Targeting Financial Stability: Macroprudential or Monetary Policy

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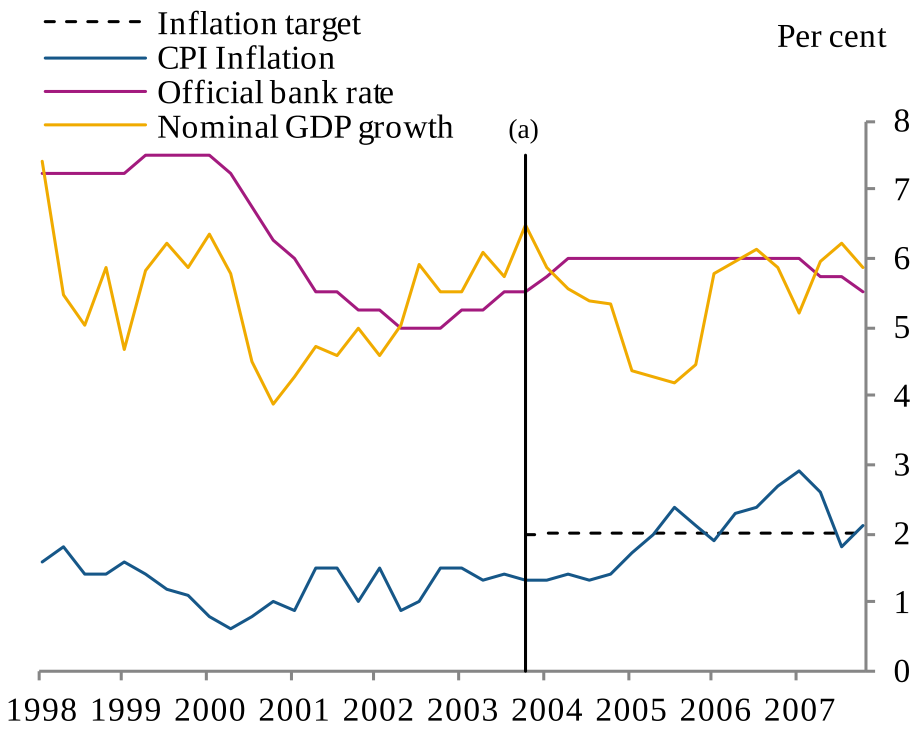
* The views expressed in this presentation are those of the presenter and should not be thought to represent those of the Bank of England, Monetary Policy Committee members, or Financial Policy Committee members.

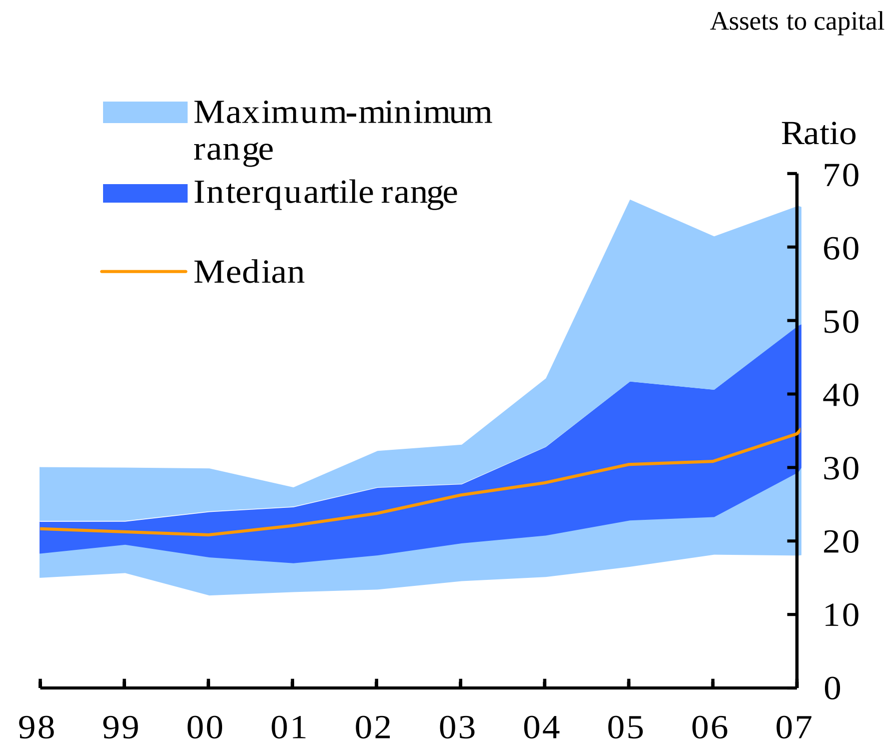
Pre-crisis: UK monetary policy and financial stability

