

# Inflation targeting and financial stability

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## Questions:

### **A. How to set up the macro prudential policy strategy?**

- How to operationalize financial stability policy?
- Can we benefit from experience designing the monetary policy strategy?
- What is missing for the successful conduct of macro prudential policy?

# Inflation targeting and financial stability

## Questions:

### **B. How can MP under IT regime promote financial stability?**

- What are potential adjustments of IT regime discussed?
- Should we amend policy rules for financial indicators?
- What is the appropriate degree of coordination of monetary, supervisory and regulatory policies in the decision making?

### **C. Are common central bank models capable to assess implications of macro prudential policy?**

- Paper of Benes, Kumhof, and Vavra addresses some of the existing weaknesses.

# Background: An unusual debate

## Multiple instruments

- Re-emergence of FX interventions as a standard instrument
- Renewed appetite for administrative and prudential measures in both preserving financial stability as well as monetary policy instruments
- Various forms of quantitative easing and budget financing

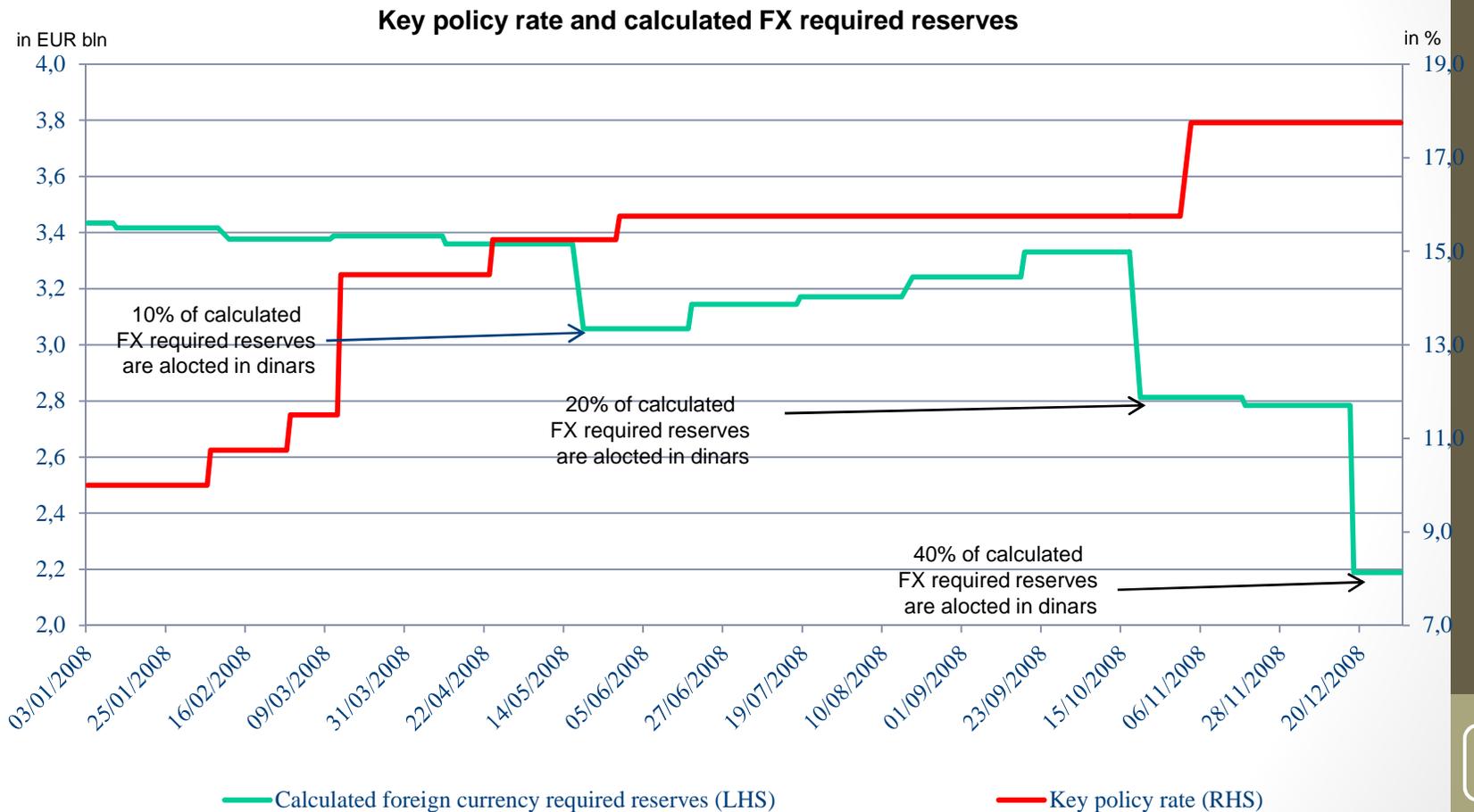
## ... and multiple objectives

- “leaning against the wind” policies
- Interest rates and quantitative easing to achieve financial stability objectives
- FX interventions as a tool supporting growth
- Money and FX market facilities to preserve market stability
- Administrative measures serving a macro-prudential role

# Background: An unusual debate

- Problems with conflicting objectives during the crisis
  - Financial stability and macro-prudential warnings not feeding into policy stance assessment
  - Financial stability objectives interfered with monetary and fiscal ones, e.g. in floating but euroized economies
  - Growth in conflict with price stability objectives

# Background: An unusual debate



# A. Macro prudential policy

- Many countries have been experimenting with macro prudential measures, but a well defined framework (targets, measurable indicators, and instruments) is still missing.

