DANMARKS
NATIONALBANK

Quest for ROMP

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Quest for Robust Optimal Macroprudential Policy

Starting from the end.....

Introduction

Optimal capital requirements

Optimal countercyclical capital buffers

Optimal interaction of instruments

Some highlights

- Optimal level of bank capital for the Euro Area (EA) lie at 15.64% (2% higher than the average level for 2001-14 period). Optimal capital **increases somewhat** the total **level** of welfare (utility), but **reduces significantly** the **volatility** of the economy.
- 'Undershooting' is much more costly than 'overshooting'.
- Optimal EA Countercyclical Capital Buffer is the one that responds to credit and house prices, with a larger response to house prices.
- Under an optimal combination of policies, gains in welfare are larger than the sum of its parts due to synergies.
- In this case, optimal CCyB changes to the one that responds to credit and mortgage spreads, with a higher weight on the first argument.
- Optimal capital buffers are country-specific as the macro-financial structures vary across Euro Area countries. 'One rule fits all' policy should therefore not be implemented.

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Brief motivation from ongoing policy debates

- Since the financial crisis in 2008, a set of (macro)-prudential tools have been designed and implemented in the Euro Area. Yet, there is still thin evidence on their (joint) impacts and optimal interaction.
- At the same time, there are increasing concerns regarding the **costs** and **unintended consequencies** of macroprudential measures.
- There is also some concern that the **degree of complexity** of the current regulatory framework may be preventing smooth functioning of the financial system (*regulatory economy*).
- It comes back to the dichotomy of whether the current regulatory architecture is **overburdening** the financial system or **not sufficiently safegarding** the economy from future adverse events.

What we do here

- We respond to some of these questions by determining optimal macroprudential policies using holistic welfare criteria.
- The optimal policy approach has been adopted to the macroprudential context.
- The criteria (or objective functions) are consistent with the model structure and derived using the weighted utility of borrowers and savers.
- We use the criteria to extract the following policies:
  - Optimal level of capital requirement (CR)
  - Optimal countercyclical capital buffer rule (CCyB)
  - Optimal interaction between CR and CCyB
  - (Cross-country optima)
- Moreover, we incorporate a few imperfections common for policy-making in real-time.

Application

- The 3D model (Clerc et al 2015) has emerged as the Euro Area financial frictions model that allows policy experiments, counterfactual analysis and cross-country comparisons.
- The model introduces financial intermediation and three layers of default into a DSGE model.
- It provides a clear rationale for capital-based regulation arising from two types of distortions: **limited liability** by banks and bank **funding cost externalities** leading to excessive risk taking by banks.
- The model is fit to (Euro Area) individual country data, matching first and second moments of the main macro and financial variables
- Capital-based instruments are quantified and evaluated in terms of household welfare, GDP cost, credit losses, sectorial losses. We examine optimal policy in this paper.

Briefly on model distortions

- Banks finance their loans by raising **equity** (from bankers) and **deposits** (from savers). Costly equity is only enough to satisfy the regulatory limit.
- Deposits are formally insured by a deposit insurance agency funded with lump sum taxes.
- Taxes are paid by depositors to keep them 'in the game'.
- Depositors are incentivized to save by allowing them to charge a time-varying deposit rate that includes a (perceived) deposit risk premium.
- When banks default, depositors do suffer some transaction costs despite the presence of deposit insurance.
- This feature is introduced in the model in order to provide a link between bank risk and banks' funding costs. It is a crucial model feature for our welfare analysis.

Key distortion

- The key distortion in the model is related to the fact that **banks' cost of funding is unrelated to banks' individual risk taking**. This happens for two main reasons:
  - Safety net-guarantees insulate banks from the effect of their risk taking on the cost of deposits;
  - The deposit premium is based on system-wide (rather than individual) bank failure risk. This reduces the incentive of any individual bank to limit leverage and failure risk because it will get no funding cost benefit when depositors are uninformed.

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Curvature and method

- From the model, we know that **welfare of savers increases** with higher bank capital levels, meanwhile it **quickly drops for borrowers**.
- Moreover, in the long run, capital requirements affect bank funding costs in two off-setting ways. On one hand it **lowers the cost of deposit funding**, but at the same time, **increases the share of more expensive equity funding**.
- Further, on aggregate there are trade-offs in maximizing aggregate demand (output) and containing risks.
- Therefore, a comprehensive (well-rounded) and consistent method is required to determine the 'optimal balance'.
- There is an established literature on optimal monetary policy design using a LQ approximation of the various utility functions in a model with financial frictions (De Fiore and Tristani (2009), Chadha et al (2013), Gerba (2016), Ferrero et al (2017)).
- We use their insights and adapt it to our particular problem.

Welfare function

- We make a second order approximation (SOE) of the joint utility, with both first-order and second-order terms in order to also capture volatility effects of capital requirements.
- *Reason*: CR is a non-cyclical instrument that affects the level of aggregate utility of agents in the steady state. Thus, apart from the standard **volatility** effects, bank capital levels impact the **level** of welfare (or consumption) in steady state.
- After derivations, our SOE welfare functions is:

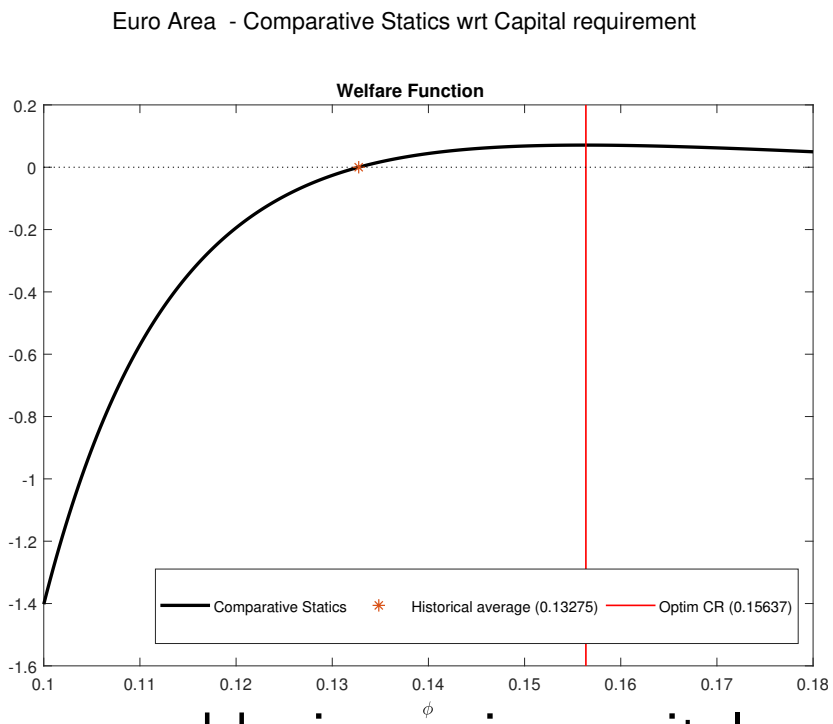
$$E_0 \sum_{i=0}^{\infty} \beta^{t+i} W_t,$$

$$W_t = \chi_{h^s}(\mu_{h^s} - \sigma_{h^s}^2) + \chi_{h^m}(\mu_{h^m} - \sigma_{h^m}^2) + \chi_w(\mu_w - \sigma_w^2) + \chi_k(\mu_k - \sigma_k^2)$$

where the normalized weights in SS of each term are:

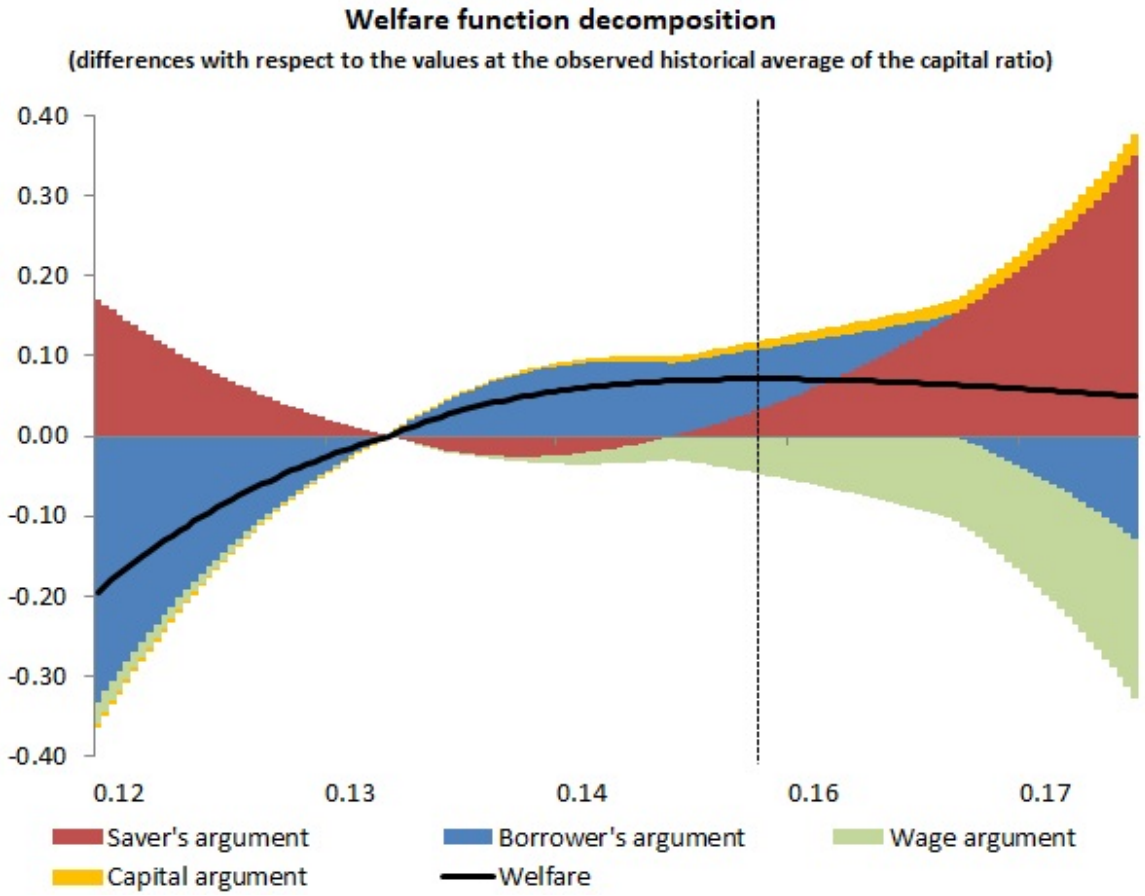
$$\chi_{h^s} = 0.99 \qquad \chi_{h^m} = 1 \qquad \chi_w = 0.47 \qquad \chi_k = -0.26$$