Real economy stability…



(a) Date MPC shifted to a 2% CPI inflation target

…financial instability



Sources: Published accounts and Bank calculations.

Post-crisis views

- Broad agreement on need for tougher structural regulation of financial sector and the role of macroprudential policy

- Divergence on role of monetary policy:
  - Stein (2013) only '*monetary policy gets in all the cracks*'
  - Shin (2015) '*both monetary policy and macroprudential policies have some effect in constraining credit growth and the two tend to be complements*'
  - Svensson (2015) '*little or no support for leaning against the wind for financial stability purposes*'

A simple, common framework for policymakers

- Articulate monetary-macroprudential interactions and trade-offs using a simple New-Keynesian model which:
  - introduces a role for credit and the possibility of a financial crisis (similar to Woodford, 2012; Ajello et al, 2016; Svensson, 2016)
  - augments standard loss function for financial stability objectives, including possibility of (financial crisis) hysteresis effects
  - includes macroprudential policy via countercyclical capital buffer (CCB)
  - examines jointly optimal policy and considers when monetary and macroprudential policies are substitutes or complements, including under different shocks
  - considers the implications of the zero lower bound, market-based finance and the risk-taking channel of monetary policy, and whether monetary policy should lean against the wind

Benchmark two-period model

IS curve:

$$y_1 = E^{(ps)}{}_1 y_2 - \sigma(i_1 - E^{(ps)}{}_1 \pi_2 + \omega s_1) + \xi^{y}{}_1$$

Phillips curve:

$$\pi_1 = \kappa y_1 + E(^{ps})_1 \pi_2 + \nu s_1 + \xi^{\pi}{}_1$$

Real credit growth:

$$B_1 = \varphi_0 + \varphi_i i_1 + \varphi_s s_1 + \xi^{B}{}_1 \; [+\varphi_{is} i_1 s_1]$$

Macroprudential policy:

$$s_1 = \psi k_1 + \xi^{B}{}_1$$

Crisis probability (based on cross-country estimation):

$$\gamma_1 = \frac{\exp(h0 + h_1 B_1 + h_2 k_1)}{1+\exp(h0 + h_1 B_1 + h_2 k_1)}$$

