Should monetary policy stabilize lending spreads? Optimal monetary policy in an estimated model of the euro area

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Outline

Background and motivation

Main research question

Should monetary policy be used, in part, to stabilize financial asset prices or quantities?

Our approach to quantifying the benefits of financial stabilisation

Understanding the consequences policy alternatives requires a model, and an assumption on the objectives and conduct of policy.

- We adopt a New Keynesian model with a banking sector, estimate it on euro zone data.
- We analyse Ramsey optimal monetary policy in the presence of financial frictions, and quantify welfare costs of inflation targeting.
- We examine the benefits of extending the central bank's stabilization mandate to include financial variables.
- We quantify how the central bank's mandate relates to macroeconomic outcomes.

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Background and motivation

Why is this interesting?

- No central bank monetary policymaker has a primary stabilization mandate beyond prices, and less commonly, resource utilization.

  In practice recognize importance of financial frictions in the transmission of monetary policy (see design of ECB's non-standard measures).
- It has been established in stylized models that stabilizing financial variables is welfare optimal (Andrés et al., 2014; Carlstrom et al., 2010; De Fiore and Tristani, 2012).

  Do the results carry over to a policy-relevant model?
- Macroprudential policy may be unavailable, slow to implement (Adrian, de Fontnouvelle, Yang, and Zlate, 2015), or 'leaky' (Aiyar, Calomiris, and Wieladek, 2014).

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Background and motivation

Monetary policy in the presence of banking frictions

- Cúrdia and Woodford (*BIS WP*, 2009) show, in a small New Keynesian model with a stylized banking sector, that social welfare under a simple instrument rule is raised when direct responses to financial conditions are allowed.
- Gambacorta and Signoretti (*JEDC*, 2014) show that financial extensions to simple monetary policy rules are welfare-improving in a medium-scale model with banks.
- Andrés, Arce and Thomas (*JMCB*, 2014) identify the additional monetary policy stabilization goals that banking and collateral constraints entail, and solve the Ramsey problem.

The literature has moved on from ‘respond or not?’ to financial imperfections, to ‘how much to respond?’

Background and motivation

	Model size	Estim-ated?	Simple rules?	Object-ive	Banks	Policy frontier
Cúrdia-Woodford (2009)	small	n	y	welfare	y	n
Gambacorta-Signoretti (2014)	medium	(y)	y	both	y	y
Rubio-Carrasco (2014)	small	n	y	welfare	n	n
Airaudo-Olivero (2014)	small	n	n	welfare	y	n
Andrés et al. (2013)	small	n	n	welfare	y	n
Carlstrom et al. (2010)	small	n	n	welfare	n	n
Di Fiore-Tristani (2013)	small	n	n	welfare	n	n
Debortoli et al. (2016)	medium	y	n	both	n	y
This paper	medium	y	n	both	y	y

Background and motivation

Things we don't do

- Analyse the performance of simple rules (Gambacorta and Signoretti, 2014).
- Study optimal policy in presence of a macroprudential tool (DePaoli and Paustian, 2016; Meeks and Laureys in other work).
- Allow for disasters (Gourio, Kashyap, and Sim, 2016).

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- Repeated much of the analysis in different models of the same class.

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Outline

Model and mechanisms

Gertler and Karadi (*JME*, 2011)

Our analysis is conducted on the G&K model, a workhorse in the literature.