Measure	Countries
Loan to Value	Singapore, China, South Korea, Hong-Kong
Loan to Income	Serbia
Debt to Income	South Korea
Credit restrictions	Serbia, Malaysia
Direct control of credit	Malaysia, Philippines, Singapore

Institutional arrangements:

EU—European Systemic Risk Board.

UK—Financial Policy Committee.

France—Financial Regulation and Systemic Risk Council.

# A. Two Competing Concepts

- Price stability is sufficient, but needs to be refined
  - Challenge is to integrate financial stability with the traditional interest rate based monetary policy focused on price stability
  - Financial stability is a precondition for price stability - it makes achieving price stability easier
- Financial stability is a separate function
  - Challenge is to define the new function with its objectives, instruments and decision making processes
  - Financial and price stability may be in conflict

# A. Two Competing Concepts

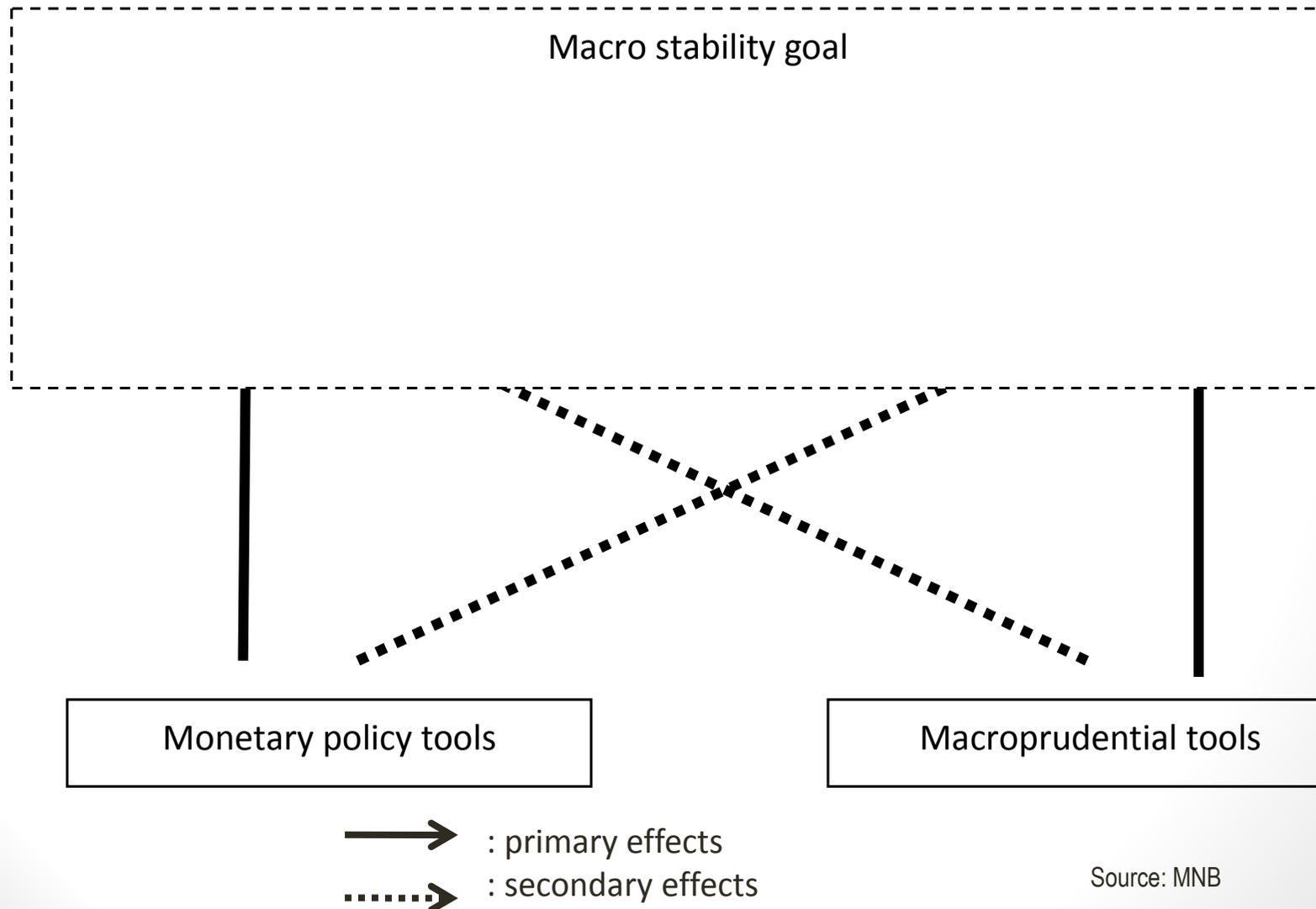
## Price stability is sufficient, but needs to be refined

- Account for changing transmission channels
- Measures of leverage/fin stability risk as an additional intermediate objective
- Interest rates as the main instrument
- Other instruments/prudential measures as short-term fixes

## Financial stability is a separate function

- Remove systematic risk across sectors and across time
- Potential conflict with price stability
- There are many feedback mechanisms between both functions that needs to be internalized
- Capital requirements as the main instrument (interest rates)