Loss function, expectations and calibration

Loss function: $L = \pi_1^2 + \lambda y_1^2 \ldots$

$$\beta(1-\gamma_1)(\pi_{2nc}^2 + \lambda y_{2nc}^2)\ldots$$

$$+\beta(1+\zeta)\gamma_1(\pi_{2c}^2 + \lambda y_{2c}^2)$$

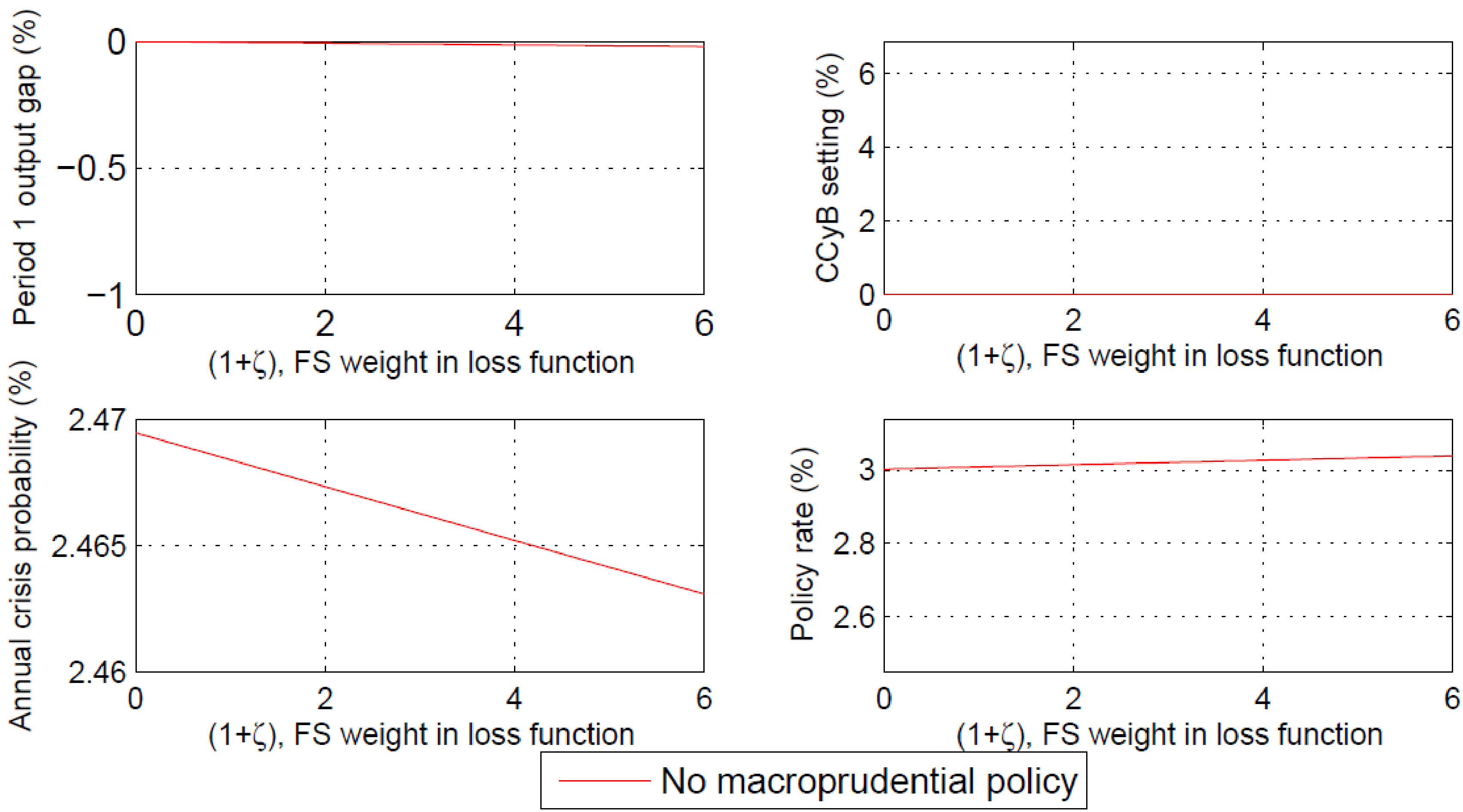
Private sector assumes crisis will not occur so does not:

- react to changes in crisis probability
- internalise the effect of its behaviour on crisis probability

