In the Quest of Macroprudential Policy Tools

Daniel Sámano
Banco de México

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Introduction

- Charles A.E. Goodhart, "The Changing Role of Central Banks":

  (...)the experience of financial crisis, panic in September 2008 to March 2009, and nearly widespread collapse, has been so unnerving and shaking that there is likely to be far-reaching changes to the operation and regulation/supervision of the financial system in general, and to the role and functions of the Central Bank in particular (...)

Introduction

- Scope of macroprudential policy
  - From a *narrow* perspective, the goal of macroprudential policy is to avoid episodes of system-wide financial distress.
  - From a *broader* point of view, macroprudential policy should aim at avoiding large changes in financial variables, in order to prevent sharp fluctuations in real variables.

Introduction

- Main Question:
  - Can a central bank achieve a better outcome, from a macroeconomic perspective, by setting a banking sector capital adequacy ratio rule along with a Taylor rule than by employing a Taylor rule alone?

Introduction

- Relevance:
  - Previously, monetary policy operated largely under the assumption that the financial sector was not a relevant source of shocks. Thus, financial variables were not considered greatly relevant for macroeconomic stability and financial supervision was seen as regulators' jurisdiction.
  - Today, the proven importance financial variables demand of monetary policy has exposed the critical need of studying the financial sector's feedback to the real economy.
    - ★ However, at present there is no accepted "canonical" model for studying the interaction between financial and macroeconomic variables.

Introduction

- Similar studies include:
  - Angeloni and Faia (2009)
    - ★ Counter-cyclical capital ratios dampen business cycle fluctuations.
  - Covas and Fujita (2009)
    - ★ Output volatility reduced by counter-cyclical capital requirements.
  - Angelini, Neri and Panetta (2010)
    - ★ Central bank with two coordinated instruments reduces output and inflation volatility, vis à vis monetary authority which operates with Taylor rule.
  - Beau, Clerc and Mojon (2011)
    - ★ By using the loan-to-value ratio as an additional policy instrument the monetary authority can "shield" macro variables from financial sector shocks.

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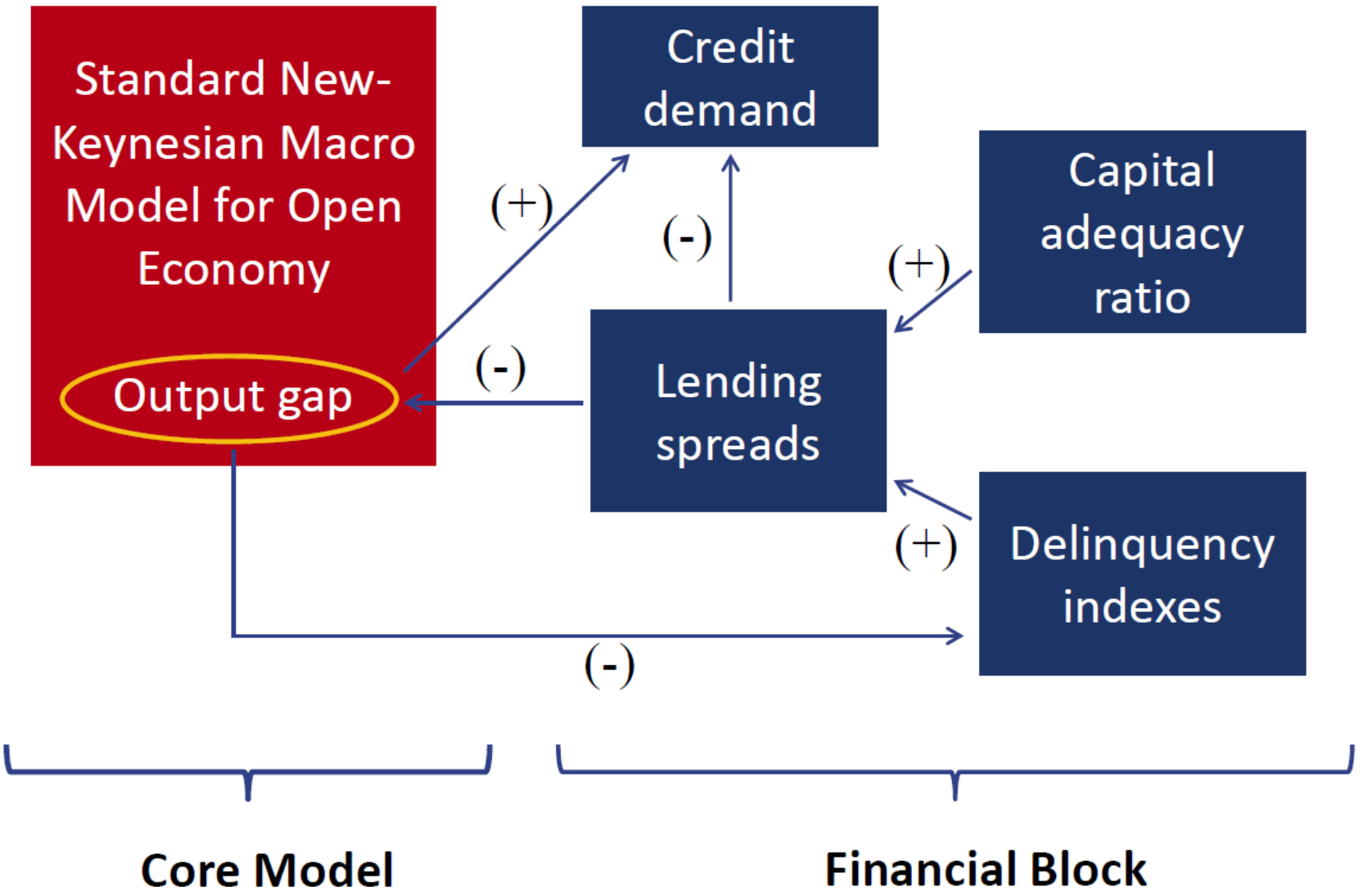
Model

