BANQUE CENTRALE DU LUXEMBOURG

EUROSYSTEM

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Capturing macroprudential regulation effectiveness: A DSGE approach with shadow intermediaries

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Macroprudential policy: from research to implementation

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Outline

- Motivation
- Existing literature
- Overview
- The model
- Quantitative analysis
- Results
- Macroprudential policy implications and welfare
- Conclusions

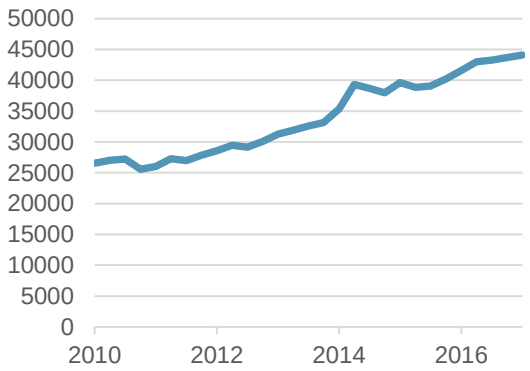
Motivation

- The post-crisis period has seen a flourishing of general equilibrium models with a fully-fledged financial sector.
- Despite **spectacular growth of shadow intermediation** in the last decades, these models still largely ignore non-bank intermediation activities. Need to fill this gap.
- Shadow banking matters: it may undermine financial stability by amplifying adverse shocks and by creating new risks through interconnectedness.
- Current regulation may even foster shadow intermediation activities (**regulatory arbitrage**), thereby producing unintended consequences.
- How can financial regulation contain the threats of the non-bank financial sector?
- How should policy makers and regulators deal with shadow intermediation activities?

Some stylized facts in the Euro Area

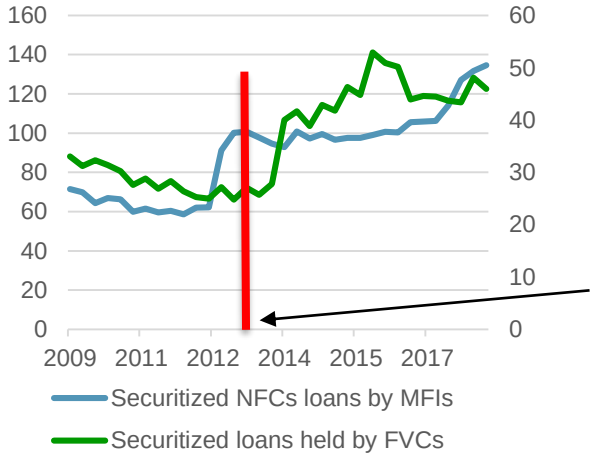
Shadow intermediation

Equity holdings by investment funds
(billions of euros)



Securitized loans

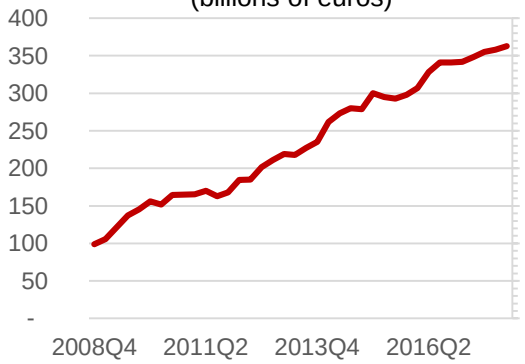
(billions of euros)



Capital Requirement Regulation (CRR) (EU No. 575/2013)

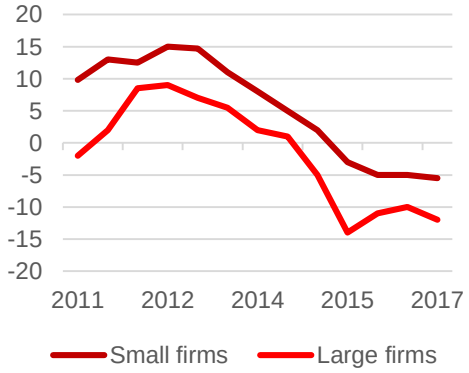
NFCs funding by investment funds

NFC debt securities held by investment funds
(billions of euros)



Perceived external financing gap

SAFE composite indicator*



*Source: ECB SDW.
A positive value of the indicator suggests an increasing financing gap.