Welfare function - shape



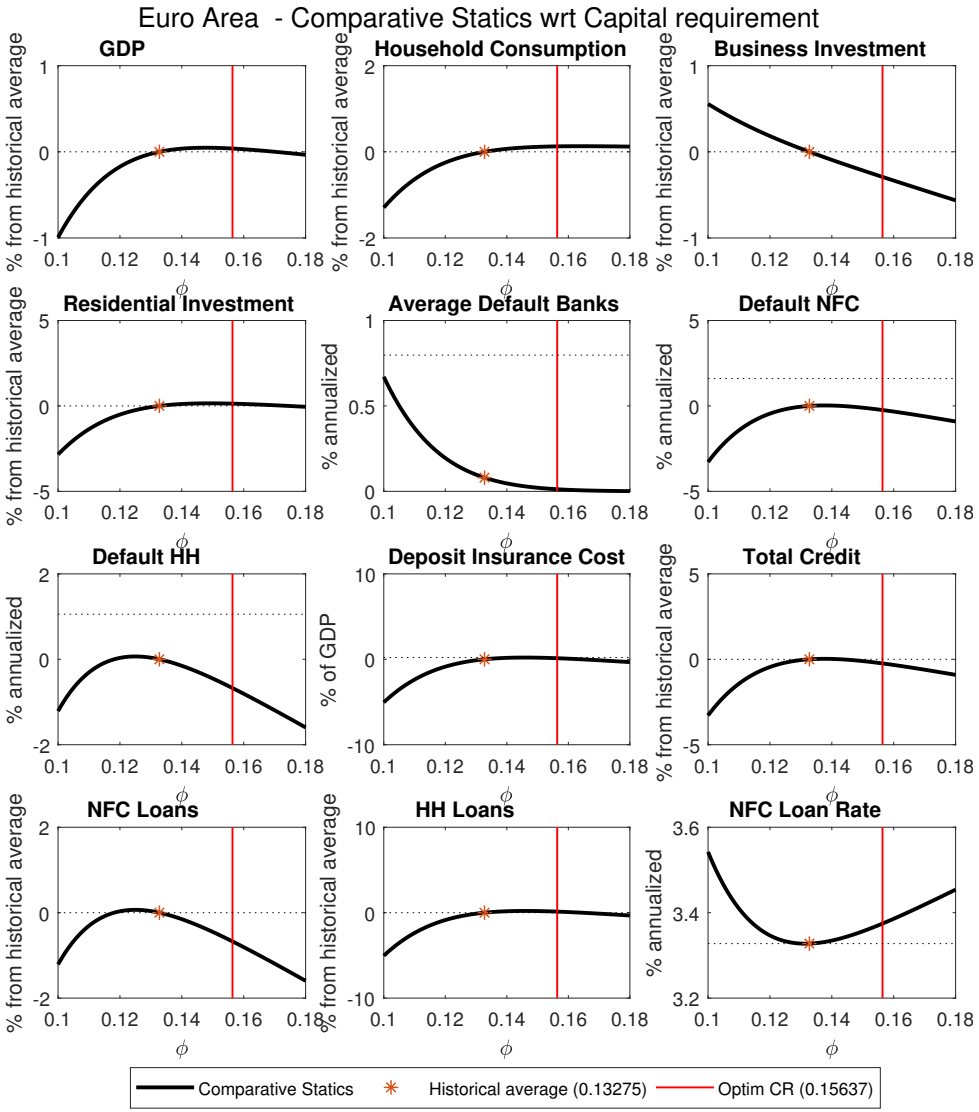
- Total welfare is improved by increasing capital requirements from the baseline steady-state levels.
- 'Undershooting' is costly.
- Asymmetric welfare function along the capital dimension.
- *Implication*: Defaults are socially very costly and generate important externalities: Remember: welfare of savers vs borrowers

Decomposition of the welfare function

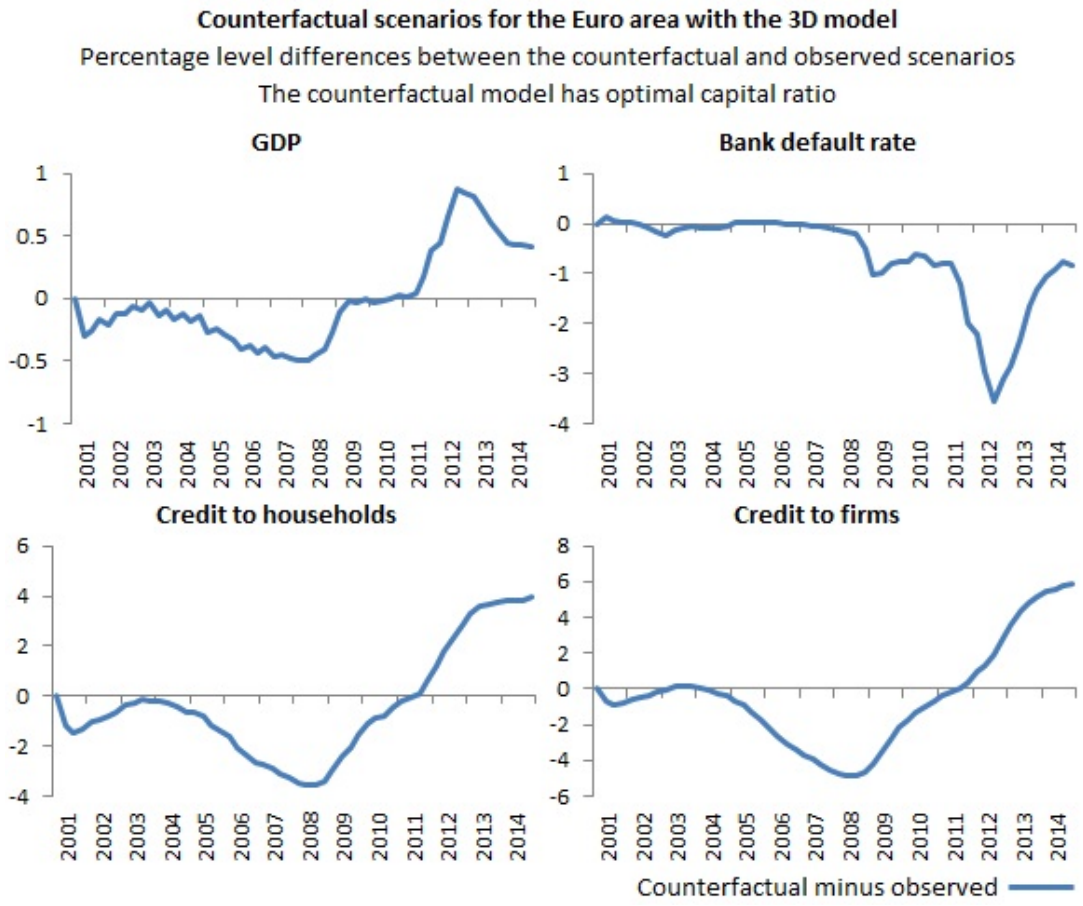


- Trade-off among borrowers, savers, wages and capital are non-linear and determine optimal capital requirements.
- Non-linear compromise between boosting economic activity and maintaining default risks negligible is visible here.