- Financial Block appended to a standard new-Keynesian macro model for a small open economy (core model):
  1. Interest rate lending spreads
  2. Delinquency indexes
  3. Credit gaps (credit growth rates...)
  4. Capital adequacy ratio
- Credit sectors considered are: **commercial, consumption and housing**.
- The financial block is introduced through a "reduced form" specification.
- The financial block affects the output gap of the core model through the aggregate interest rate spread. As in *Macroeconomic Assessment Group (2010)*, an increase in the aggregate interest rate spread reduces economic activity.
- The model is estimated for the Mexican economy.
  - Sample data: quarterly observations from 2003Q1 to 2010Q3.

Model


Standard New-Keynesian Macro Model for Open Economy
Output gap
Credit demand
Capital adequacy ratio
Lending spreads
Delinquency indexes
(+)
(-)
(+)
(-)
(+)
(-)
Core Model
Financial Block

Model

- Key mechanism: commercial banking sector adjusts its interest rate spreads in reaction to capital requirements and delinquency indexes so as to maintain profits roughly constant.
  - So when a commercial bank sees its capital requirement and/or delinquency indexes rise, it increases its interest rate spreads to transfer as much as possible these costs to its customers.

Model

- Interest rate spreads:

$$spread_t^j = \beta_0^j + \beta_1^j spread_{t-1}^j + \underbrace{\beta_2^j}_{(+)} delin_t^j + \underbrace{\beta_3^j}_{(+)} CAR_t + \varepsilon_{spread,t}^j$$

where $j = \{$ commercial,consumption,housing $\}$.

  - Increases in delinquency indexes which entail potential losses and/or increases in capital requirements generate greater costs for commercial banks. These seek to transfer increases in costs to consumers by widening their lending spreads.

Model

- Delinquency indexes:

$$delin_t^j = \alpha_0^j + \alpha_1^j delin_{t-1}^j + \underbrace{\alpha_2^j}_{(-)} x_t + \varepsilon_{delin,t}^j$$

  - Delinquency indexes are modelled as a function of the output gap. Decreases in economic activity cause increases in delinquency indexes and economic expansions lead to a fall in delinquency indexes.

Model

- Credit gaps:

$$cre_t^j = \gamma_0^j + \gamma_1^j cre_{t-1}^j + \underbrace{\gamma_2^j}_{(+)} x_t + \underbrace{\gamma_3^j}_{(-)} spread_t + \varepsilon_{cre,t}^j$$

  - Demand for loans are represented through credit gaps. These have a negative relationship with lending spreads and a positive one with the output gap.

Model

- Capital adequacy ratio. Two alternatives where considered:
  - In the base model with a simple Taylor rule, the banking sector capital adequacy ratio is modelled as an AR(1) process:

$$CAR_t = \delta_0 + \delta_1 CAR_{t-1} + \varepsilon_{CAR,t}$$

  - Once we allowed the central bank to have a second rule this will take the following form:

$$CAR_t = \delta_0 + \delta_1 CAR_{t-1} + \delta_2 z_t + \varepsilon_{CAR,t}$$

where $z_t \in \{x_t, cre_t, spread_t\}$

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Results

- "Loss" function used to optimize coefficients on instruments' rules:

$$\mathscr{L} = \sigma_{\pi}^2 + \sigma_{x}^2 + \textit{Instruments Smoothing}$$

  - σ_{π}^2 and σ_{x}^2 are the variance of the inflation gap and of the output gap when simulating the model for 1,000 periods and 3,000 replications ("invariant distribution").
  - Notice that the loss function does not incorporate explicitly any macroprudential term...
  - Optimal coefficients are calculated using Dynare's OSR (Optimal Simple Rule) routine.
  - A thousand different random initial conditions for each rule were sampled and the set of coefficients that achieved the minimum loss were selected.