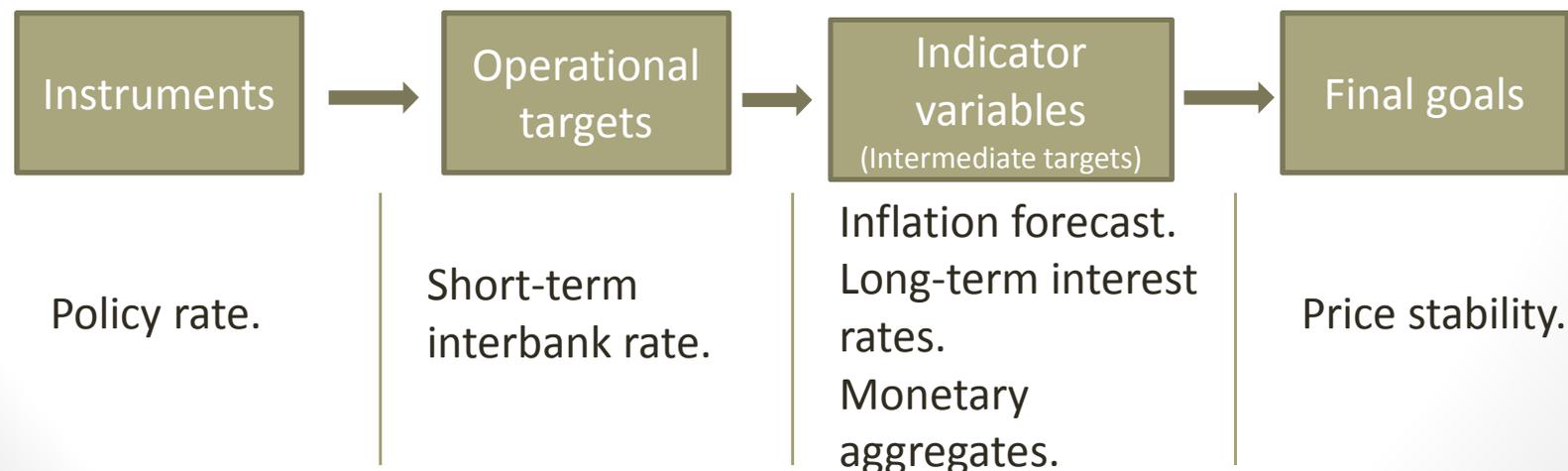
# A. Price and Financial Stability: Integration or Coordination?



Source: MNB

# A. Macro prudential policy

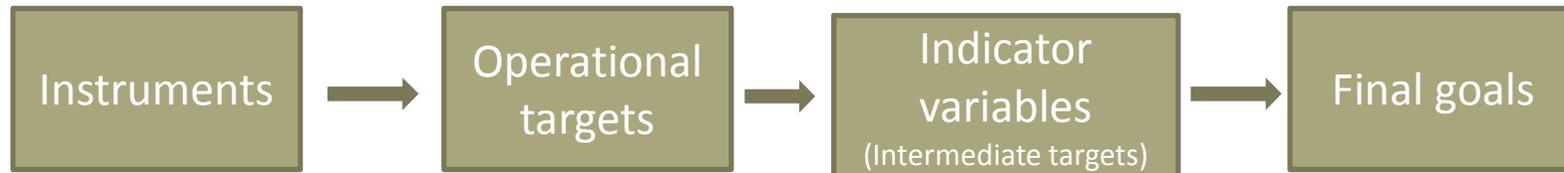
- To conduct macro prudential policy requires:
  - i. An operational framework with clearly defined goals, measurable indicators, and instruments.
  - ii. Knowledge of the transmission mechanism from instruments to targets and indicator variables.
  - iii. A rule for operational targets changes.
- Financial stability policy can be framed around a framework similar to monetary policy.



# A. Macro prudential policy

- Potential benefits from such a framework for macro prudential policy:
  - i. Enhanced fulfillment of the financial stability goal— instruments affect financial stability indirectly with transmission lags.
  - ii. Regular assessment of policy stance via information variables is enabled.
  - iii. Improved communication of policy actions.
  - iv. Forward looking and rule based manner of policy is enabled.
- In contrast to the MP framework, there is:
  - i. More than one instrument but also many operational targets.
  - ii. Potential non-linearity—sudden stops, financial innovations, etc.

# A. Macro prudential policy



1. Countercyclical capital buffers.  
Dynamic provisioning.  
Direct control of credit to specific sectors.

2. Loans to deposits limits. Liquidity requirements.

3. Loan-to-value ratios. Debt service to income ratios.

4. Currency mismatch limits. FX positions limits.

Capital adequacy ratio.  
Provisions levels.

Liquidity measures (NSFR and LCR).

Loan-to-value ratios.

Currency mismatch.

Credit growth.

Liquidity indicators.

Mortgage lending.

Currency mismatch indicators.

Final goals

Macro financial stability

Micro financial stability

# A. Macro prudential policy

Remaining agenda:

- Achieve a consensus on qualitative definition of financial stability (literature).
- Define measurable indicators of systemic risks or identification techniques.
- Macro prudential toolkit of instruments, including criteria for their choice and calibration.
- International co-ordination.

# A. Macro prudential policy

Remaining agenda:

- Empirical evidence on the transmission from instruments to indicator variables.
- Decision making rules and communication of steps. Rule based or discretionary changes of instruments?
- An integration with micro prudential policy and supervision.
- Macro models exhibiting financial frictions and cycle.