General equilibrium effects

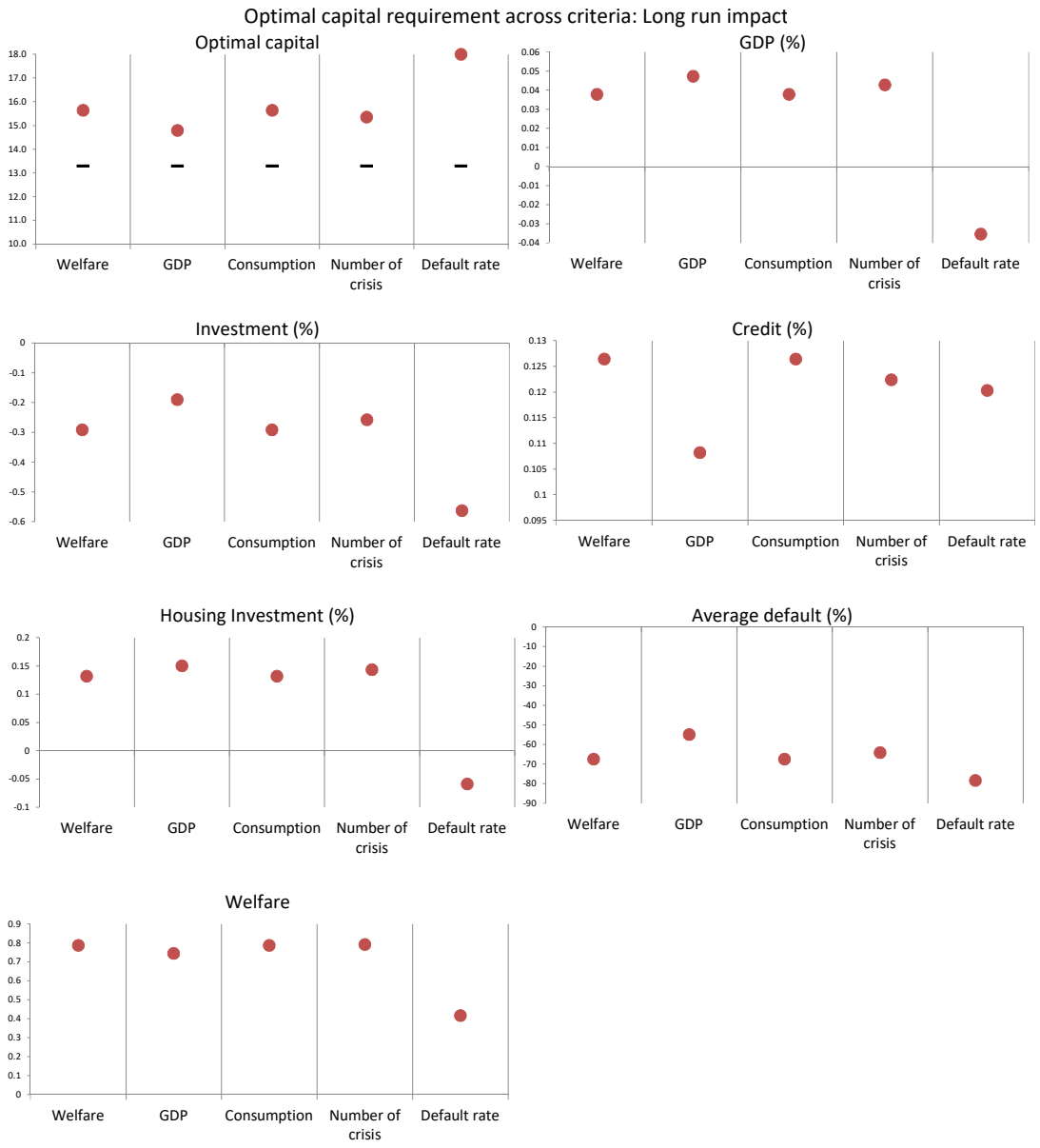


Counterfactual



- **Dual policy objective achieved**: Lower PD and smoother cycles
- Bank default rate is greatly reduced during crisis.

Comparison to other welfare criteria



Take home message

Key message from this section

The optimal capital **increases somewhat** the total **level** of welfare (utility), but **reduces significantly** the **volatility** of the economy, even with a time-invariant rule.

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Why CCyB

- Optimal capital requirements make cycles smoother. But in principle, not time-varying and not focusing on short-term risks and costs.
- Drivers of risks in the short-run are not *a priori* obvious. These need to be identified within a structural model and appopriate automatic rules designed to contain those risks.
- That is the role of the Countercyclical Capital Buffers (CCyB), which are added on top of the capital requirements (one could also accommodate for sector-specific CCyB, although not the current scope of this paper).