Existing literature *(inter alia)*

- NK-DSGE models with financial intermediation:
  Goodfriend and McCallum (2007); Christiano et al. (2007); Curdia and Woodford (2010).
- General equilibrium models with macroprudential policy:
  Van den Heuvel (2008); Meh and Moran (2010); de Walque et al. (2010); Angeloni and Faia (2013); Martin-Miera Suarez (2014); Benes and Kumhof (2015).

More recently:

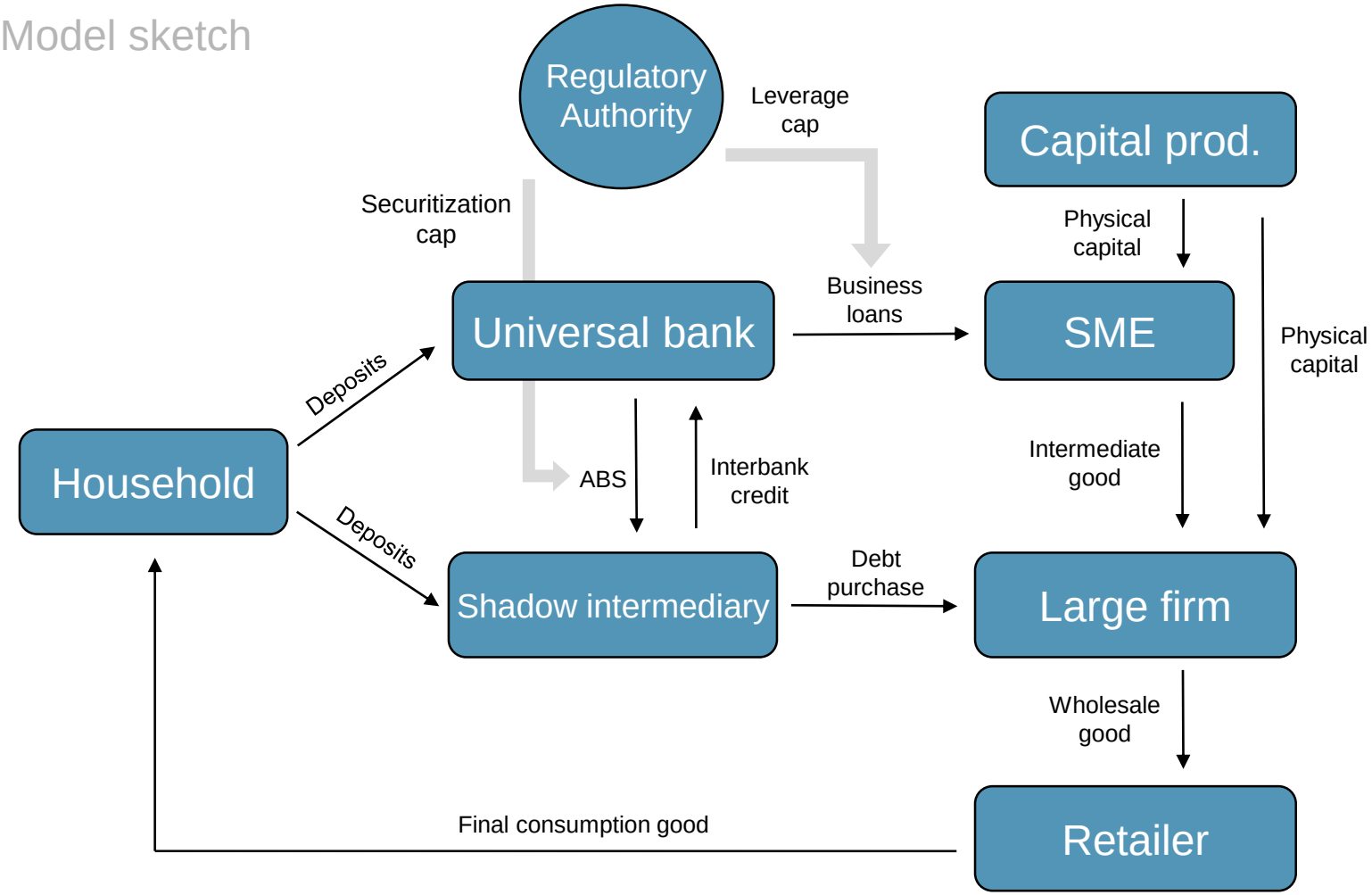
- General equilibrium models with shadow banking:
  Gorton and Metrick (2010); Goodhart (2012); Verona et al. (2013); Plantin (2014); Huang (2014); Ordonez (2017); Meeks (2017); Meh and Moran (2015); Begenau and Landvoigt (2017).
- **This paper:** NK-DSGE with traditional and shadow financial sector (investment funds), heterogeneous households and firms, and active macroprudential policy