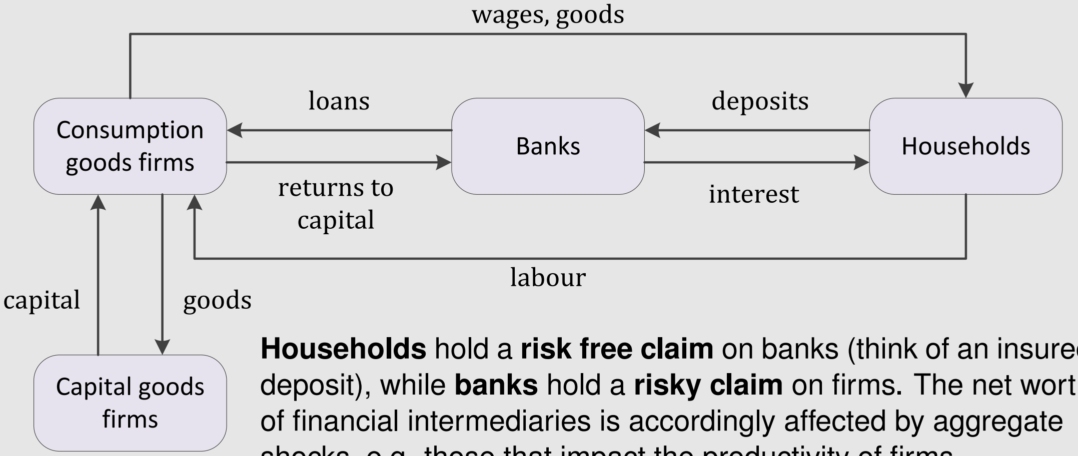
Banks are 'special' in the model in that (a) **bank deposits** are the sole vehicle for direct household saving; (b) **bank loans** are required by production firms for the purchase of capital inputs.

While the model is stylized, it contains a number of realistic ingredients:

- Banks earn carry profits from maturity transformation (but no non-interest income);
- Banks are exposed to (mark-to-market) gains and losses on the asset portfolio (although there is a single class of non-defaultable claim);
- Bank net worth is 'sticky', and can be rebuilt only gradually through retained earnings following a shock (but there are no systemic crises in which the banking system becomes insolvent).

Model and mechanisms

The architecture of the Gertler & Karadi (2011) macroeconomy



Households hold a **risk free claim** on banks (think of an insured deposit), while **banks** hold a **risky claim** on firms. The net worth of financial intermediaries is accordingly affected by aggregate shocks, e.g. those that impact the productivity of firms.

Model and mechanisms

Gertler & Karadi's financial friction

Bank balance sheets are extremely simple:

$$s_t = d_t + n_t \qquad \text{loans = deposits + net worth}$$

Banks aim to maximize their 'going concern' value (expected profit):

$$V_t = \mathbb{E}_t[n_{t+1}] = \mathbb{E}_t[R^s_{t+1} s_t - R^f_t d_t] \qquad \text{profit earned from spread}$$

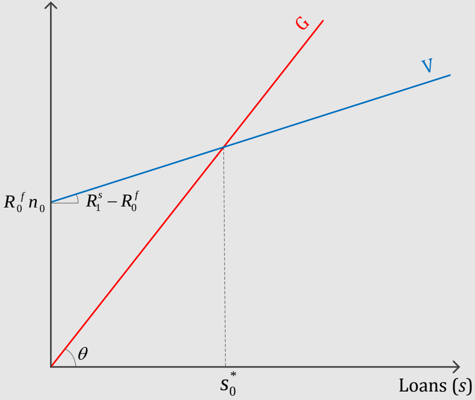
Banks are constrained in their ability to borrow from households by an incentive constraint:

$$V_t \geq \theta s_t := G_t \qquad \text{bank value must exceed a fraction of assets}$$

Constraint always binds in equilibrium.

Model and mechanisms

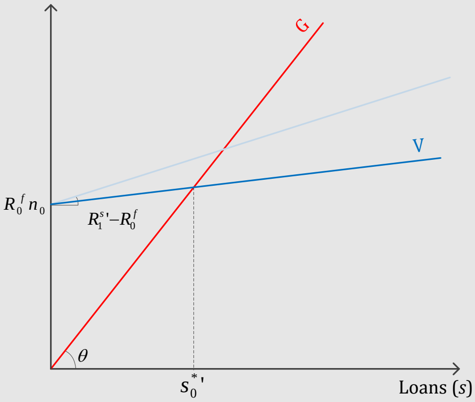
Borrowing is determined by expected returns



Whenever net interest margin > 0, the banks lend and take on debt.

Model and mechanisms

Lower expected asset returns imply smaller balance sheet



Lower expected returns reduce the bank's value as a 'going concern'.