Loss function

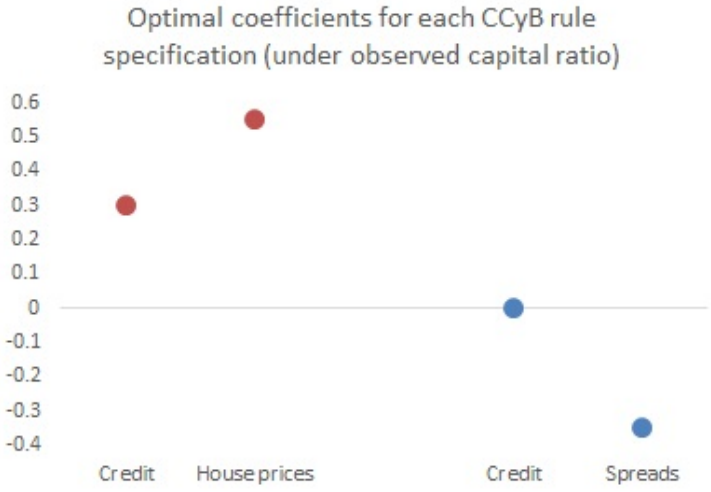
- Countercyclical Capital Buffers (CCyB) are time-varying, have a cyclical/shorter-run objective, and fluctuate based on certain thresholds (e.g. the Total credit-to-GDP gap).
- Roughly speaking, CCyB is the financial stability analogue of monetary policy rules.
- Hence, likewise inoptimal monetary policy, we proceed to make a second order approximation of the joint (weighted) utility of borrowers and savers. The scope of the policy is on short-run cyclical swings. We **minimize** this objective function as welfare decreases with higher volatility in the arguments.
- After derivations, our SOE loss functions is:

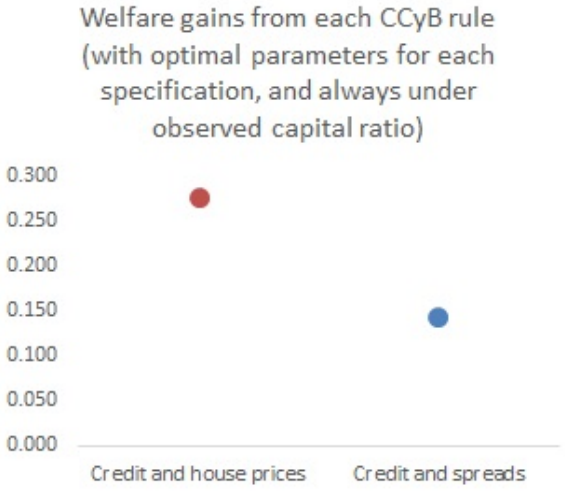
$$L_t = \chi_{h^s}\sigma_{h^s}^2 + \chi_{l^s}\sigma_{l^s}^2 + \chi_{h^m}\sigma_{h^m}^2 + \chi_{l^m}\sigma_{l^m}^2 + \chi_k\sigma_k^2$$

where the normalized weights in SS of each are:

$$\chi_{h^s} = 0.91 \quad \chi_{l^s} = 0.12 \qquad \chi_{h^m} = 1 \qquad \chi_{l^m} = 0.09 \quad \chi_k = 0.92$$