Results

- Exercise 1. Taylor rule:

$$i_t = \rho i_{t-1} + (1-\rho)\left[\mu_1 \pi_t + \mu_2 x_t\right]$$

- Exercise 2. Taylor rule and capital adequacy ratio rule with output gap:

$$i_t = \rho i_{t-1} + (1-\rho)\left[\mu_1 \pi_t + \mu_2 x_t\right]$$

$$CAR_t = \theta_1 CAR_{t-1} + \theta_2 x_t$$

- Exercise 3. Taylor rule and capital adequacy ratio rule with credit gap:

$$i_t = \rho i_{t-1} + (1-\rho)\left[\mu_1 \pi_t + \mu_2 x_t\right]$$

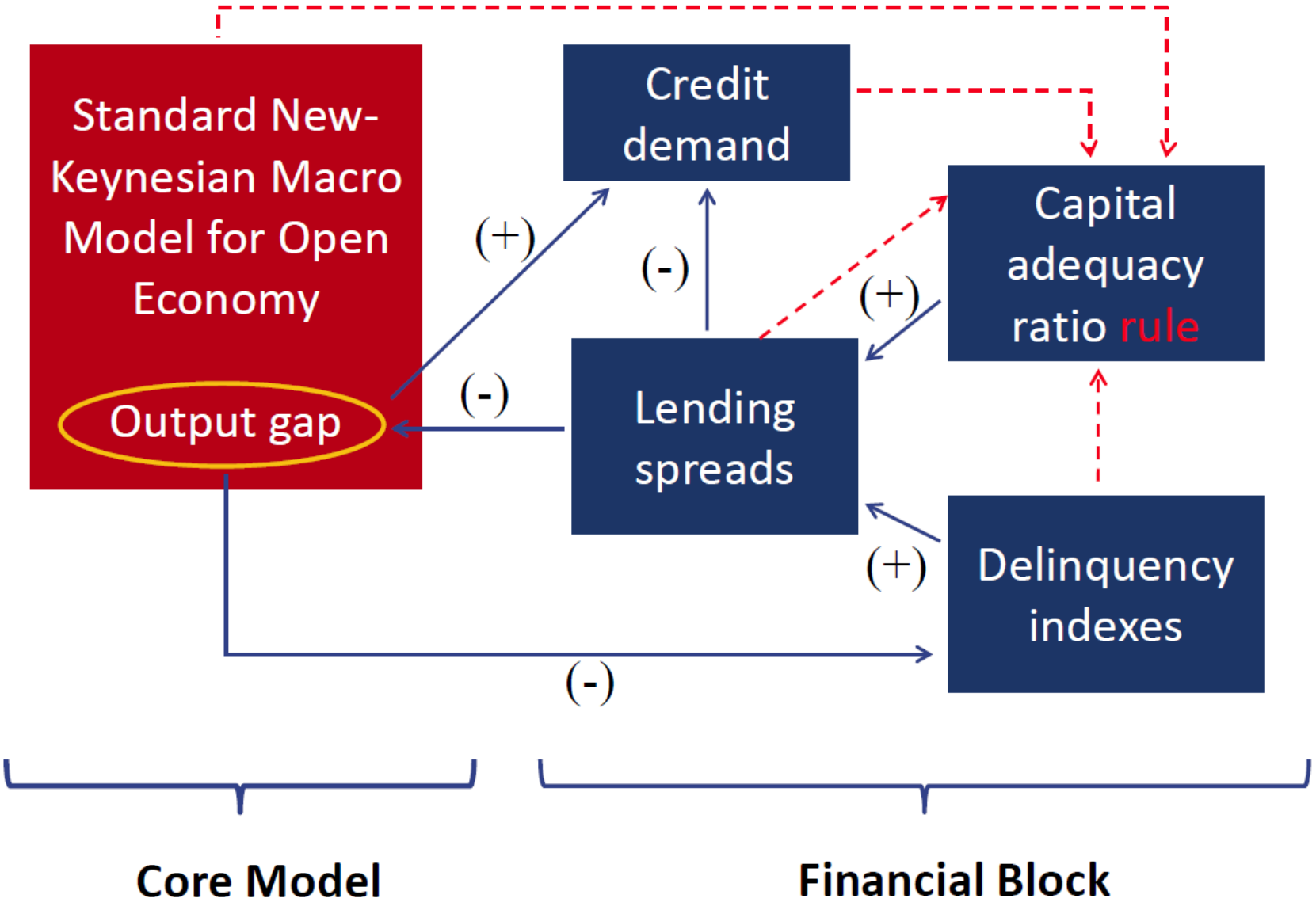
$$CAR_t = \theta_1 CAR_{t-1} + \theta_2 cre_t$$