Model and mechanisms

The macroeconomy

The non-financial economy has a familiar New Keynesian structure à la Smets and Wouters (*JEEA*, 2003; *AER*, 2007):

- Monopolistic competition amongst intermediate goods producers
- Sticky prices/wages with indexation
- Investment adjustment costs on capital goods producers
- Consumption habits
- For estimation only: A Taylor-type rule for monetary policy (not present under optimal policy)

Model and mechanisms

The macroeconomy

The economy is driven by shocks to:

- Total factor productivity;
- Labor supply;
- Price markups;
- Investment-specific productivity;
- Consumption preferences (‘risk premium’);
- Net worth of financial intermediaries (a redistribution from constrained to unconstrained agents);
- Government spending and external trade;
- For estimation only: Monetary policy (not present under optimal policy).

Outline

Monetary policy trade-offs

Two types of objective

Social welfare Under Ramsey optimal monetary policy, the objective is to maximize social welfare, subject to the constraints imposed by competitive equilibrium.

Simple mandate Under mandate optimal monetary policy, the objective is to stabilize a couple of key variables, as in the 'dual mandate' (Debortoli et al., 2016). An 'extended simple mandate' will include an objective to stabilize some financial price or quantity. Constraints are again given by competitive equilibrium.

Monetary policy trade-offs

Why simple mandates?

No central bank has, in practice, been mandated to maximize social welfare: There would be multiple distortions upon which monetary policy would then be called upon to act.

Simple mandates carry the advantages that:

- Communicating policy decisions is (relatively) straightforward.
- Accountability is enhanced when objectives are simple and measureable.
- By analogy with simple rules, simple mandates are argued to perform well in a range of settings (Svensson, 2010).

Monetary policy trade-offs

Monetary policy objective function under an extended mandate

The central bank mandate is represented by the *simple* objective function:

$$L = \mathbb{E}_0 \sum_{t=0}^{\infty} \beta^t \left\{ \omega \left[(1-\alpha) y_t^2 + \alpha \pi_t^2 \right] + (1-\omega) x_t^2 \right\} \qquad \text{(OBJ)}$$

where:

- y_t may be output *growth* (minus trend), or the output *gap* (the deviation of output from its efficient level, minus trend);
- π_t is the deviation of CPI inflation from target;
- x_t is a financial stability variable (next slide).
- ω is the relative weight on macro versus financial stabilization ($\omega = 1 \rightarrow$ dual mandate)
- α is the relative weight on inflation versus output stabilization

Monetary policy trade-offs

Extended mandate objectives

We consider the various x_t variables (of which two appear in this presentation):

- Credit-to-GDP ratio – Angelini, Neri & Panetta (*JMCB*, 2014);
- Loan-deposit interest spreads – Gelain & Ilbas (*WP*, 2014);
- Banking system leverage – Darracq Pariés et al. (*IJCB*, 2011);
- Growth in debt – Rubio & Carrasco-Gallego (*JBF*, 2014).

Observations on simple mandates

- The mandate-optimal policy is not time consistent.
- In general, mandate-optimal policy will be responsive to financial variables *even under a dual mandate*.
- Financial volatility will *always* be lower under an extended mandate than under a dual mandate.

Welfare

Ranking policy alternatives

- The aim of our exercise is to compare alternative central bank mandates. That requires a common yardstick, which we take to be social welfare.
- To compare social welfare under policy alternatives we derive a purely quadratic approximation to the utility function of the representative household.
- The approximation then takes the form (up to an irrelevant constant):

$$U(C_t, L_t) = -\frac{1}{2}\mathbf{x}_t'\mathbf{W}\mathbf{x}_t \tag{1}$$

  where $\mathbf{x}_t$ is a vector of model variables, including relevant leads and lags, and $\mathbf{W}$ is a matrix of welfare weights.
- When the covariance matrix $\boldsymbol{\Sigma} = \mathbb{E}[\mathbf{x}_t\mathbf{x}_t']$ is known and the exogenous variables are Gaussian, expected utility is proportional to:

$$\mathbb{E}[U(C_t, L_t)] = -\frac{1}{2}\mathrm{tr}(\mathbf{W}\boldsymbol{\Sigma}) \tag{2}$$