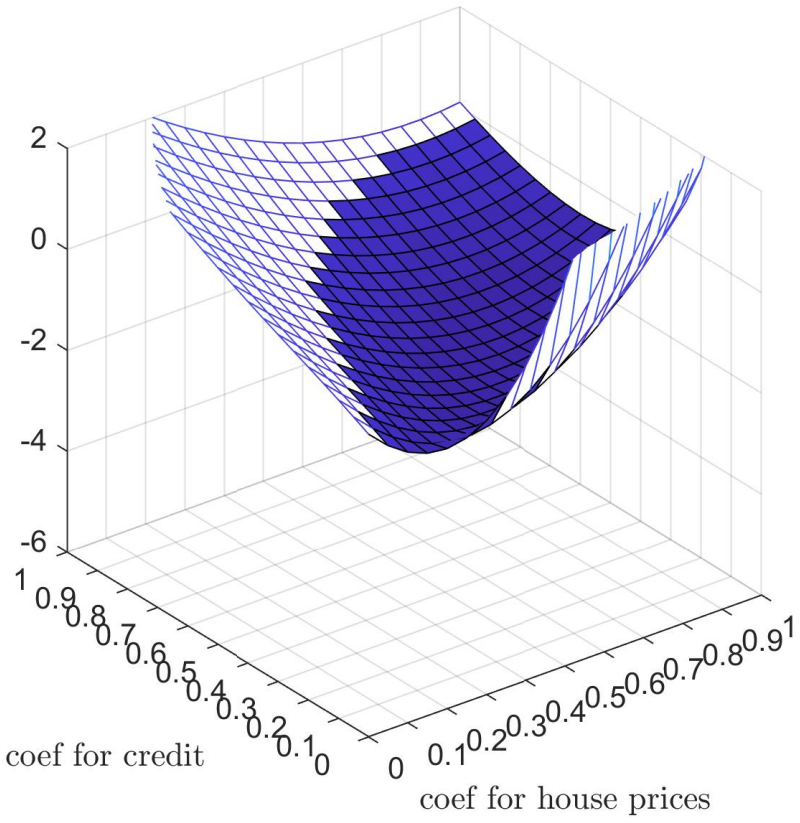
Optimal CCyB

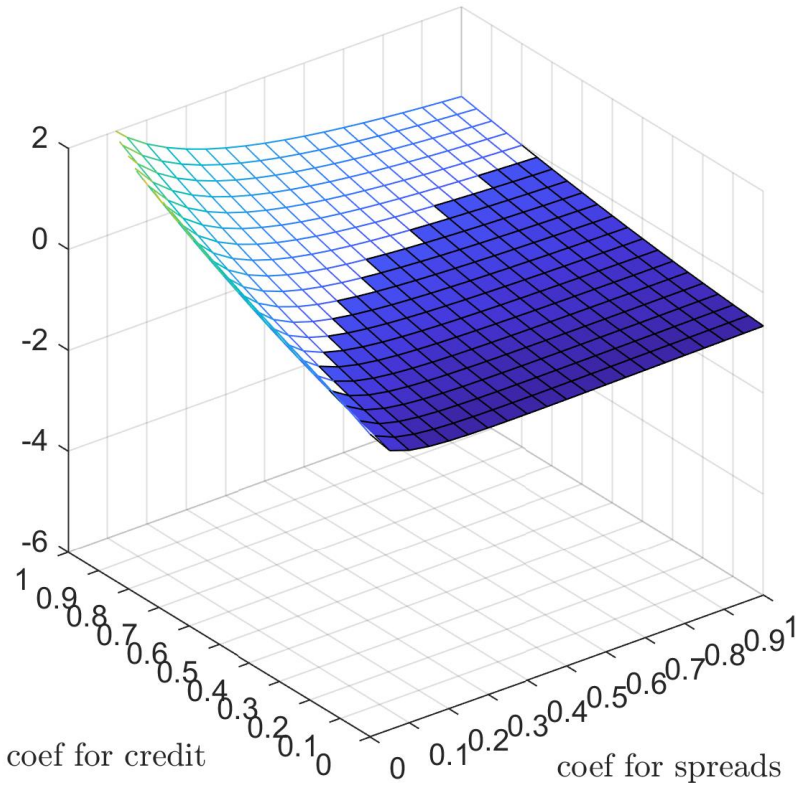




- Optimal set of parameters (for each CCyB) is obtained from minimizing the loss function.
- A bad choice of parameters deteriorates welfare.

Surface of the loss functions





Take home message

Key message from this section

Optimal CCyB should tackle the (macro-financial) imbalances in the economy over the cycle. Those imbalances are economy/case-specific.

Understanding those is crucial for the design of the correct rule. Failing to account for that can generate unnecessary additional costs over the cycle.

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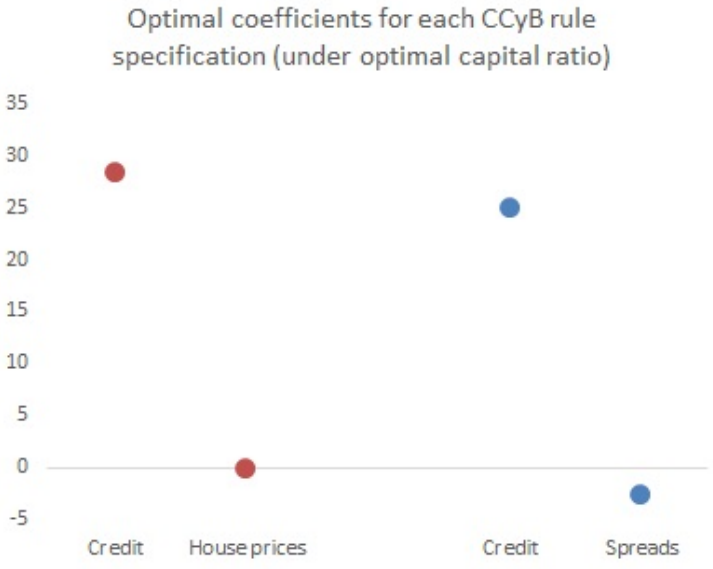
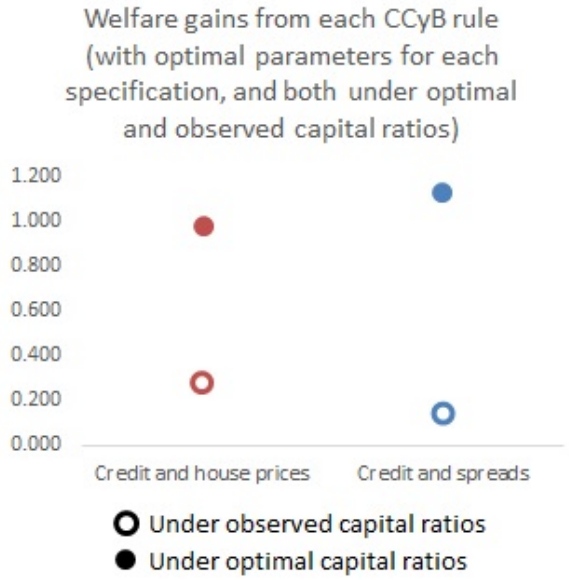
Joint optimal instruments - questions

- Do (and by how much) our previous conclusions change if both instruments are at optimal levels?
- More specifically, and conditional on the *optimal* (not observed) level of capital requirements, what is the optimal CCyB rule?
- Moreover, do the welfare gains from each rule look similar?
- Also, is the probability of 'missing' the optimal parameters in the optimal CCyB rule larger or smaller compared to before?
- Can we say anything about model stability wrt. instruments?

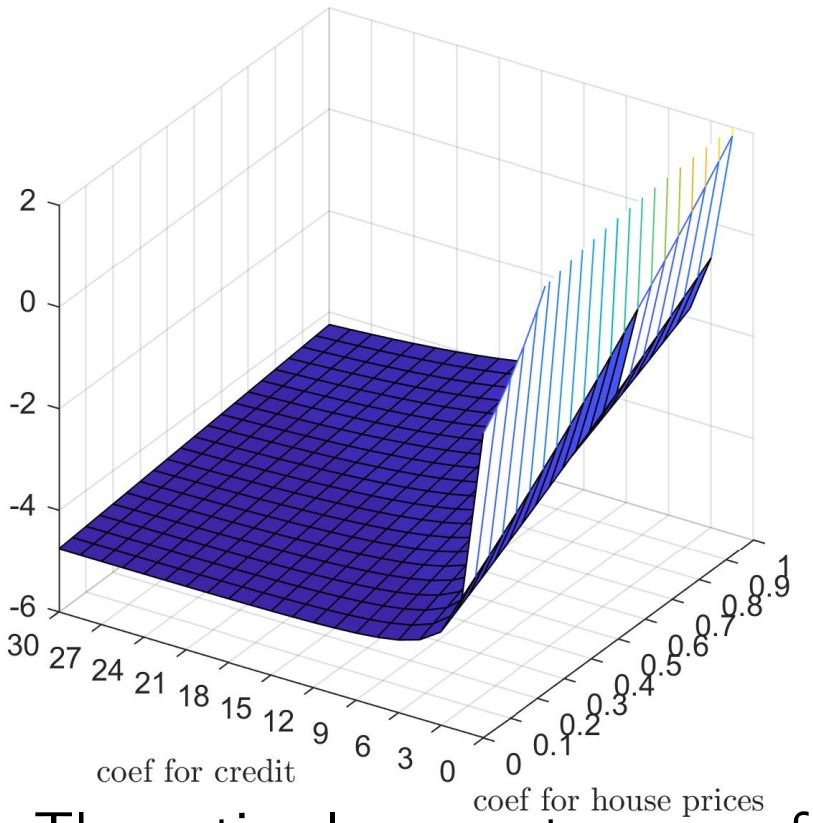
Optimal CCyB when optimal CR is in place