- Exercise 4. Taylor rule and capital adequacy ratio rule with lending spread:

$$i_t = \rho i_{t-1} + (1-\rho)\left[\mu_1 \pi_t + \mu_2 x_t\right]$$

$$CAR_t = \theta_1 CAR_{t-1} + \theta_2 spread_t$$

Results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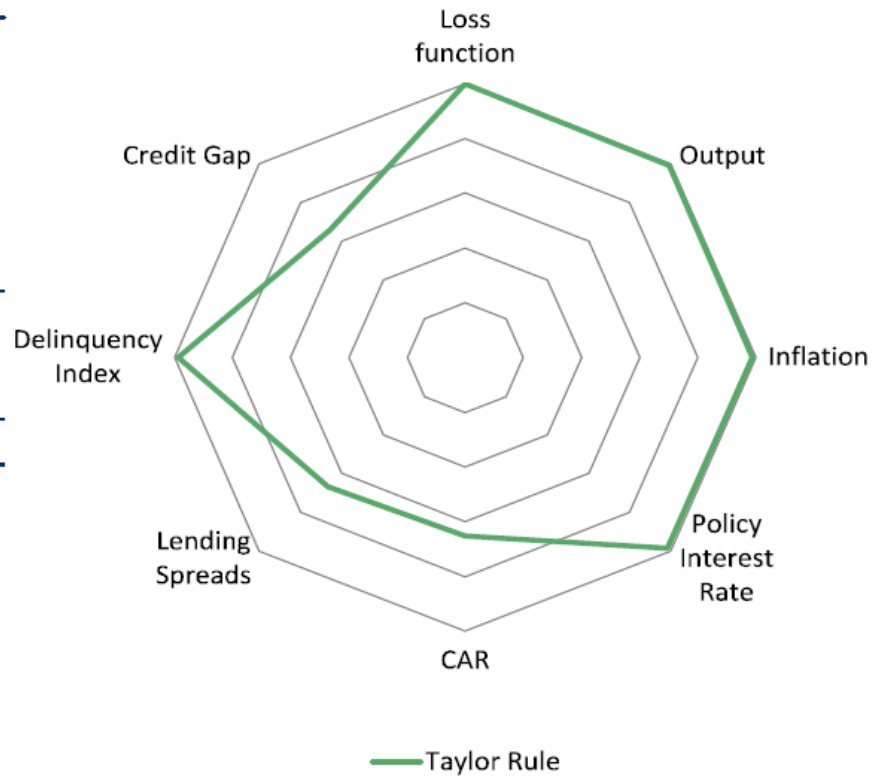
Results

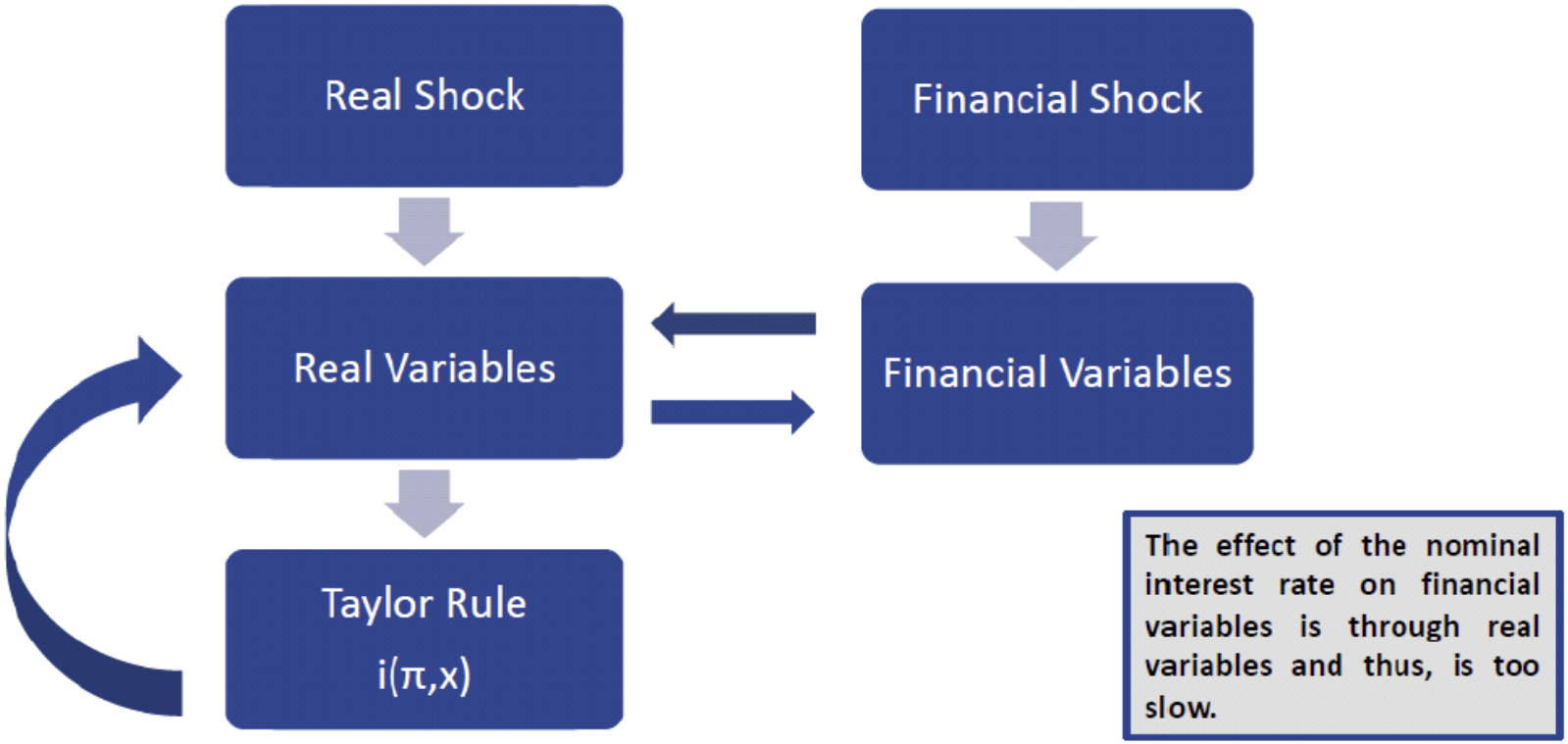
Loss Function and Variances Across Exercises