Welfare

Ranking policy alternatives

Our process for evaluating policy alternatives is:

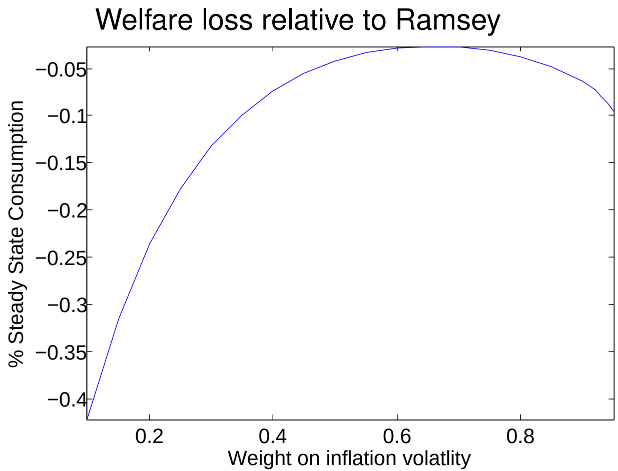
1. Propose a central bank mandate of the form $\mathcal{Q}(\mathbf{z}_t) = \mathbf{z}_t'\mathbf{Q}\mathbf{z}_t$, for $\mathbf{z}_t = (y_t^g, \pi_t, f_t)$.
2. Compute the equilibrium under commitment by maximizing $\mathcal{Q}(\mathbf{z}_t)$ subject to the constraints given by the linearized conditions for competitive equilibrium.
3. Evaluate social welfare under the mandate $\mathcal{Q}$ relative to welfare under Ramsey optimal policy $\mathcal{R}$ in terms 'consumption equivalents' (CE).

   Definition of CE the percentage reduction in household consumption that leaves them indifferent between the allocation under mandate $\mathcal{Q}$ and the Ramsey allocation $\mathcal{R}$.

Outline

Results

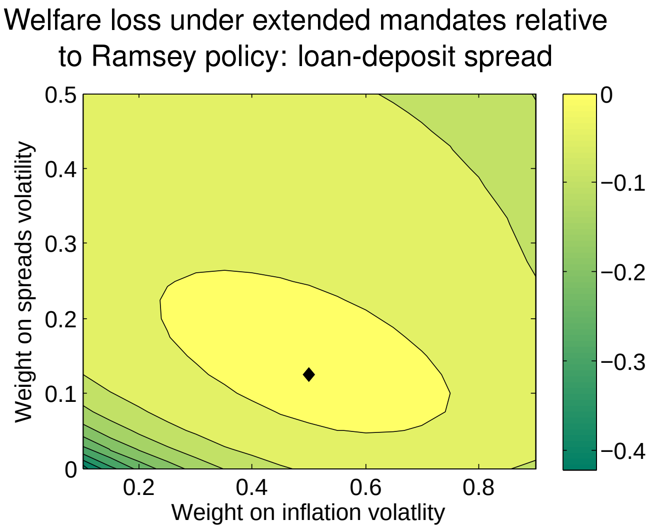
What weight should a central bank with a dual mandate ($\omega = 0$) place on inflation stabilization?



$$L_t = (1-\alpha)y_t^2 + \alpha\pi_t^2$$

- Optimal inflation weight under a dual mandate $\alpha^\dagger = 0.65$.
- Strict inflation targeting (à la Woodford), and extreme dovishness, both suboptimal.
- Welfare loss under *strict* IT ($\alpha = 1$) around 0.3% of consumption.

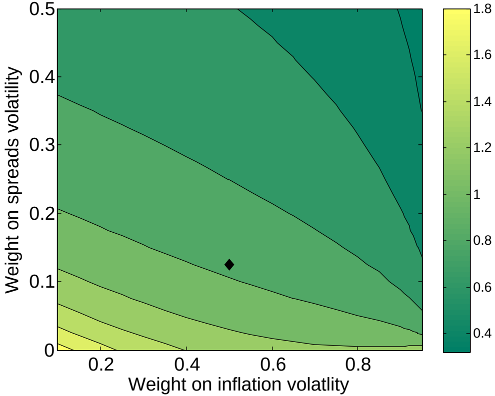
Results



- Welfare losses in percentage consumption equivalent terms (color scale).
- Black ◆ indicates optimal mandate.
- Darker colors indicate worse outcomes.

