Getting in touch with QPM

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Outline

1. Issues in the forecast
2. Case studies
3. Sensitivity analysis
4. Stress Scenarios
Outline

1. Issues in the forecast
2. Case studies
3. Sensitivity analysis
4. Stress Scenarios
Forecast issues

- Use of expert judgement:
  - Model change
  - Data preparation

- Exogenous shocks:
  - Tax changes: First-round and Second-round effects
  - Subsidies
  - Fiscal policy
  - Risk premium: Exchange rate behavior
Forecast evaluation

- Alternative scenarios and sensitivity analysis:
  - Exchange rate sensitivity
  - Alternative scenarios: Exogenous variables forecasts
  - Stress scenarios for financial stability studies

- Forecast effects decomposition:
  - Forecast decomposition: information groups - outlooks for foreign economy, fiscal policy, taxes, etc.
  - Forecast changes decomposition: What changes drive forecast?
  - Evaluation of forecast 6 quarters ago: Fulfilment of inflation target
Forecast decomposition

Forecast vs. the previous forecast:

Forecast Decomposition against database for LGDP_GAP
Issues in the forecast

Model comparison

Forecast deviation from steady state:

Forecast Decomposition against SS for LZ_GAP
Model changes

- Over the time experience with model use is gained
- New states of economy can be observed: fast appreciation
- Changes in structure of economy: investment inflow
Model comparison

Aggregate demand shock:
Model comparison

Disinflation shock:
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How to handle information update?

- GRIP: Graph of Risks of Inflation Prediction
- Sequential update of outlooks in prediction exercise
- Information update is conditional of ordering: disadvantage
Example 1

- GRIP: ex. rate, oil
Example II

- GRIP: Eurozone

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Primární odchylka 3MP/hod. v I/2008 - II/2009

Exog. velič. - ropa, kurz EUR/USD
Exog. velič. - eurozóna, 1R Euribor

Odhvylka CPI inflace v IV/2008 (střed HNT)
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Example III

- GRIP: Government consumption

[Graph showing data points with labels for exogenous variables and fiscal impulse]
Example IV

- GRIP: Initial state
Example V

- GRIP: Inflation
Example VI

- GRIP: Domestic monetary conditions
Taxes I

Why to Deal with Taxes?

- Tax reforms affect inflation $\rightarrow$ should be incorporated in inflation projection
- CNB applies escape clauses on first-round impacts of change in taxation $\rightarrow$ no reaction of policy function
- Inflation excluding first-round impacts of indirect tax changes, called also Monetary Policy Inflation, or Inflation Relevant for MP)
- Tax changes distort inflation expectations $\rightarrow$ expectations formation should be adjusted
Inflation and MP Inflation

(actual inflation)

inflation excluding primary impact of changes in indirect taxes forecast
Requirements

- Information about planned changes in indirect taxes
- Precise estimation of direct first-round effects
- Estimation of primary effects: use CPI basket to assess
- Estimation of impact on inflation expectations formation (second-round effects): wealth effect
- Good enough estimation of direct second-round effects e.g. margin absorption, price stickiness
Taxes IV

Issue I: Foreign Taxes
- Should be treated similarly
- Typically, not enough information nor good estimates of impact on foreign inflation

Issue II: Real Exchange Rate (RER)
- Within the simple model framework, RER is defined involving CPI rather than PPI inflation rates
- From theory, RER should be adjusted to changes in indirect taxes (domestic and foreign)
- However it is difficult to apply, having usually small effects on projection
Tax changes

Czech Experience:
- From January 2004 - domestic VAT changes incorporated
- From April 2006 - foreign VAT changes incorporated
- From April 2007 - RER adjustment applied

Quantification of effects of tax changes: Time profile and size of impact (volatility of forecast)
More tax issues

1. Foreign tax change
   - Should be treated similarly
   - Typically, not enough information nor good estimates of impact on foreign inflation

2. Real Exchange Rate (RER)
   - Within the simple model framework, RER is defined involving CPI rather than PPI inflation rates
   - From theory, RER should be adjusted to changes in taxes (domestic and foreign)
   - However it is difficult to apply, having usually small effects on projection
Oil price I

Czech Experience:

- Oil price shock started in autumn 2005, peak in summer 2008
- Small weight of fuel prices (around 3% in CPI)
- Expected increase in fuel prices and regulated prices
- Very large increase in oil prices as well as their maintaining at high levels is no longer consistent with behavioral mechanism described in QPM (affects inflation expectations)
- Systematic upward bias of inflation over several periods, especially in adjusted inflation excluding fuels
- At the same time, nominal exchange rate appreciated rapidly in comparison with the forecast
- Outlook of foreign variables affected - use of a global economy model
Oil price II

- Oil Prices - Brent
Implementation I

- Effects to administered prices: energy for households
- Energy price inflation: non-administered portion of consumption basket
- Impact on foreign inflation
Revision of CPI Weights I

Czech Experience:
- New weights introduced from January 2007
- Previous revision in January 2001
- Model framework assumes constant weights in CPI
- QPM forecasts since July 2002: New experience
Revision of CPI Weights II

- Computing q-o-q and y-o-y inflation correctly: Auxiliary indices CPI1 and CPI4 were introduced
- Smooth transition
- Systematic shift in inflation: Structural change in real equilibrium exchange rate
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Analysis 1

- What is the difference in scenario of appreciation and depreciation?
- Linear model properties
Analysis II

- Depreciation

![Graph showing various economic indicators over time](image-url)
Analysis III

Appreciation

Reporting in the SR:
**Appreciation by 3%**

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Shock persistence I

- Volatile development of exchange rate: January 2007
- Re-simulation of sensitivity scenario
- Standard simulation: No persistence in shock
- Advanced simulation: Various degrees of autocorrelation

Results:

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Stress testing

- Cooperation with supervision units
- Scenario for financial stability department
- Scenarios for the bank risks evaluations models
- Series used for probability of defaults calculations
- Goals:
  - Usually unfavorable developments to be modeled
  - Probability of defaults calculations: economy wide