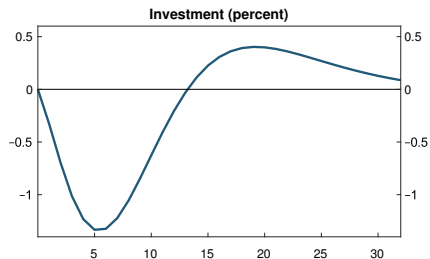
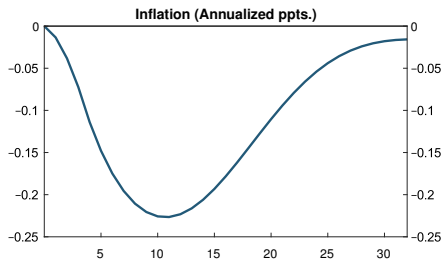
- ▶ 25% of traditional exports consist of deliveries to the oil sector abroad.

- ▶ All oil production is exported and the revenues are placed in an oil fund that invests in foreign asset markets.
 - ▶ Thus, the oil sector also influences the risk premium of investing in NOK.

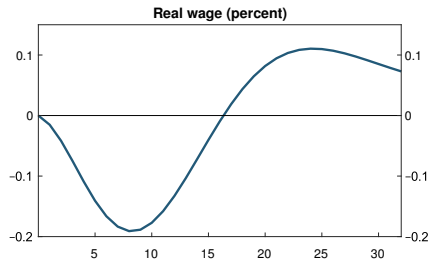
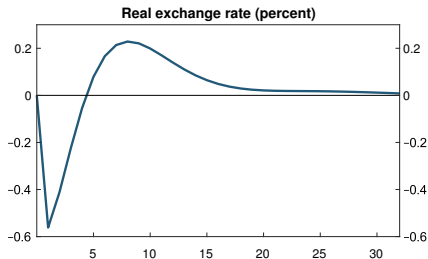
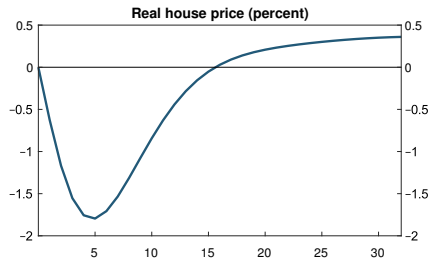
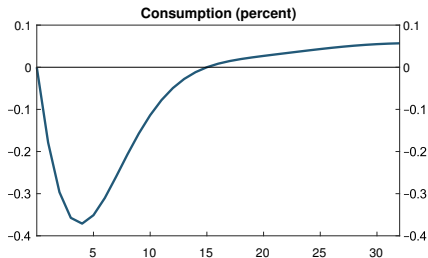
Monetary policy shock: Policy rate



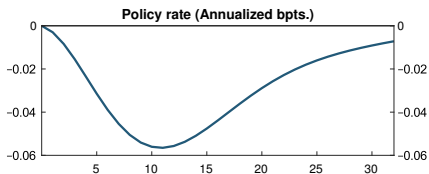
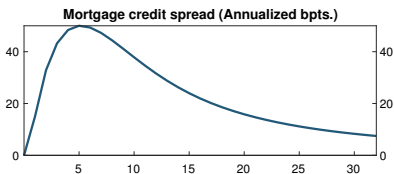
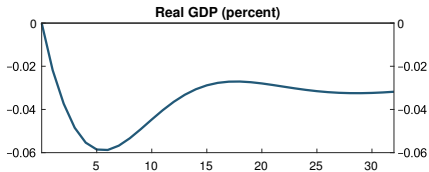
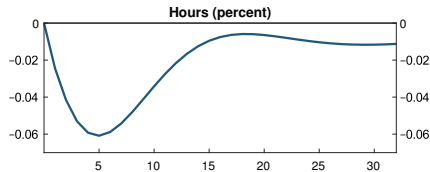
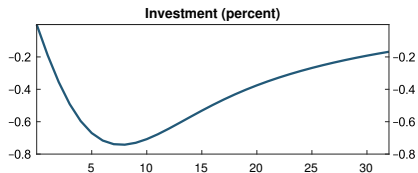
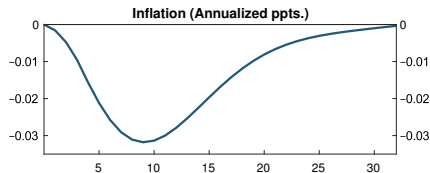
Monetary policy shock: Macro variables



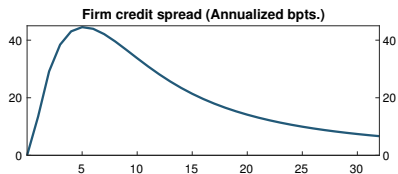
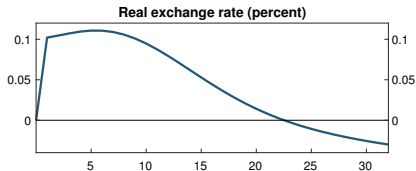
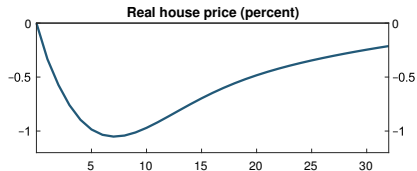
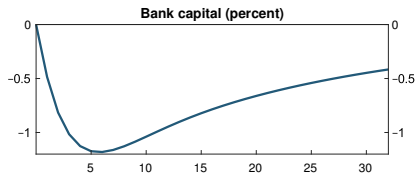
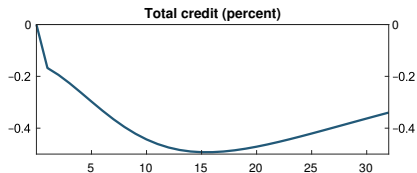
Monetary policy shock: Macro variables



Net worth shock: Macro variables



Net worth shock: Macro variables



Representative agent models

- NEMO
- Suite of macro models?

Heterogeneous agent models

- «HANK»
- Agent-based models