Overview

- Research question(s):
  - How does shadow intermediation affect the business cycle?
  - Is macroprudential policy effective in dampening business cycle flucutations when shadow intermediary activities are included?
- Key features:
  - Vertical integration of production: small vs large firms (access to capital market)
  - Financial sector: universal banks vs shadow intermediaries
  - Several layers of rigidities: real, nominal and financial frictions
  - Regulatory arbitrage considerations
  - Macroprudential regulation as a stabilization tool

Overview

Model sketch



Model

Household

- Owns the whole economy
- Chooses consumption, labor supply and deposits
- Holds deposits either with a universal bank or with a shadow intermediary
- Habits in consumption process

Model

Small firm

- Intermediate good producer: perfectly competitive, produces an homogeneous good
- Idiosyncratic shock: turning physical capital into effective capital is risky: successful with probability $p < 1$
- Aggregate shock (technology shifter)
- No net worth and no access to capital markets: bank loans only source of funding

Model

Large firm: Access to market financing

- Wholesale good producers: perfectly competitive, three inputs (capital, labor and small firms' output)
- Aggregate shock (technology shifter)
- Combines internal and external finance:
  - Access to capital markets to issue debt
  - Net worth
- Financial accelerator mechanism à la BGG 1999

Model

Universal bank

- Provides capital loans under outcome uncertainty
- Exerts costly screening effort on the borrower (value added of this paper)
- Occasionally receives an alternative investment opportunity
  - Arrival rate $l < 1$
- Issues asset-backed securities (ABSs)
- Complies with regulation
  - Leverage must not exceed a fraction of own capital
  - ABS issuance must not exceed a fraction of total loans

Model

Shadow intermediary

- Zero profits in equilibrium (competitive sector)
- Purchases NFCs debt
- Purchases ABS from banks
- Provides interbank lending
- Not regulated from a macroprudential perspective

Model

Closing the model

- Market clearing conditions
- Monetary policy: Taylor rule type
- Macroprudential policy rules
- 5 Autoregressive processes for shocks
  - Technology, monetary, probability of alternative investment opportunity, regulation (leverage and securitization)