	1
	Taylor rule
Loss Function	14.20
Variance	**1**
Output Gap	2.62
Inflation	4.62
Policy Interest Rate	10.77
Capital Adequacy Ratio	1.87
Lending Spread	5.33
Delinquency Index	0.71
Credit Gap	106.03
Corr(I,CAR)	-0.20



Note: Scale of graph adjusted for illustrative purposes.

Results

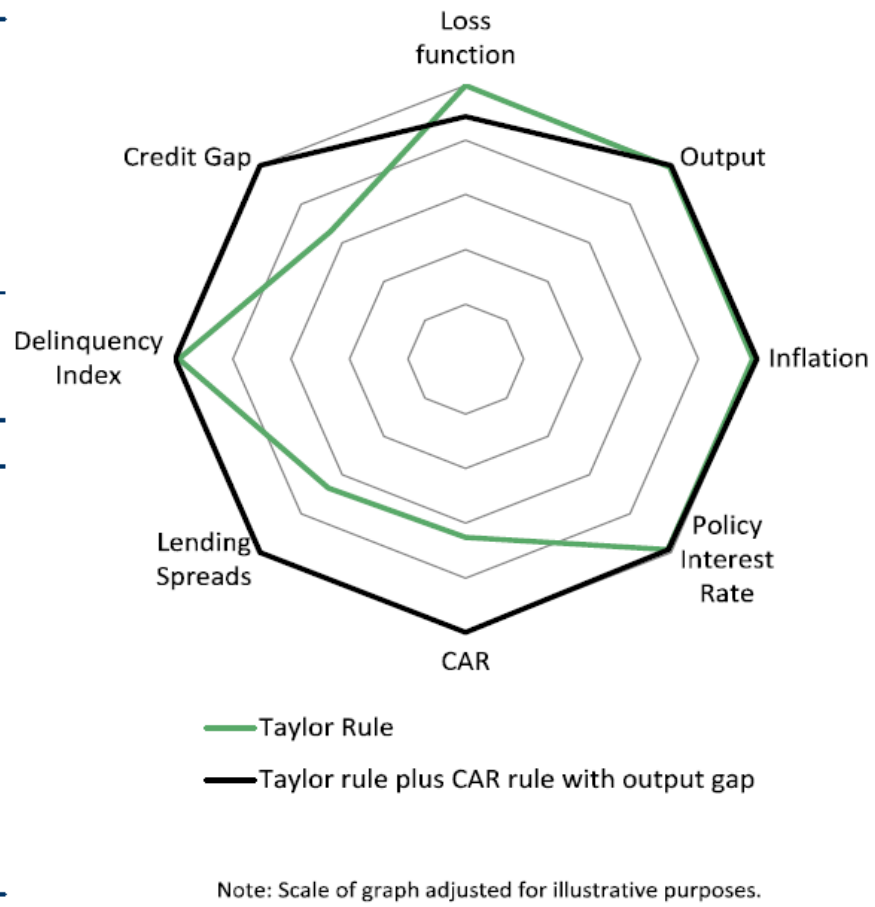

Real Shock
Financial Shock
Real Variables
Financial Variables
Taylor Rule
i(π,x)
The effect of the nominal interest rate on financial variables is through real variables and thus, is too slow.

Results

Loss Function and Variances Across Exercises

	1	2
	Taylor rule	Taylor rule plus CAR rule with output gap
Loss Function	14.20	12.57

Variance	**1**	**2**
Output Gap	2.62	2.64
Inflation	4.62	4.68
Policy Interest Rate	10.77	10.78
Capital Adequacy Ratio	1.87	2.87
Lending Spread	5.33	7.97
Delinquency Index	0.71	0.72
Credit Gap	106.03	161.36
Corr(I,CAR)	-0.20	-0.19