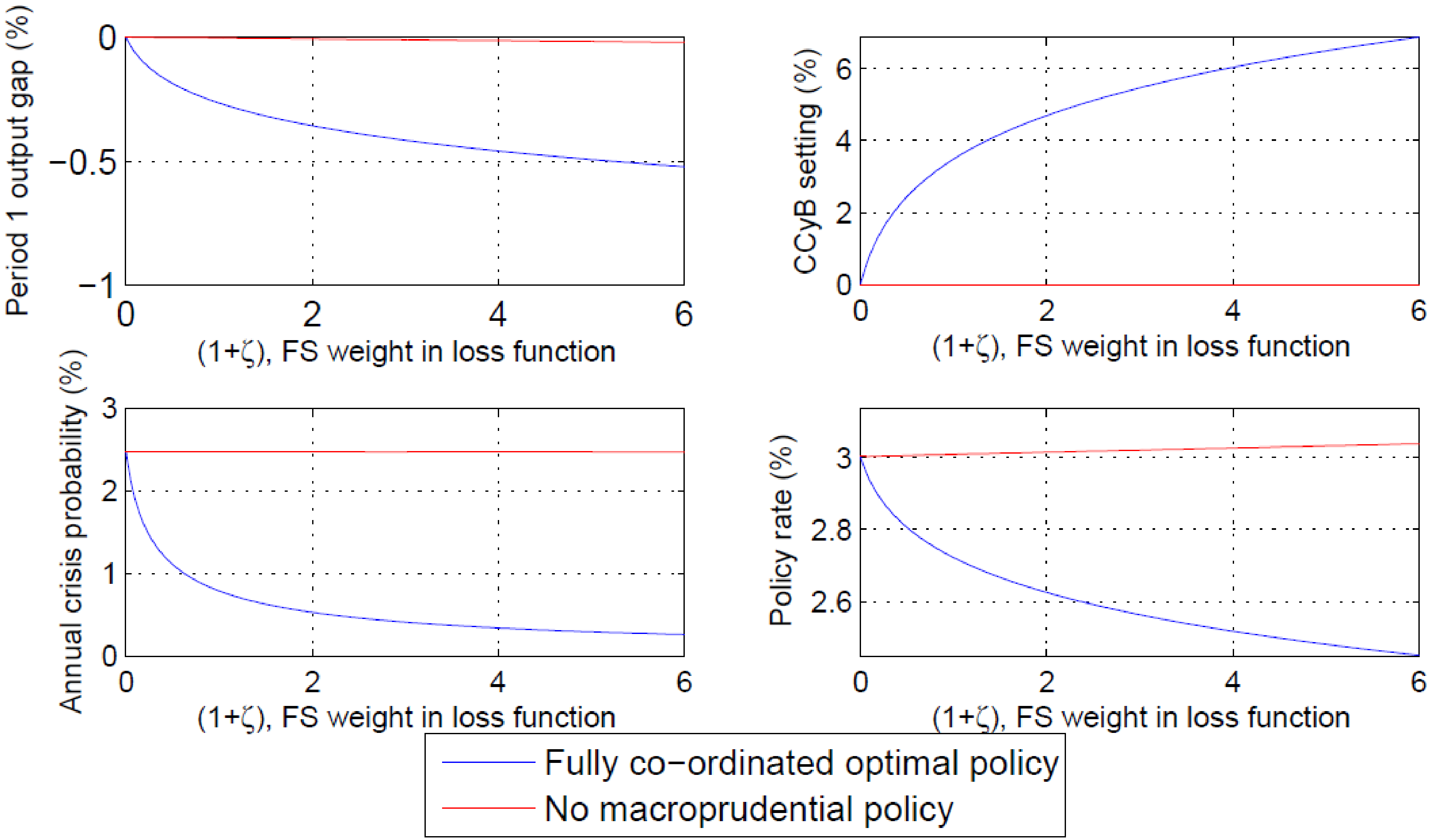
Most of model is calibrated to broadly match UK empirical evidence

- interpret time period as 3 years to capture credit building up over a longer horizon and policy implementation lags