Quantitative analysis

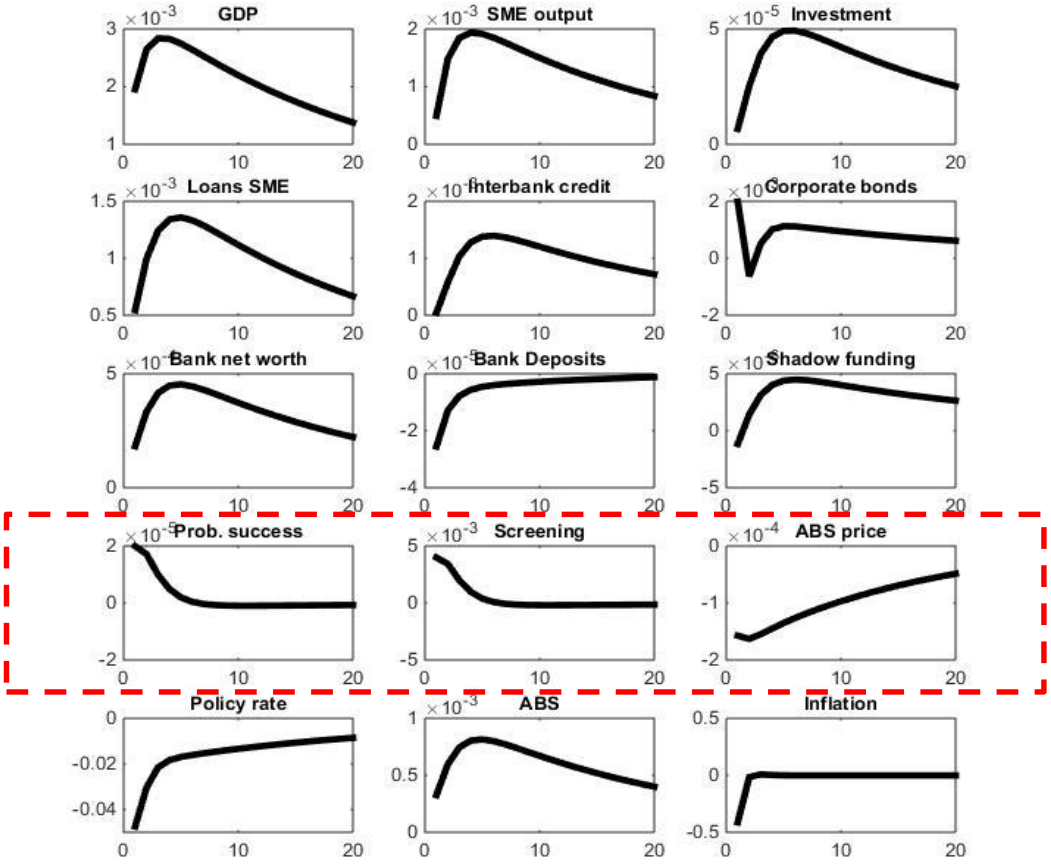
Key parameters – Calibration at quarterly frequency

Parameter	Description	Value
α_L	Output elasticity of capital for large firms	0.45
α_S	Output elasticity of capital for small firms	0.25
α	Average output elasticity of capital	0.33
β	Subjective discount factor of households	0.99
h	Habit in household consumption	0.6
δ	Depreciation rate of capital	0.025
γ_s	Elasticity of intermediate input to large firm output	0.22
$\varkappa$	Securitization ratio	[0.5,0.6]
κ^B	Leverage ratio	[4,5]
ν_L	Large firms entrepreneurs exit rate	0.95
μ	Shadow intermediaries monitoring cost	0.12
ρ_r	Persistence term of the Taylor rule	0.69
ϕ_π	Response of interest rate to inflation	1.35
ϕ_r	Response of nominal interest rate to output growth	0.26
σ_j	Standard deviation of the j-th type of shock	1
θ_p	Price stickiness	0.75
η	Labor supply elasticity	1
ψ_L	Parameter governing financial accelerator for large firms	0.05
ϵ	Elasticity of substitution	10
κ_i	Investment-adjustment cost parameter	11.5
ω	Share of SMEs	0.95
λ	Return outside investment opportunity	1.01
l	Probability of outside investment opportunity	0.25
τ_B	Survival probability of commercial bankers	0.95

Quantitative analysis

Focus on shadow intermediary

Impulse response of key variables to favorable technology shock



Key transmission channels

Mechanism

- Shock hits
- Firms wish to increase production and borrowing
- Commercial banks constrained on exposure by **leverage ratio**
- To increase lending, banks need to relax constraint on leverage:
  - **Securitization channel**
    Securitize loans and sell them as ABSs to shadow intermediaries
  - **Screening channel**
    Increase screening intensity to improve likelihood of successful projects and increase return on lending
- Since screening is costly, securitization channel dominates: externality arises
- **Regulatory arbitrage** exacerbates this externality

Policy implications

Trade-offs of securitization

- *Securitization channel* allows capital redeployment, which increases lending
- Allows pass-through of risk from traditional banks to shadow sector
- Leads to inefficiency: by worsening screening incentives it lowers successful projects
- Risk re-enters the economy trough corporate lending
- Fixing this externality requires **effective financial regulation**
- Caps to leverage and securitization induce banks to resort to the screening channel
- Efficiency is restored