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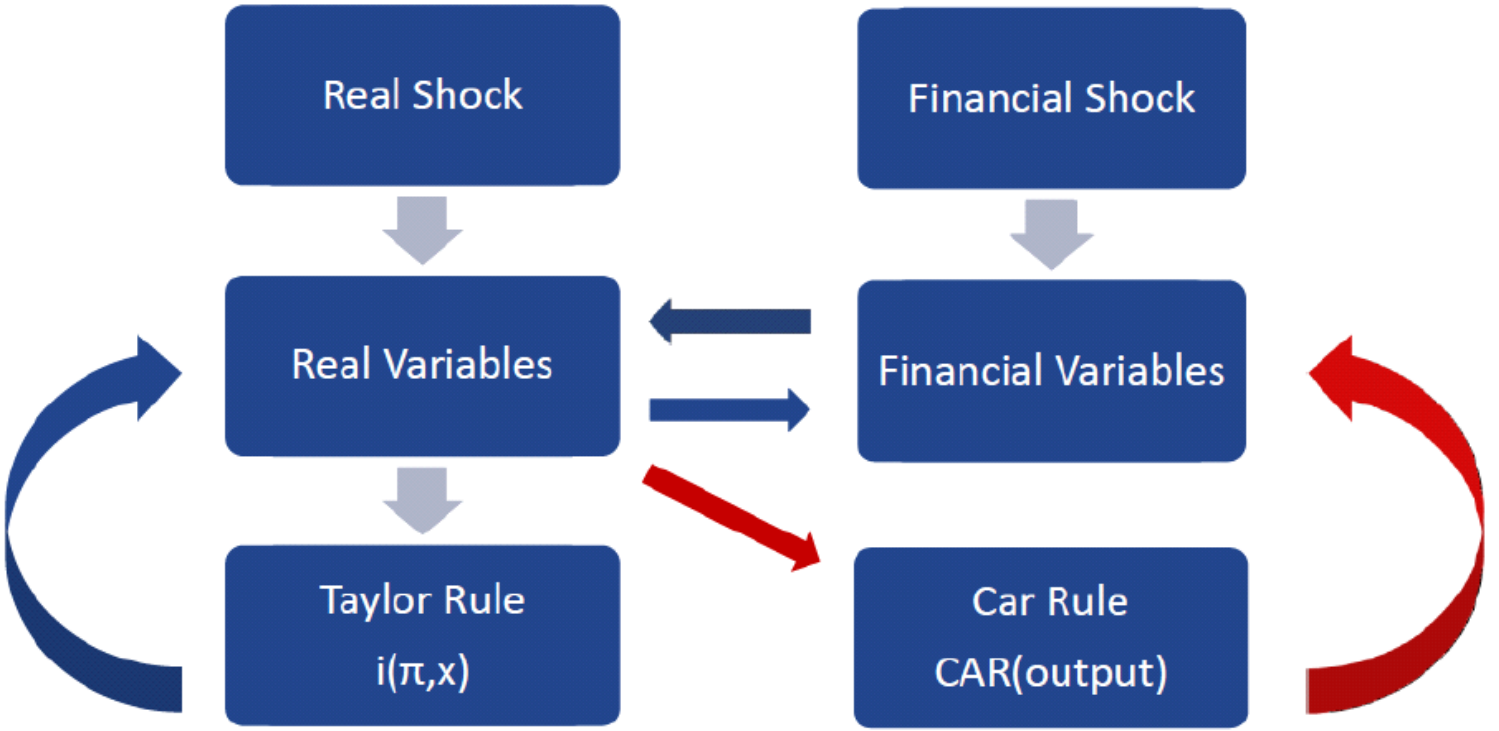
Results



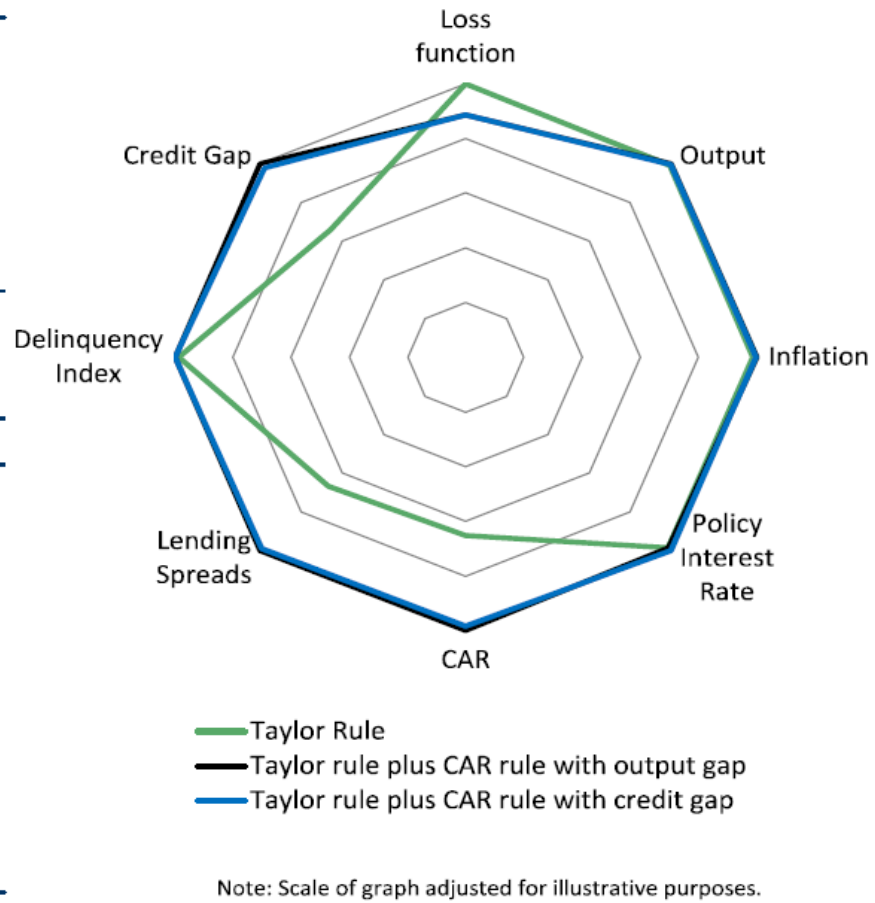
If the second policy instrument reacts to macro variables, its reaction to financial shocks only takes place after these affect the macroeconomy.