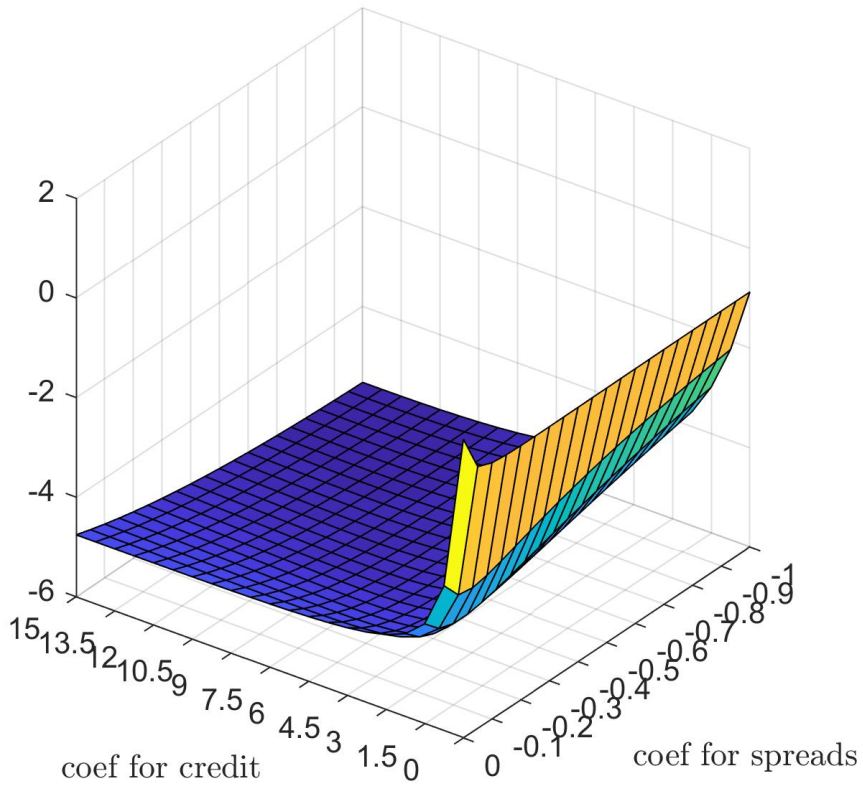




- Our previous conclusions change dramatically.
- Overall much larger gains from the combination of optimal policies.
- The optimal CCyB rule changes when capital requirements are at an optimal.
- The welfare benefits is greater than the sum of its parts.

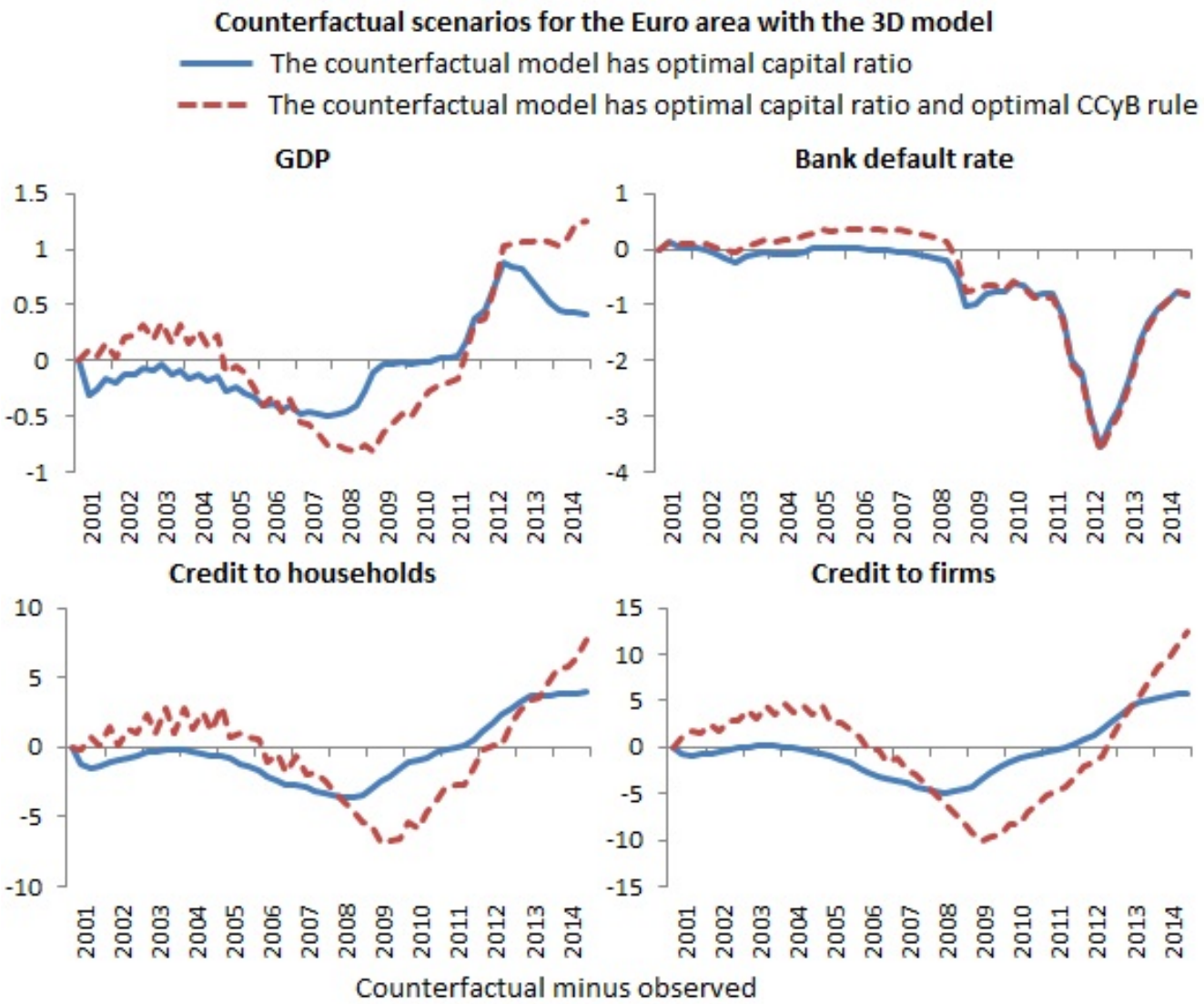
Optimal CCyB when optimal CR is in place