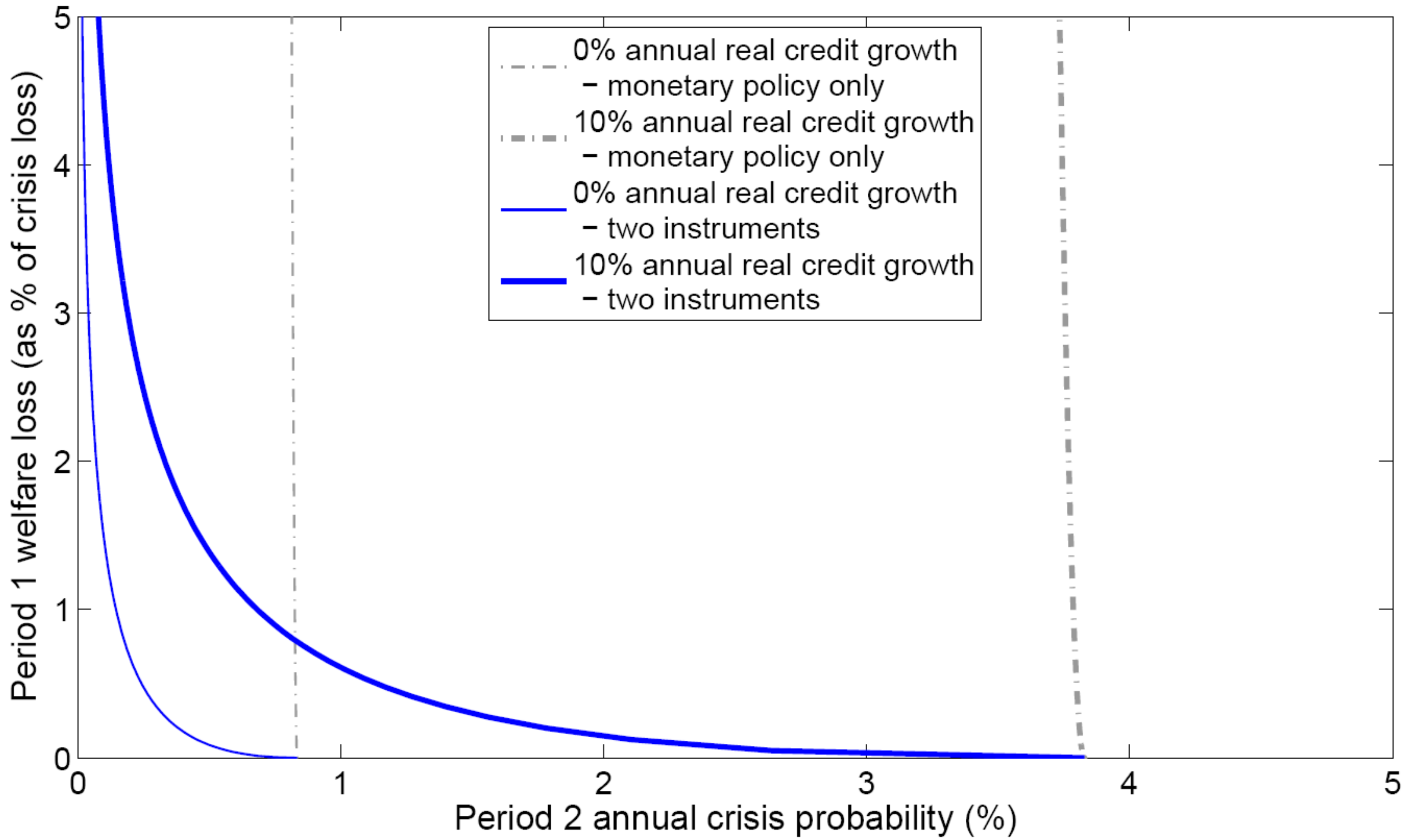
Without macroprudential policy, monetary policy must trade off two goals