Results

Loss Function and Variances Across Exercises

	1	2	3
	Taylor rule	Taylor rule plus CAR rule with output gap	Taylor rule plus CAR rule with credit gap
Loss Function	14.20	12.57	12.57

Variance	**1**	**2**	**3**
Output Gap	2.62	2.64	2.63
Inflation	4.62	4.68	4.67
Policy Interest Rate	10.77	10.78	10.95
Capital Adequacy Ratio	1.87	2.87	2.82
Lending Spread	5.33	7.97	7.89
Delinquency Index	0.71	0.72	0.72
Credit Gap	106.03	161.36	157.81
Corr(I,CAR)	-0.20	-0.19	-0.23



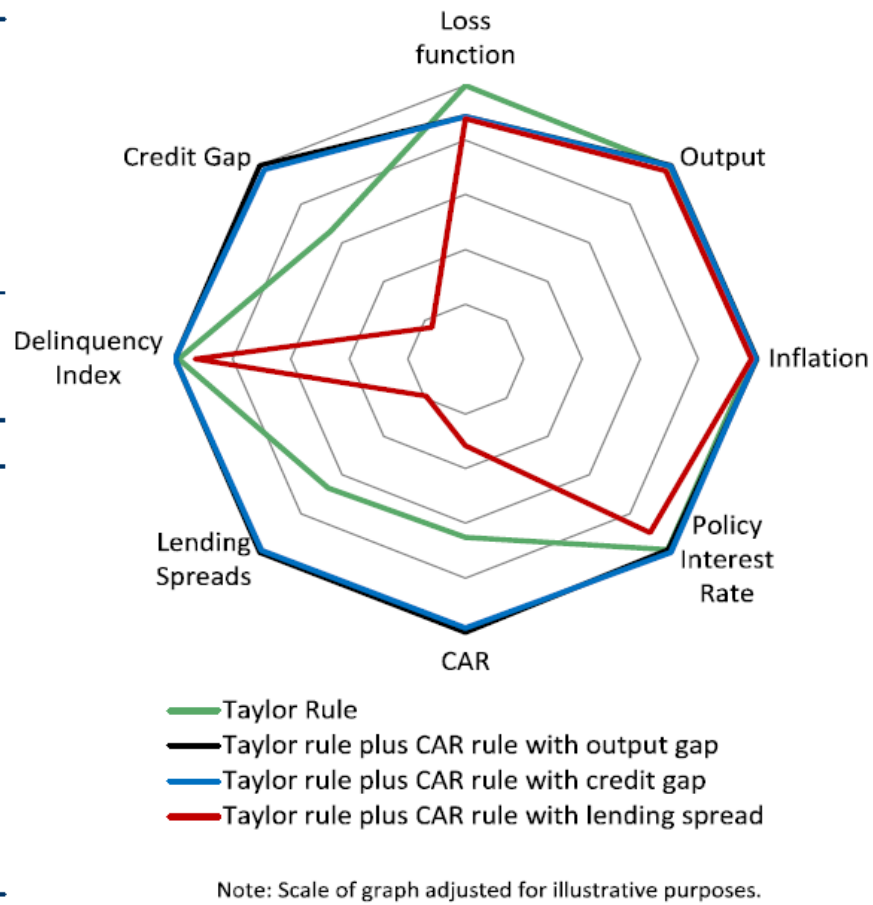
Note: Scale of graph adjusted for illustrative purposes.