# B. Inflation targeting

- It is widely accepted that the primary objective of monetary policy is the price stability.

King (2009): *“Inflation targeting is a necessary but not sufficient condition for stability in the economy as a whole. When a policy is necessary but not sufficient, the answer is not to abandon, but to augment it.”*

Amendments of IT MP discussed in the literature:

1. Lengthening of policy horizons.
2. Price level targeting.
3. Changes of policy rules, including several instrument rules (e.g FX interventions or prudential measures with MP implications)

# B.1. Lengthening of policy horizon

- Motivation:
  - i. Policy horizon of 2-3 years might be too short to take proper account of financial cycles;
  - ii. Or lengthening of the policy horizon will reduce inflation variability if financial frictions increase transmission lags.
- Two options: Forecasting (feedback) horizon or target horizon might be lengthened.
- However, from a practical perspective these strategies are not feasible:
  - i. Forecasts beyond the two years horizon are dominated by trends rather than business cycle movements.
  - ii. Adverse effects on credibility and accountability.

## B.2. Price level targeting

- Could be considered as another means of lengthening policy horizon (Sims(2003) shows that optimal target horizon of PLT is longer than for IT).
- Might help to overcome credibility issues of lengthening of policy horizons.
- Also, suitable to deal with zero lower bound (ZLB).
  - With PLT misses of target on one side will need to be reversed, and this should feed into expectations in a stabilizing way.
- Only BoC is considering/debating the PLT option.
- Research suggests that more credibility/more forward-looking expectations bolster case for PLT.

## B.3. Adjusting MP rules

- Considering price stability as the primary objective of monetary policy, most of studies conclude that standard Taylor type rules are close to optimal.
  - Models tend to suggest more aggressive inflation targeting rules or lengthening of the policy target horizon.
  - Policy rules adjusted for financial variables perform better than inflation based rules in responding to financial shocks.
  - However, following Curdia and Woodford (2009) optimal weights on financial variables vary with shocks.
  - MP can be a blunt tool to prick asset prices bubbles.
- Nevertheless, financial sector development and frictions have to be taken into account by central banks and incorporated into policy analysis and forecasting systems.

# C. We need to understand more

- Policy measures sometimes taken under time pressure without analysis of effects
- Analytical and forecasting frameworks
  - Macro – usually no explicit treatment of the financial sector, leading to underestimation of the financial and real sector repercussions
  - Financial stability – tests are often static, and largely inconsistent with lacking a dynamic link to the macroeconomic framework

# C. New Analytical Frameworks

- Need for a better understanding of the inter-linkages between the financial sector and the rest of the economy
  - Gain the capacity to conduct a forward looking analysis of financial and macroeconomic developments
  - Insufficient tools for macro-prudential analysis
- Many CBs and IFIs are intensively working in this area

# C. Central banks models and financial frictions

- Prior to the crisis many central banks employed models assuming a perfect and complete financial market.
  - No transaction costs and information asymmetries—frictionless.
  - No uncertainty about financial contracts.
  - The financial structure of firms is considered as irrelevant—Modigliani-Miller theorems.
  - One risk free interest rate paid on bonds.
- Three approaches extensively used in the literature to introduce financial aspects into DSGE models:
  - 1) Financial accelerator framework.
  - 2) Collateral constraints framework.
  - 3) Strand exploiting explicit modeling of the banking sector.

# C.1. The financial accelerator

- Introduced by BGG (1999).
- Endogenous development of credit markets amplifies and propagates shocks.
- Information asymmetries between borrowers and lenders.
  - Projects outcomes subject to idiosyncratic shocks.
  - Outcomes are observable ex-post by borrowers not by lenders—costly state verification.
- The costly state verification induces a positive external financing premium negatively correlated with borrower's net worth.
- Defaults occur in equilibrium and their frequency evolves over the business cycle.

## Weaknesses (the original setup)

- State-contingent contracts—no aggregate risks bear by lenders.
- No financial intermediaries.

## C.2. Collateral constraints

- Introduced by Iacoviello (2005).
- Asset price swings magnify imperfections in the credit market—very similar to the FA.
- The limited enforcement environment.
  - Lenders cannot force borrowers to pay unless the debt is fully insured by collateral.
  - Durable assets such as housing, capital, or land serve as collateral.
- Credit limits are determined by the market value of agent's assets.

### Weaknesses (the original setup)

- No idiosyncratic project uncertainty and therefore endogenous default risks.
- No financial intermediaries assumed.

# C.3. Banking sector modeling

- Modeling strategies range from relatively ad-hoc assumptions to rigorous micro-foundations.
- It is difficult to categorize these approaches. The modeling choice reflects objectives and obviously focuses on:
  - 1) Interest rate margins.
  - 2) Regulatory requirements.
  - 3) Banks risks taking, etc.

## Ad 1.

- Banking as a costly activity.
  - Resources as capital, reserves, or labor are required to produce loans.
  - E.g. Benes, Otker-Robe, and Vavra (2009).
- Monopolistic competition and stickiness of interest rates.
  - E.g. Mandelman (2006) or Benes and Lee (2007).

# C.3. Banking sector modeling

## Ad 2.

- Banks experiencing regulatory requirements.
  - Banks face penalty costs if they deviate from the required level.
  - Incentive based regulation, e.g. Benes, Kumhof, and Vavra (2011).