Results

Loan spread volatility under simple mandates relative to Ramsey policy



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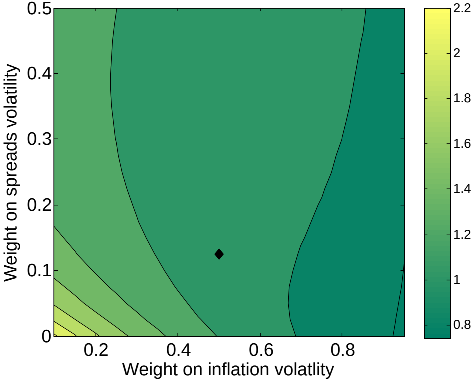

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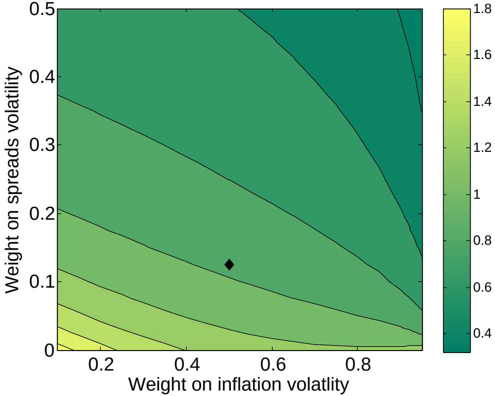
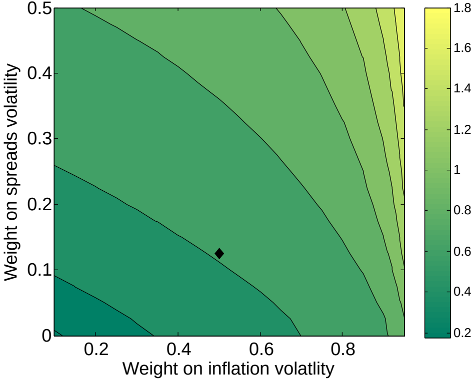


Output gap volatility under simple mandates relative to Ramsey policy



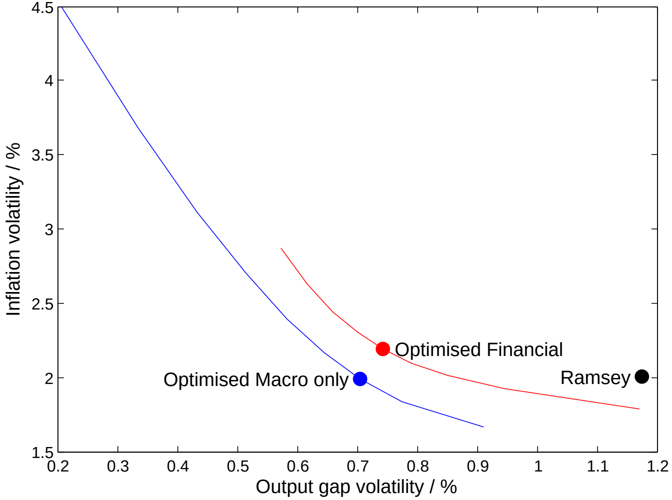
Results

Optimal extended mandate: loan-deposit spread

- It is welfare optimal for the central bank to put positive weight on stabilizing bank lending spreads.
- A central bank mandate with $\omega > 0$ is *robust*, in the sense that household welfare is roughly invariant to policymakers' relative preferences over output and inflation stabilization.
- The optimal mandate delivers inflation that is *about as volatile* as under Ramsey; the volatility of the output gap is *lower*.
- There is (mild) complementarity between inflation and financial stabilization, in the sense that raising the weight α on inflation stabilization reduces the volatility of spreads, but raises the volatility of the output gap.