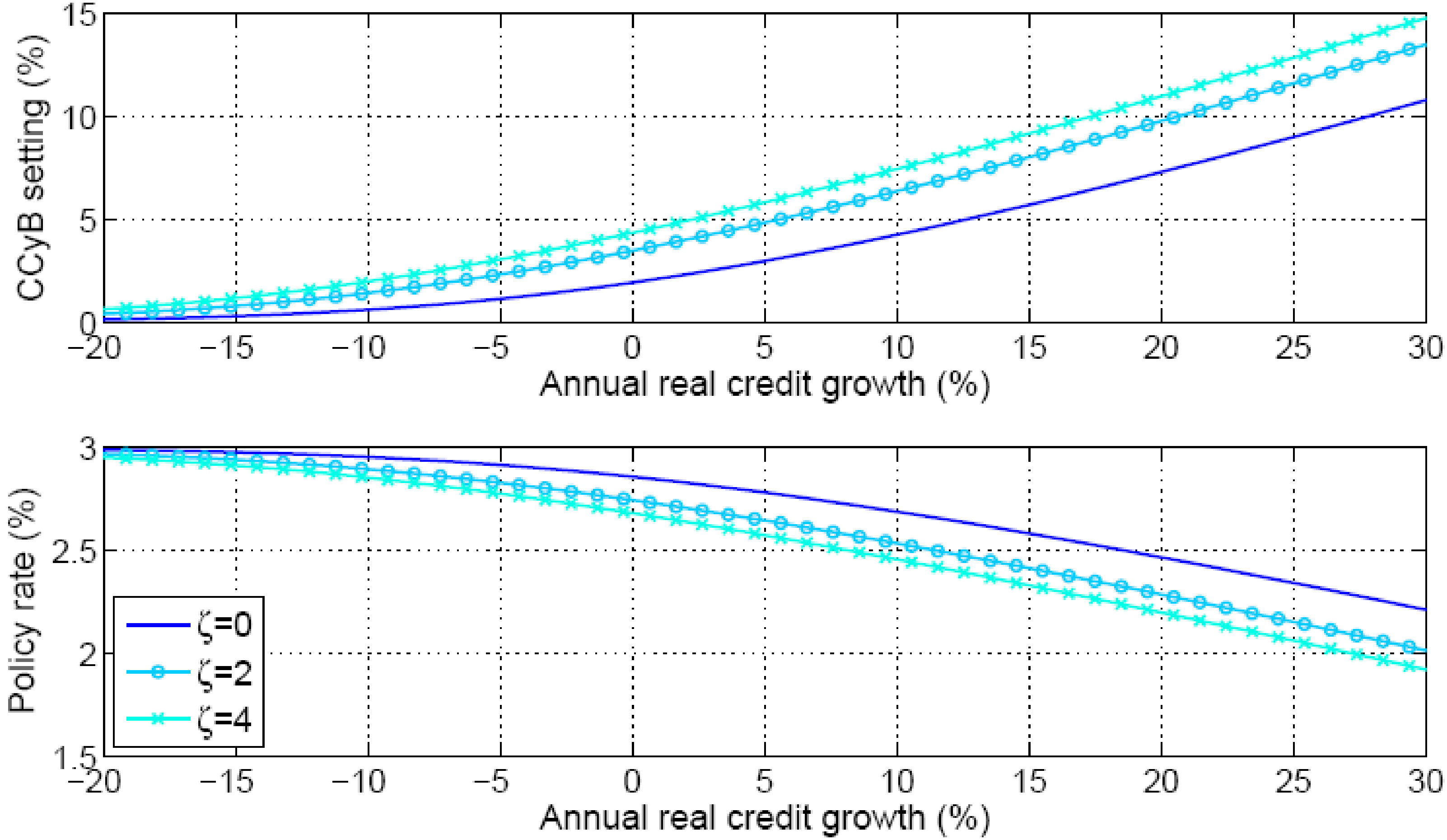
Introducing macroprudential policy leads to welfare gains (1)



Introducing macroprudential policy leads to welfare gains (2)