## Ad 3.

- Approaches motivate holding of capital/liquidity or seek to assess banks' risks taking.
  - Information asymmetries, risks of bank runs or idiosyncratic shocks and payout schemes are exploited.
  - See, e.g. Angeloni and Faia. (2009), Gertler and Karadi (2009).

## Weaknesses

- Costly banking implies pro-cyclical interest rate spreads.
- A limited set of banking sector behavior is considered.

# Remaining challenges

## **General**

- Further empirical evidence on the importance of different transmission mechanisms.
- Asset prices behavior—bubbles, house prices, implications for the conduct of monetary policy.

## **Banks**

- Debt contracts—non-state contingent with credit (default) risks; multi-period contracts (maturity mismatch).
- Balance sheets including interbank borrowing and liquidity risks.
- Contagion risks.
- Risk taking behavior—organizational structure, moral hazard, or time varying risk aversion?

# Ex: Balance Sheet Effects

- Benes, Berg, Portillo and Vavra: “Sterilized Interventions and Balance Sheet Effects of Monetary Policy “
- Introducing balance sheet effects of monetary/exchange rate policy transmission through optimizing banking sector

Central Bank	Financial Sector	Households
$F$	$O$	$L$
	$L$	$NW$

- where  $F$  stock of FX reserves,  $O$  CB issued securities,  $L$  commercial banks loans to households,  $B$  banks refinancing from abroad,  $NW$  households net worth. Note that  $NFL = L$ ,  $F = O$
- Output-output model of banking sector

# Ex Balance Sheet Effects

- Optimizing banking sector:

$$\max_{\{O,L\}} \Pi_{+1} = \exp(j)L + \exp(i)O - O + \exp(i^*)(O + L) \frac{S_{+1}}{S} - \Omega(O, L)$$

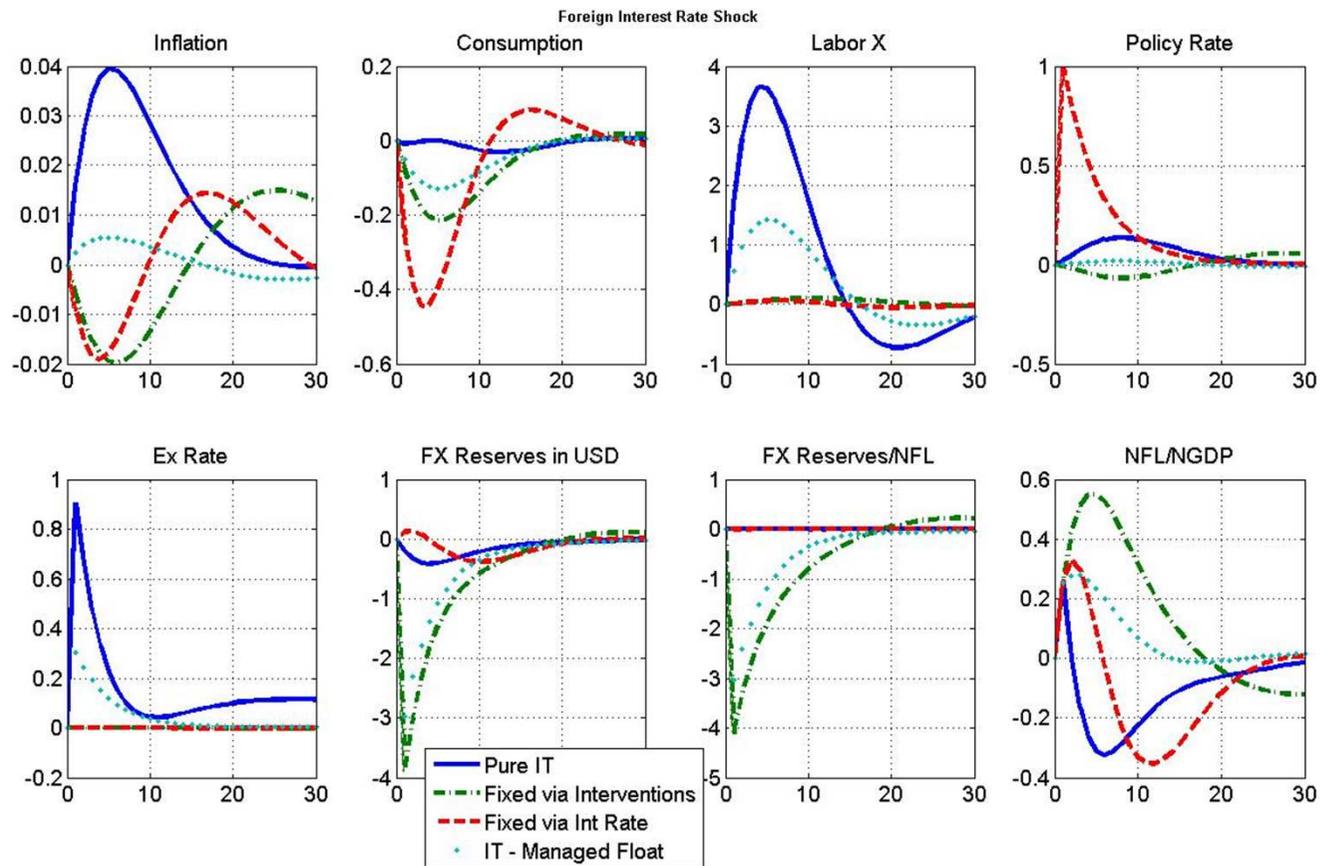
$$\Omega(O, L), \quad \Omega_i(\cdot) > 0 \quad \Omega_{ii}(\cdot) < 0 \\ \Omega_{ij}(\cdot) < 0, \quad i, j \in \{O, L\}$$