Results

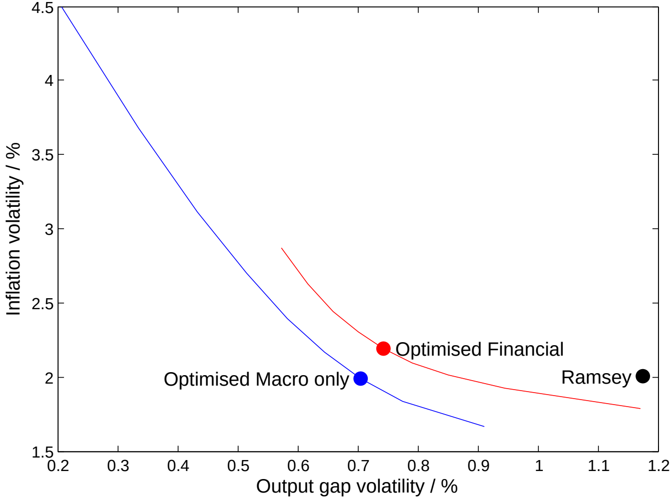
Taylor (volatility) frontier: Loan-to-desposit spread



- Frontiers show the combinations of volatility in inflation and slack under simple mandates as α varies.
- Dual mandate frontier is blue ($\omega = 0$).
- Extended mandate frontier is red ($\omega = \omega^*$).
- Optimal extended mandate has a lower weight on inflation $\alpha^* = 1/2$, and $\omega^* = 1/8$.

Results

Taylor (volatility) frontier: Loan-to-desposit spread

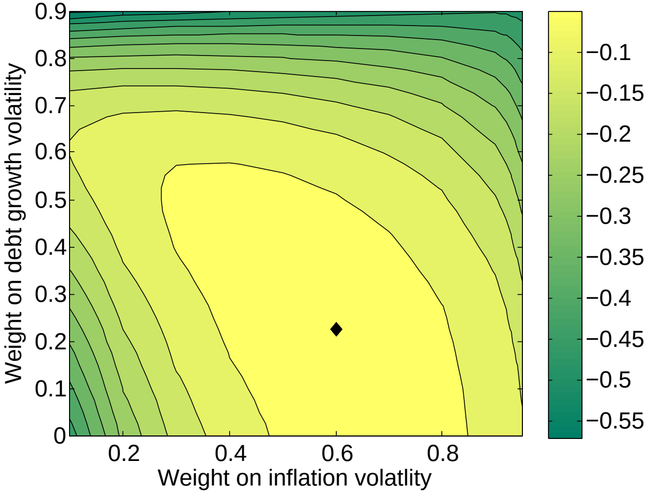


- In output-inflation space, financial stabilization leads policymakers to face a strictly worse menu of options.
- Output gap volatility is higher under Ramsey than under an optimal simple mandate.
- Inflation volatility is about the same in all cases.

Outline

Robustness

Welfare loss under extended mandates relative to Ramsey policy: Loan growth



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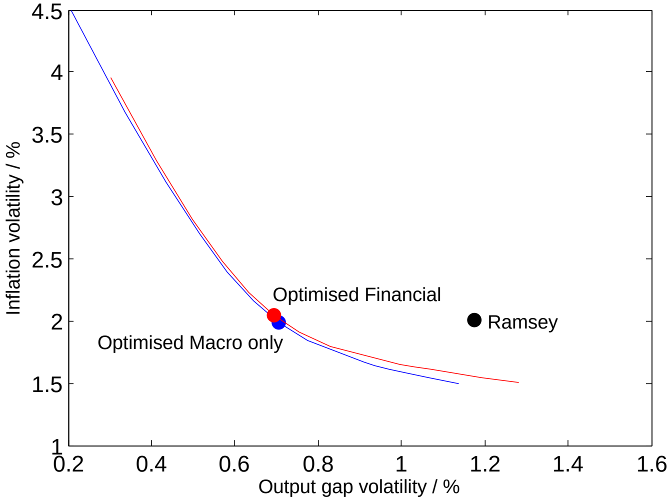