Normative analysis

Welfare analysis

Quantifying costs and benefits of MP

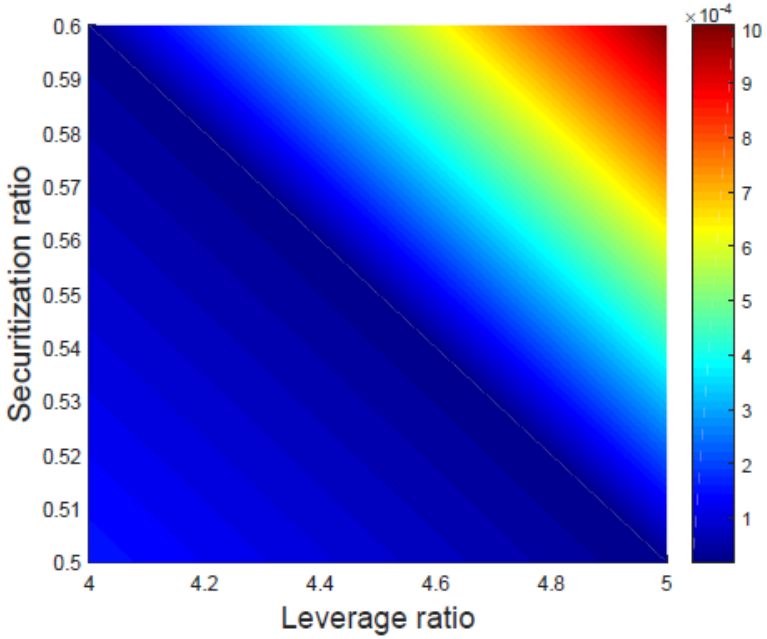
- We solve the model by second order approximation around the non-stochastic steady state.
- Evaluate the second moments of output for each pair of the macroprudential policy instruments
- Define a recursive formulation of social welfare as in Schmitt-Grohe Uribe (2004) and Wolff and Sims (2017):

$$welfare = W_t = E_0 \sum U_t(C_t, N_t) + \beta^t W_{t+1} \quad , \quad t \in [0, +\infty],$$

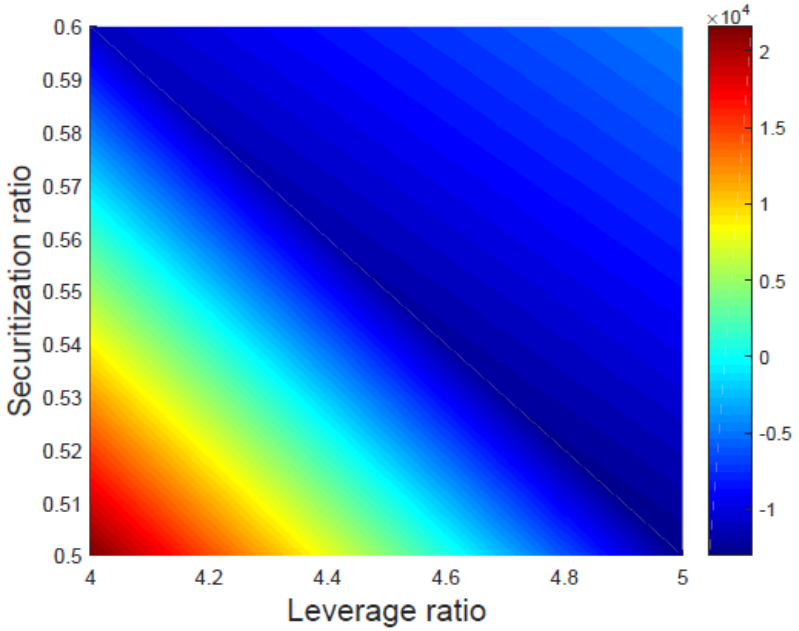
- Analyze welfare response for each combination of the macroprudential policy instruments

Macroprudential policy effectiveness

Output volatility



Welfare



Conclusions

Takeaways

- Ignoring the shadow sector may non-trivially underestimate its impact
- We built a NK-DSGE model with a non-bank financial sector and uncover two channels in financial intermediation: the *securitization channel* and the *screening channel*
- The securitization channel leads to an externality
- This inefficiency reduces bank screening incentives and results in business cycle amplification
- Financial regulation in the form of caps to leverage and securitization is **effective** in fixing the inefficiency and dampen business cycle amplification

Thank you for your attention