



MINISTRY OF FINANCE

Model Development in the Finnish Ministry of Finance

Mika Kuismanen
 Director
 Economics Department



Economics Department

Hosts "wish list" for the presentation

The purpose of models in the Finnish Ministry of Finance

- Forecasting vs. policy analysis

Model development in the Ministry of Finance

- In-house vs. outsourcing

The use of models in the Ministry of Finance

- Suite of Models
- How often used?
- Amount of staff involved

How to model the fiscal reaction function for Finland?

How to evaluate the steady-state growth path of the Finnish economy?



Modelling history

- First structural macroeconomic model (Kessu) was built in the late 70's.
- Model was used and developed until early 90's.
- 2007 it was decided to start a new model project.
- Different types of models were considered.
- Decision was to build a DSGE-type of model. Choice did not please all.
- Current model (KOOOMA) operational since circa 2011-2012.
- KOOOMA-model will not converge to any SS-version.

Analytical tools in the Ministry

- Indicator models: three different ones
- Nowcasting
- Sectoral models: time series based (e.g. error-correction) tools to analyze different sectors like consumption, export, inflation etc.
- Forecasting
- Static "model": spreadsheet based tool to collect national account identities.
- Forecasting and "simple" policy analysis
- SVAR
- Background tool for the KOOOMA-model
- KOOOMA
- Policy simulations and forecasting

Modelling strategy

In-house or outsourcing?

- In-house was chosen? Why?
 - 1) Need to increase human capital
 - 2) Commitment
 - 3) Continuity

Small model building team.

- 3/4 persons
- Division of labour
- Not everyone should be able to run it.



Model team

In the beginning three persons:

Mika Kuismanen: general model structure and demand

Meri Obstbaum: labour markets and fiscal

Mikko Sariola: supply and trade

Current version is run and developed by Jukka Railavo and Harri Pönkä.

Matlab & Iris skills required.



KOOMA – DSGE Model for the Finnish Economy.



- Policy questions:
 - How much tax increases affect consumer or firm behaviour?
 - What is the optimal inflation rate?
 - What is the role and magnitude of foreign demand shock?
 - How should fiscal policy respond to increasing debt level?
 - What is the size of fiscal multiplier?
- All these questions:
 - Have a quantitative answer.
 - Require contemplating the interaction of labour markets, good markets, financial markets, etc.
 - Impossible (?) to work out in one's head.

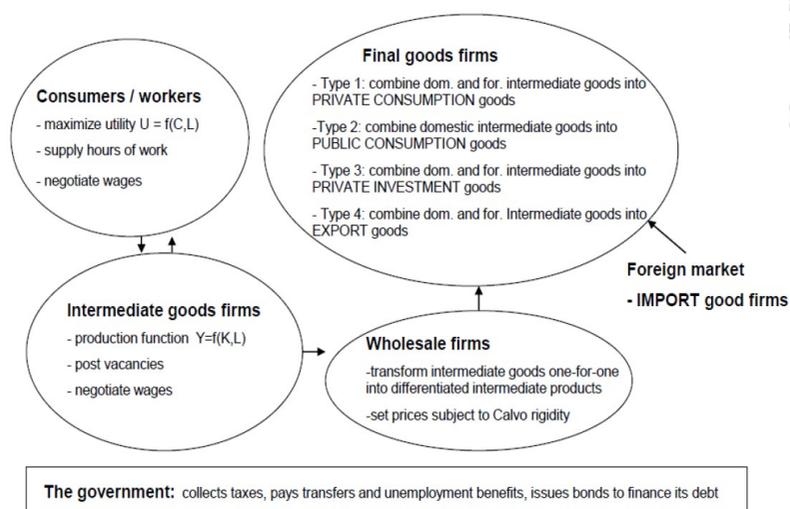
- Models can deliver the quantitative answers that are required
- Models can ensure that the rationale for whatever decision is taken is coherent.
- Model is a discipline device: if the answer it gives contradicts your intuition, you can fight it out with the model.
 - Either you discover that your intuition was wrong
 - Or, you realize you are right and that the model is not to be taken seriously (because of an implausible feature)
 - in this case you have gained a deeper understanding of your own initial intuition.



Why DSGE?