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Outline

Summary

The main findings of our paper

- ***A balanced stabilization mandate improves on strict inflation targeting*** Optimal mandate assigns broadly equal importance to stabilization inflation and resource utilization; findings in Debortoli et al. (2016) carry over to case of financial frictions.
- ***An extended mandate results in welfare close to the best achievable Ramsey outcome*** Stabilizing bank lending spreads is welfare-improving; non-standard measures designed to reduce spreads are likely a useful complement.
- ***An extended mandate is robust*** Augmenting mandate with credit spread produces similar levels of welfare regardless of policymakers' macro preferences.
- ***Existing results on optimal monetary policy with financial frictions hold in empirically relevant models*** Findings consistent with literature based on compact models and efficient steady state.
- ***Financial target*** Welfare greater when targeting credit prices rather than quantities.

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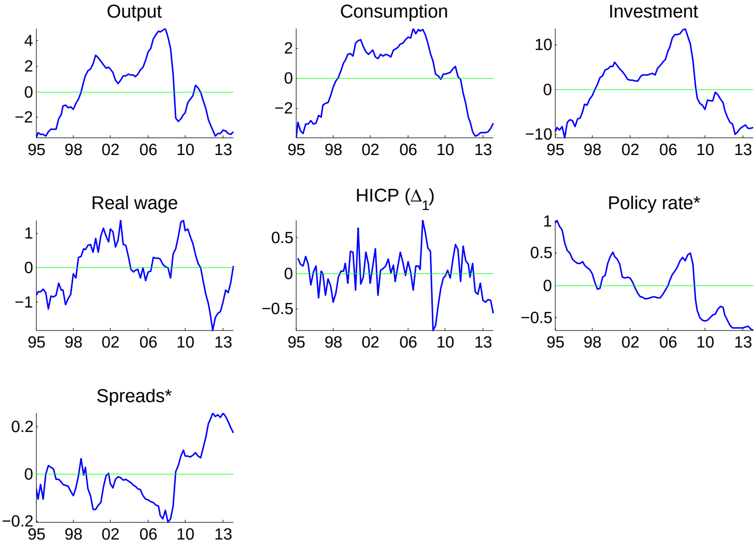
End of presentation

Estimation



Note: data are in log deviations from a linear trend except *, percent deviation from mean.

Estimation

Structural parameter estimates

	Prior	Posterior	
	Mean	Mean	90% HPD
Calvo price rigidity	0.75	0.77	[0.59 0.79]
Calvo wage rigidity	0.75	0.81	[0.47 0.71]
Price indexation	0.75	0.53	[0.63 0.85]
Wage indexation	0.75	0.41	[0.21 0.53]
Consumption habit	0.70	0.72	[0.44 0.93]
Invest. adj. cost	4.0	0.77	[0.70 0.84]
Leverage	4.0	2.3	[0.70 0.84]
Taylor rule			
Weight on π	1.70	1.80	[1.66 1.94]
Weight on y^g	0.06	0.15	[0.08 0.23]
Smoothing	0.90	0.80	[0.77 0.83]

Estimation

Forcing process parameter estimates

	Prior	Posterior		
	Mean	Mean	90% HPD	
ρ_R	0.5	0.69	[0.59	0.79]
ρ_A	0.5	0.59	[0.47	0.71]
ρ_I	0.5	0.74	[0.63	0.85]
ρ_L	0.5	0.37	[0.21	0.53]
ρ_P	0.5	0.72	[0.44	0.93]
ρ_G	0.5	0.77	[0.70	0.84]

	Prior	Posterior		
	Mean	Mean	90% HPD	
σ_R	0.01	0.029	[0.019	0.039]
σ_A	0.01	0.021	[0.015	0.027]
σ_I	0.01	0.024	[0.018	0.030]
σ_L	0.01	0.121	[0.060	0.183]
σ_P	0.01	0.006	[0.004	0.008]
σ_G	0.01	0.015	[0.013	0.017]
σ_N	0.01	0.009	[0.005	0.015]

R = risk; A = technology; I = investment; P = price markup; L = labor supply; G = government; N = net worth