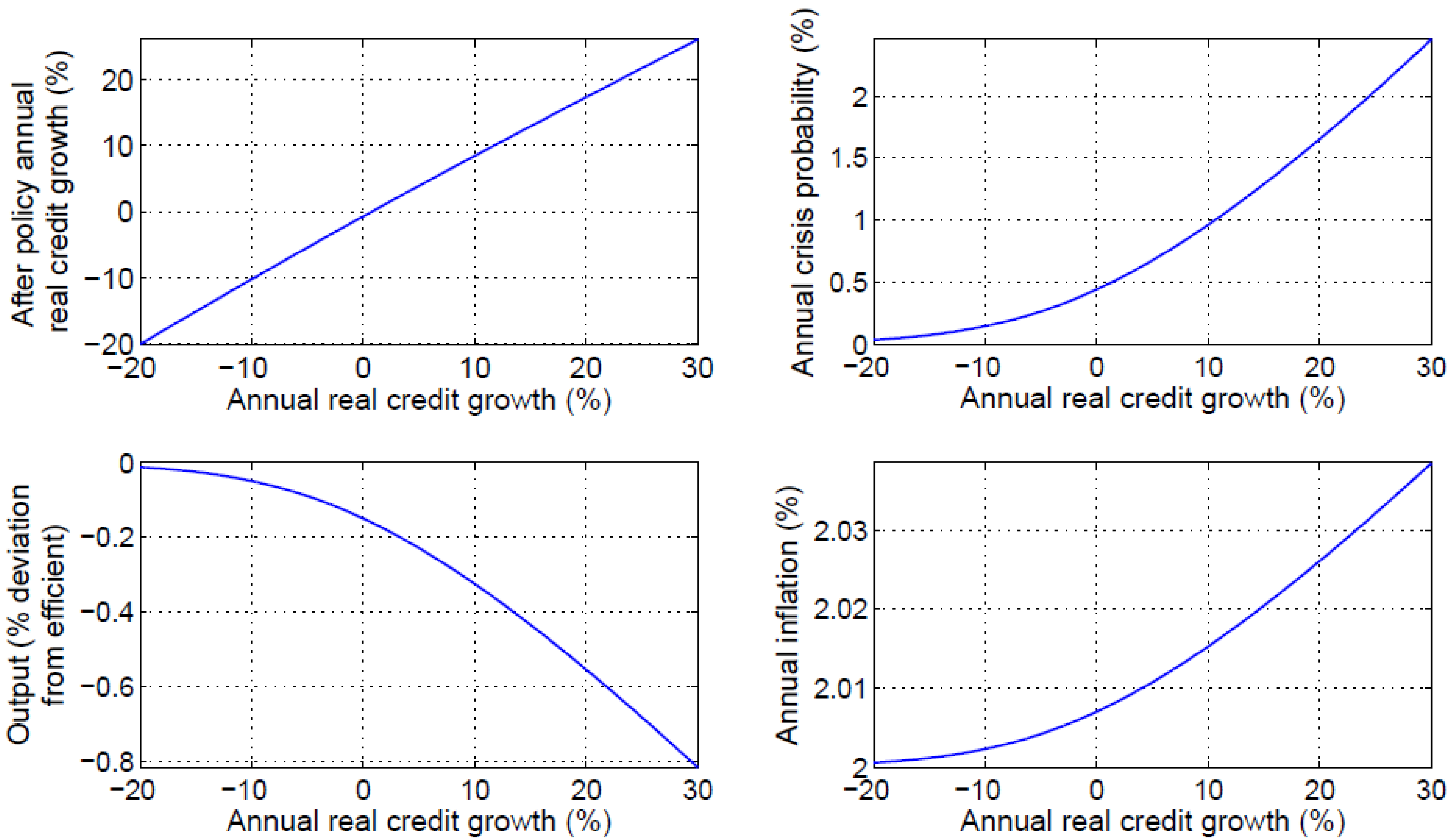


Credit growth shocks: policies as substitutes



- In benchmark case, macroprudential tightening leads to monetary policy loosening, eg as credit growth increases

Credit growth shocks (2)



Policies as substitutes or complements

Table 5: *Optimal policy in response to a credit boom (Shock to: ξ_1^B)*

Case	Δk_1	Δi_1	Parameter restriction	Intuition
Instrument complements	+	+	$\frac{\kappa^2}{\kappa^2+\overline{\lambda}}\frac{\nu\psi}{\kappa} > \sigma\omega\psi$	The impact of the CCyB on potential output sufficiently exceeds its impact on demand
Instrument substitutes	+	−	$\frac{\nu\psi}{\kappa}\frac{\kappa^2}{\kappa^2+\overline{\lambda}} < \sigma\omega\psi$, $\frac{\frac{\partial\gamma_1}{\partial k_1}}{\frac{\partial\gamma_1}{\partial i_1}}\frac{\sigma}{(\sigma\omega\psi+\frac{\kappa^2}{\lambda+\kappa^2}\frac{\nu\psi}{\kappa})} > 1$	The impact of the CCyB on potential output does not sufficiently exceed its impact on demand, and the CCyB has a comparative advantage for reducing crisis probability
Instrument substitutes and sign switches	−	+	$\frac{\frac{\partial\gamma_1}{\partial k_1}}{\frac{\partial\gamma_1}{\partial i_1}}\frac{\sigma}{(\sigma\omega\psi+\frac{\kappa^2}{\lambda+\kappa^2}\frac{\nu\psi}{\kappa})} > 1$	The impact of the CCyB on potential output does not sufficiently exceed its impact on demand, and monetary policy has a comparative advantage for managing the crisis probability

- Monetary and macroprudential policies are strategic substitutes in the benchmark case, though instrument assignment can switch
- Might be strategic complements if macroprudential policies have large supply effects, and the policymaker places a fairly high weight on inflation, or if they boost aggregate demand