- Dynamic model to assess dynamic problems
- Allows to make predictions about future production and consumption based on agents' behaviour (micro foundations) instead of historical data
- i.e. robust to Lucas (1976) critique
- Strong in policy simulation
- Allows to assess a variety of shocks
- Consistency check of medium term outlook
- Comparative advantage in DSGE modelling
- Limitations?

Key features of the KOOMA



Key features

- New Keynesian DSGE model
 - Monopolistic competition, rigid prices
- Equilibrium unemployment
 - Labour market frictions and rigid wages
 - Improves the model's fit to the data (Shimer, 2010)
- Focus on fiscal policy
 - Distortionary taxation, possibility to run deficits
 - Rule-of-thumb consumers
 - No Ricardian equivalence
- Finland-specific model structure
 - Open economy, no monetary policy
 - Debt-elastic interest rate assumption



Forecasting with KOOMA - steps

- Update the data (HP trend + judgement)
 - => steady state path
- Unconditional forecast
 - deviation from steady state based on current shocks
- Incorporate forecast for chosen variables, e.g. wages
 - conditional forecast



Policy simulations – e.g. fiscal policy

- Reducing unemployment important objective of fiscal stimulus programs, but many modern macro models have nothing to say about unemployment
- What do we know from the literature on the effects of fiscal policy?
 - Empirical
 - Theoretical

	Y	C	L^S	L^D	W/P
RBC	↑	↓	↑	-	↓
New Keynesian	↑	↓	↑	↑	↑↓

- Uncertainty about the effects of fiscal policy
 - Especially the effects on private consumption, employment and the real wage
- Tailormade model is needed because the effects of fiscal policy are likely to be
 - Country-specific, situation-specific, instrument-specific

Fiscal policy transmission

- Responses of private consumption, employment and the real wage in line with NK literature with no matching frictions
- Standard NK effects
 - **The wealth effect:** increased government spending perceived as a fall in private lifetime income, $\Delta_t \uparrow$. As long as leisure and consumption are normal goods, the supply of hours worked will increase and consumption will decrease
 - **The labour demand effect** (not present in RBC model): Firms respond to increased aggregate demand by posting more vacancies
- The effect of the small currency area member state setup -> no counteractive effect from monetary policy
 - The real interest rate falls - dampens the fall in private consumption

The role of matching frictions

- Two additional channels of transmission - through link between fiscal policy instruments and agents' behaviour on the labour market
- Interpretation of the "wealth effect"
 - Raises the supply of individual hours worked
 - But now also increases the **total surplus** from employment (by lowering the disutility from working)
 - => increases vacancy posting - job creation on the extensive margin
 - MPT marginal value of time channel
- The rise in the shadow value of wealth drives up the real interest rate
 - produces a fall in the discounted marginal benefit from new vacancies - vacancy posting decreases

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Fiscal reaction function

- Fiscal authority
 - collect taxes
 - use them to finance
 - Unemployment benefits
 - lump-sum transfers
 - government spending
- The government budget is balanced in each period using lump sum transfers.
- Government consumption and distortionary tax rates are set exogenously.
- (Simple) Fiscal policy rules can be written for
 - Government consumption
 - Value added tax
 - Wage tax
 - Tax rules are counter cyclical and relative to GDP growth
 - Government consumption growth is equal to GDP growth

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Steady-state growth path

- The model equations are linearized around a deterministic steady state.
 - Model steady state does not have growth.
- Hodric–Prescott filter with "tunes"
 - Time series with "tunes" on the change in the trend.
 - Set trend growth rates separately for each variable for projection horizon.
- Separate growth trends for each variable
- Model consistent data in terms of gap between observables and trend path.
- ➔ Outside the model.

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Use of the model

Forecasting

- 4 forecasting rounds per year
- Shadow forecast
- Special role in the medium-term analysis

Policy analysis

- In continuous use
- E.g. to evaluate governments "competitiveness package"
- Crises scenarios

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Policy Simulations examples

- Fiscal policy (taxation, expenditures)
- External demand (trade shocks)
- Price shocks (oil, interest rates etc.)
- Exchange rates
- Household preferences (consumption vs. labour supply)
- Productivity
- Increased competition
- Labour markets
- Investment

Concluding remarks

- Transparency
- Repeatability
- Understanding the limitations of models (whatever type of model one is using)
- Increased interaction with academics
- Positive externalities

David Romer's answer to critics



Thanks for your attention!