- FOC:

$$\exp(i) = \exp(i^*) \frac{S_{+1}}{S} + \Omega_O\left(\frac{F}{P}\right), \quad \Omega'_O(\cdot) > 0$$

$$\begin{aligned} \exp(j) &= \exp(i^*) \frac{S_{+1}}{S} + \Omega_L \\ &= \exp(i) + \Omega_L - \Omega_O\left(\frac{F}{P}\right) \end{aligned}$$

# Ex Balance Sheet Effects



# Ex Bank Capital

Benes, Kumhof Vavra: **“Aggregate risk and bank capital: Incentive-based analysis of capital regulation in an open economy”** :

- Address at least some weaknesses exhibited by existing macro models.
- Capture interactions between real and financial cycles.
- Propose a framework suitable for macro-prudential policy analysis.
- Provide a special reference to emerging market economies (aspects as dollarization, characteristic shocks, etc.).
- Illustrate the use of the model developing a number of hypothetical scenarios as shocks to the country spread, terms of trade shocks, and asset price bubbles.

# Ex Bank Capital (BKV model)

The model aspects crucial for an assessment of macro-prudential policy:

## i. **Credit (default) and interest rate risks**

- Debt contracts exhibit endogenous defaults (idiosyncratic shocks to projects outcomes—the financial accelerator framework).
- Debt contracts are non-stage contingent contracts—there are subject to uncertainty on the aggregate (economy) level.
- As a result, lenders (banks) bear a part of aggregate risks.
- This type of contract is in contrast to a large amount of macroeconomic models with financial frictions and state-contingent debt contracts, originated by Carlstrom and Fuerst (1997) and Bernanke et al. (1999).

# Ex Bank Capital (BKV model)

## ii. Banks hold capital.

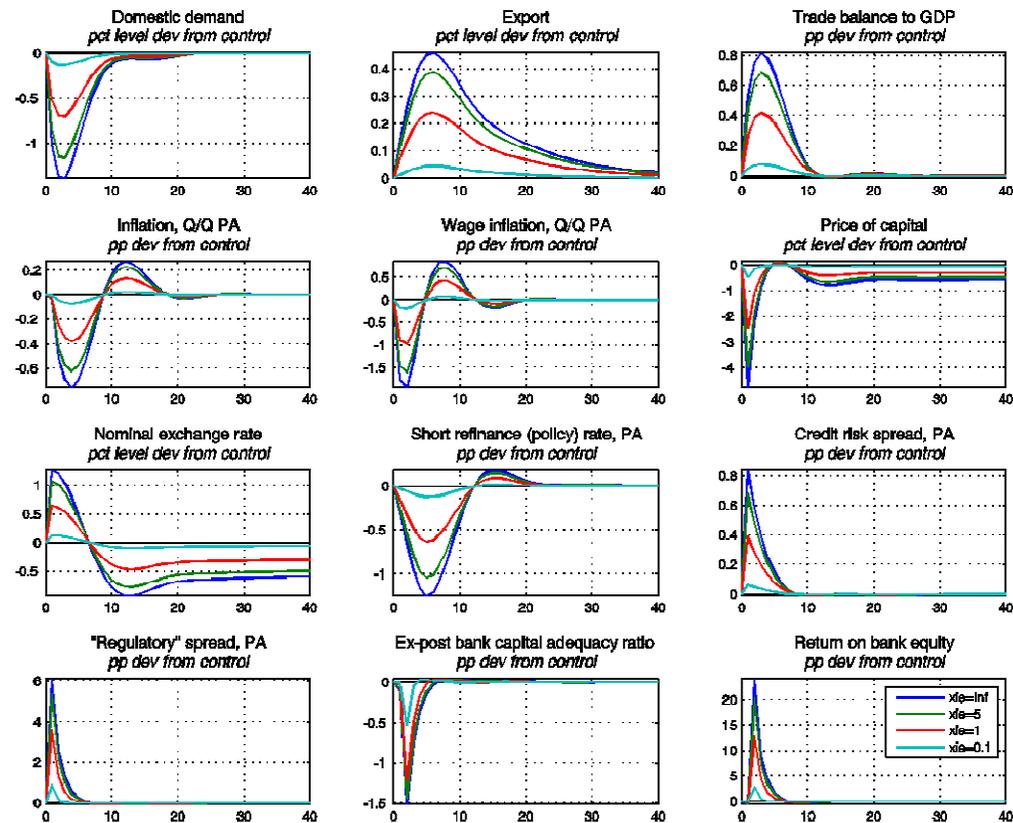
- Reflecting credit and aggregate (economy) risks, banks need hold their own net worth—bank equity, capital.
- Bank capital plays a non-trivial role in determining the banks' lending policy.

## iii. Bank capital is subject to regulation

- Regulation is not a binding constraint in the bank optimization problem.
- Regulatory requirements are introduced as system of penalties that creates incentives for behavior of banks—**incentive based regulation** (Milne, 2002).
- Regulatory requirements and an assumption that acquiring new capital is costly give arise an endogenous capital buffer.
- Bank capital and balance sheet position of banks affect their lending—bank capital channel (Van den Heuvel, 2002).