Results

Loss Function and Variances Across Exercises

	1	2	3	4
	Taylor rule	Taylor rule plus CAR rule with output gap	Taylor rule plus CAR rule with credit gap	Taylor rule plus CAR rule with lending spread
Loss Function	14.20	12.57	12.57	**12.46**

Variance	**1**	**2**	**3**	**4**
Output Gap	2.62	2.64	2.63	2.57
Inflation	4.62	4.68	4.67	4.60
Policy Interest Rate	10.77	10.78	10.95	9.83
Capital Adequacy Ratio	1.87	2.87	2.82	0.91
Lending Spread	5.33	7.97	7.89	1.52
Delinquency Index	0.71	0.72	0.72	0.67
Credit Gap	106.03	161.36	157.81	26.18
Corr(I,CAR)	-0.20	-0.19	-0.23	0.16



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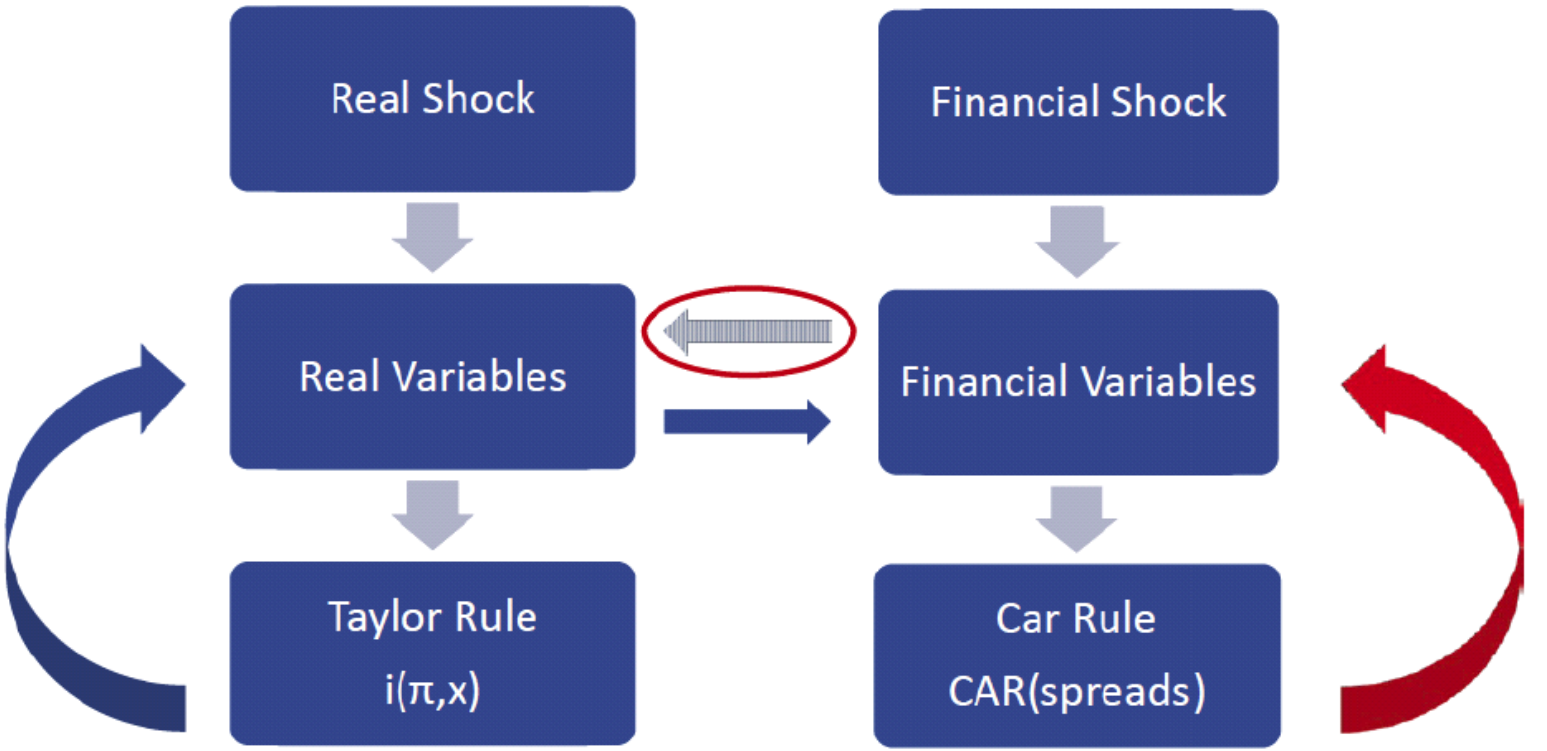
Results



Second policy instrument (CAR rule) can "isolate" financial shocks from the real economy.

Results

- Taylor rule plus CAR rule with lending spreads perform better because they are well designed.
  - Second policy instrument is able to effectively influence the channel through which financial frictions affect the macroeconomy.
  - Second instrument responds to financial variable that accurately captures the state of the financial sector.
- These characteristics allow the second policy instrument to complement the interest rate.
  - Feedback between the real economy and the financial sector is attenuated.
  - Financial sector shocks are directly mitigated; thus, macroeconomic variables are "shielded" from financial shocks.

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Conclusions

- Analyzing monetary and macroprudential instruments in a simple framework suggests two instruments perform better than one:
  - Complementarity of these policy instruments reduces fluctuations in macro variables.
  - Macroprudential instruments have the potential to affect the performance of financial variables and can be helpful in reducing the effect of financial shocks on macroeconomic variables.
- Although results are model-dependent, this framework seems useful to start a systematic approach to the design and effectiveness of macroprudential policy.

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