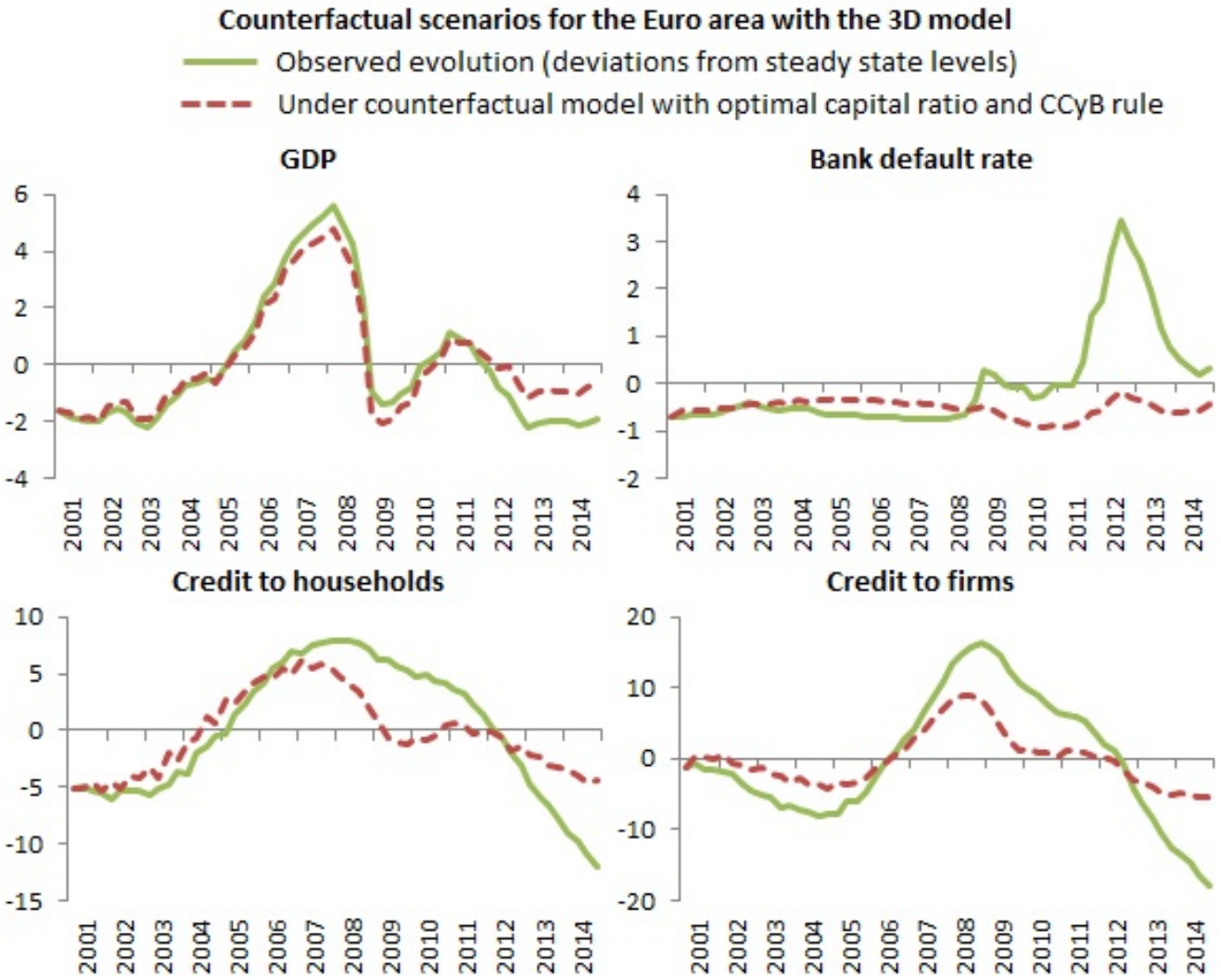


- The optimal parameter space for both CCyB rules is much wider.
- The probability of 'missing' is therefore much narrower.
- Our results point to greater model stability when both instruments are jointly considered.

Counterfactual



What if Eurosystem had done it different;y.....



Take home message

Key message from this section

Optimal rule depends on the level of capital.

The combination of instrument generates synergies.
The welfare gains from the interaction is greater than the sum of the parts.

Trade-offs are smoothened when both both instruments are optimal.