# Ex Reduction in the bank capital (BKV model)

Exogenous shock to bank capital

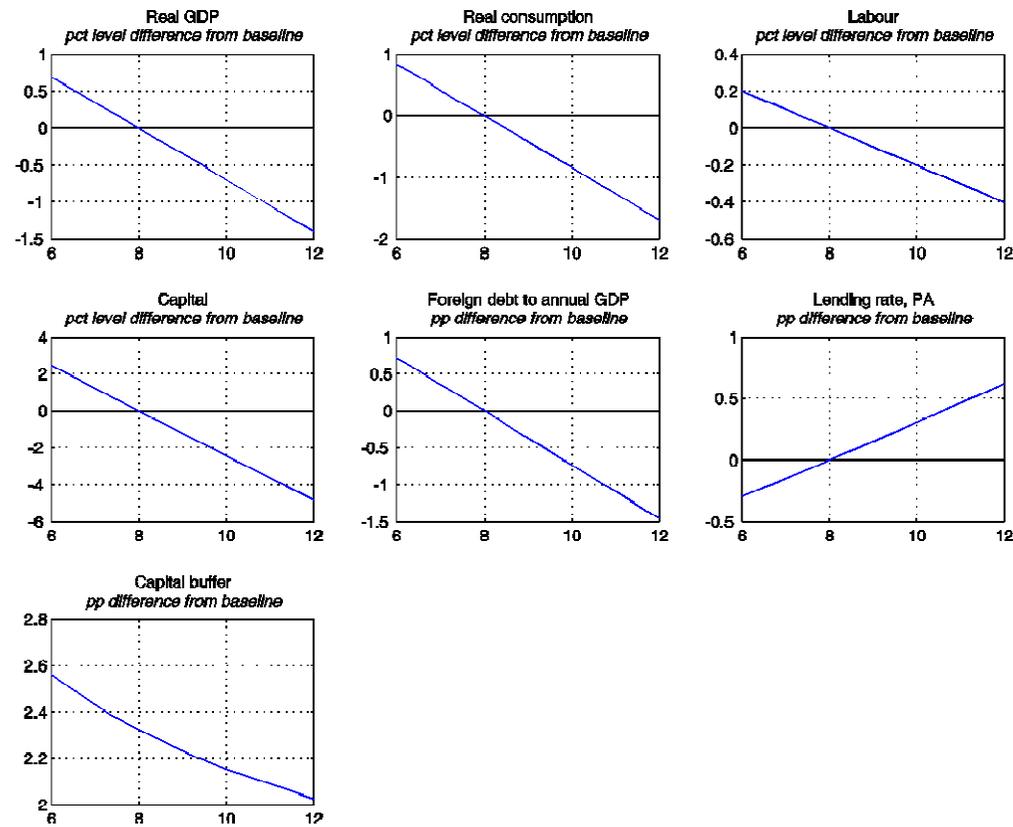


# Ex Bank Capital (BKV model)

- Macro-prudential policy (in the form of capital requirements) has permanent effects on real equilibrium allocations
  - Unlike traditional MP tools
  - Similar to fiscal policy effects through taxation of HH borrowing (Bianchi and Mendoza, 2010)

# Ex Changing Capital Requirements (BKV model)

Comparative static for regulatory minimum

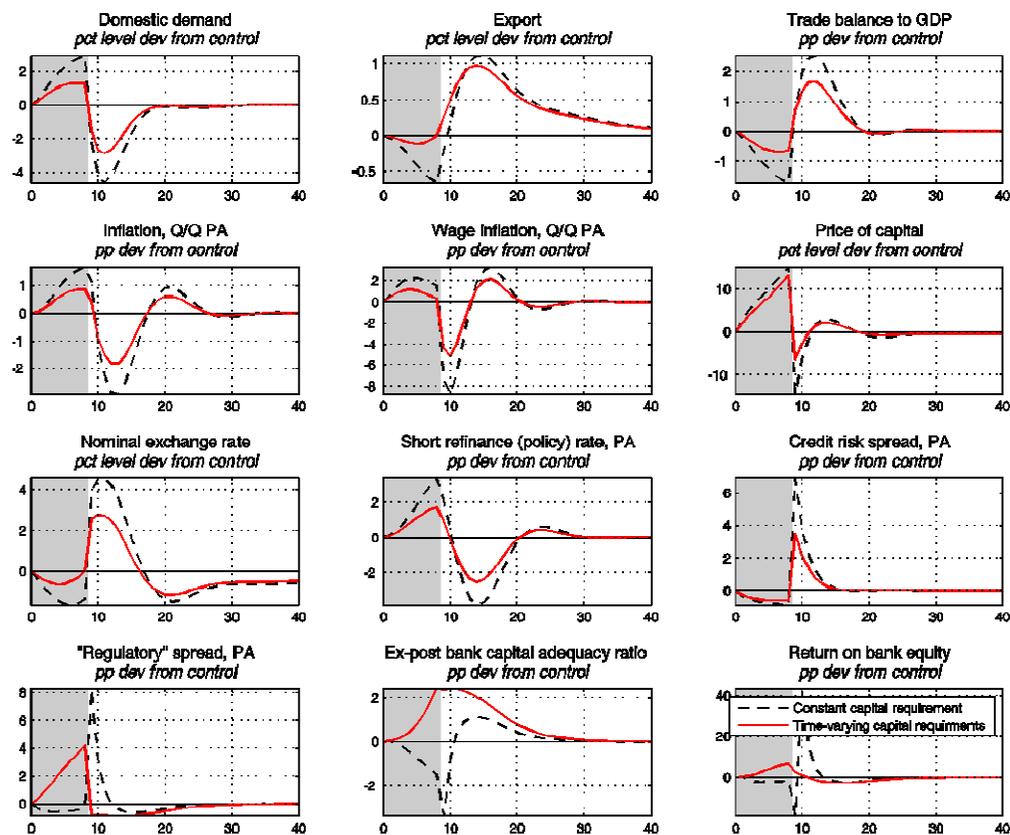


# Ex Bank Capital (BKV model)

- Macroprudential regulation entails both costs and benefits
  - reduces output and consumption by increasing the wedge between refinance and lending rates (Estrella, 2004)
  - Creates more financially stable environment by reducing some externalities through limiting the leverages of banks and households

# Ex Irrational asset price bubble with time varying capital requirements

Asset price bubble and burst



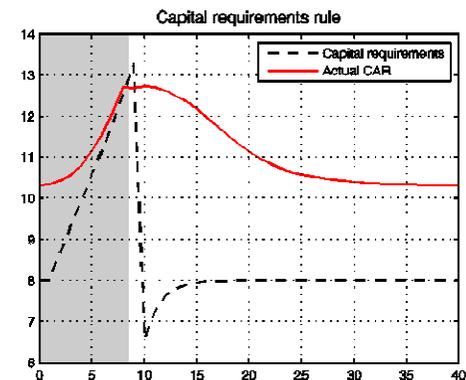
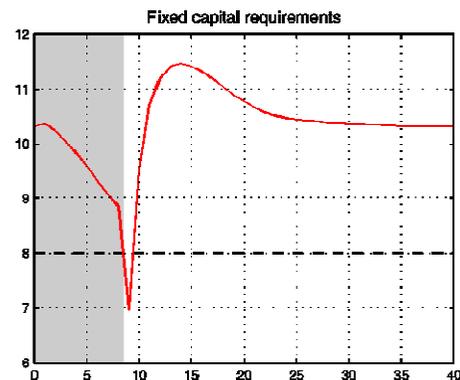
# Ex Bank Capital (BKV model)

- Do not support the notion of pro-cyclical prudential policy
  - Linking capital requirements to real activity or targeting stable financial sector indicators (e.g. credits-to-GDP) is a reduced form thinking that links remedies to symptoms rather than the underlying cause of instability
  - Rather we need a measure of systemic (aggregate risk) across the financial sector
  - E.g. we use a lending spread as a measure of the aggregate credit spread and show that it can work more reasonably than a output (cyclical) related rule
  - $\gamma = \bar{\gamma} + \varphi(R_L - R_F - \bar{\Delta})$
  - However, in practice many measures as well as judgment and model based experiments needed – arguably many more than for robust monetary policy making

# Ex Irrational asset price bubble with counter-cyclical requirements

Contrast the pro-cyclical requirements (hyphenated) with credit spread requirements

Asset price bubble and burst



# Ex BKV Conclusions and Limitations

- Banks accumulate systemic risk during the bubble
  - Consumption, investment and lending increase
  - Borrowing from abroad increases
  - Capital adequacy falls
  - Credit risk spread declines
- Systematic macro-prudential policy can help reduce the build up of the imbalances
- No cross-sectional dimension , only time dimension (a representative bank)
- No liquidity risk
  - Early liquidation costs
- No deposits
  - Input-output, versus output-output story

# Main Themes Again

- What is the appropriate degree of coordination of monetary, supervisory and regulatory policies in the decision making?
- The crisis is a bad reason for forgetting the hard won lessons of how to conduct policies enticing credibility
  - Simple targets, discipline in rules, independence in decisions, transparency in actions
- We need to understand more

Thank you

# Backup slides

## Regulatory measures implemented in emerging market economies

Objective	Tools	Examples
Manage aggregate risk over time (ie procyclicality)	<ul style="list-style-type: none"> <li>• Countercyclical capital buffers linked to credit growth</li> <li>• Countercyclical provisioning</li> <li>• Loan-to-value (LTV) ratios</li> <li>• Direct controls on lending to specific sectors</li> </ul>	<ul style="list-style-type: none"> <li>• China<sup>1</sup></li> <li>• China, India</li> <li>• China, Hong Kong SAR, Korea, Singapore</li> <li>• Korea, Malaysia, Philippines, Singapore</li> </ul>
Manage aggregate risk at every point in time (ie systemic oversight)	<ul style="list-style-type: none"> <li>• Capital surcharges</li> <li>• Liquidity requirements / funding</li> <li>• Limits on currency mismatches</li> <li>• Loan-to-deposits requirements</li> </ul>	<ul style="list-style-type: none"> <li>• China, India, Philippines, Singapore</li> <li>• India, Korea, Philippines, Singapore</li> <li>• India, Malaysia, Philippines</li> <li>• China, Korea</li> </ul>

<sup>1</sup> Being considered.

Note that reserve requirements are not included as they are considered an instrument of monetary policy.

Source: ICFR web.