Optimal policy conditions

Intratemporal condition:

$$\bar{\lambda} y_1 + \kappa \pi_1 = 0$$

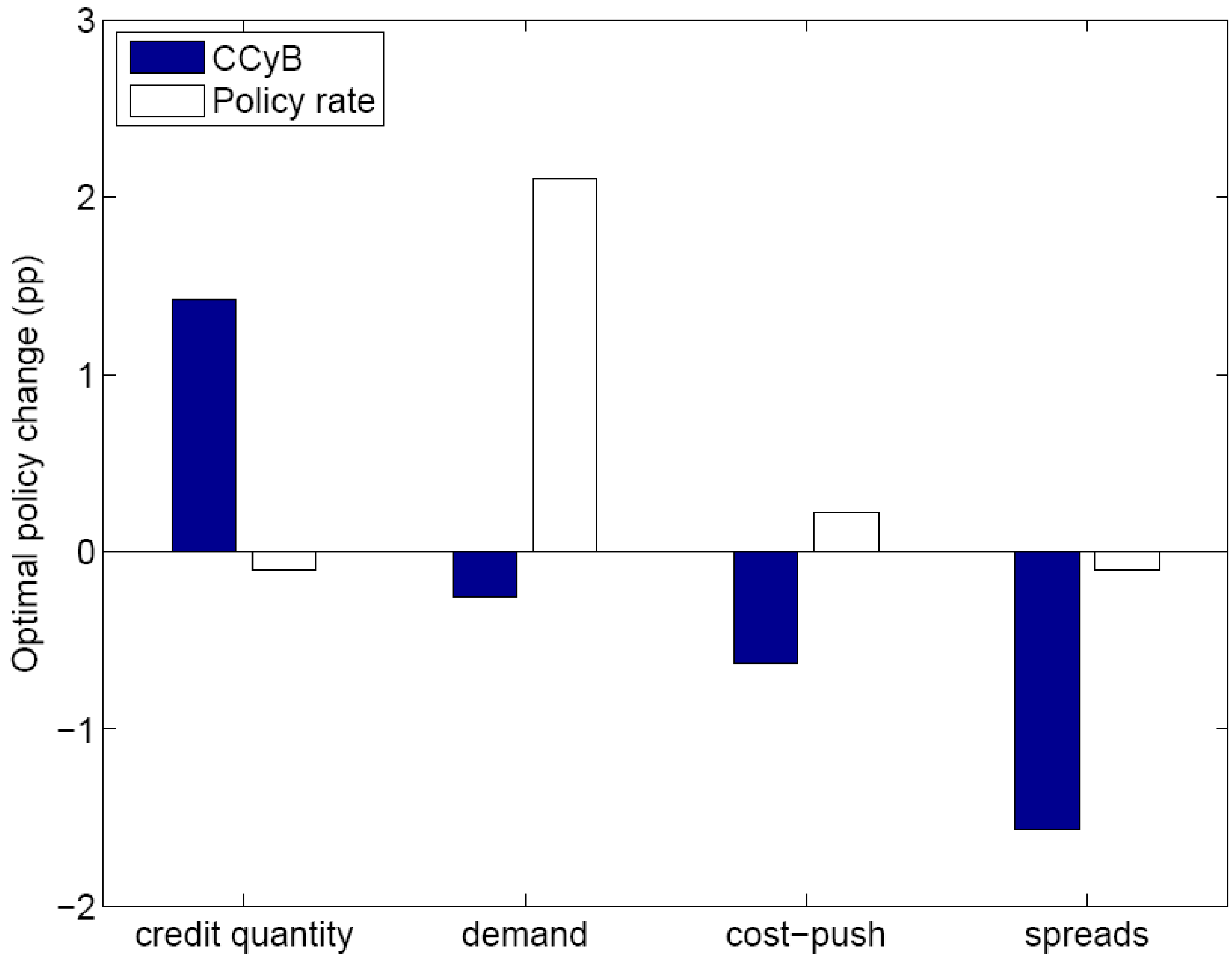
where $\bar{\lambda} < \lambda$

Intertemporal condition:

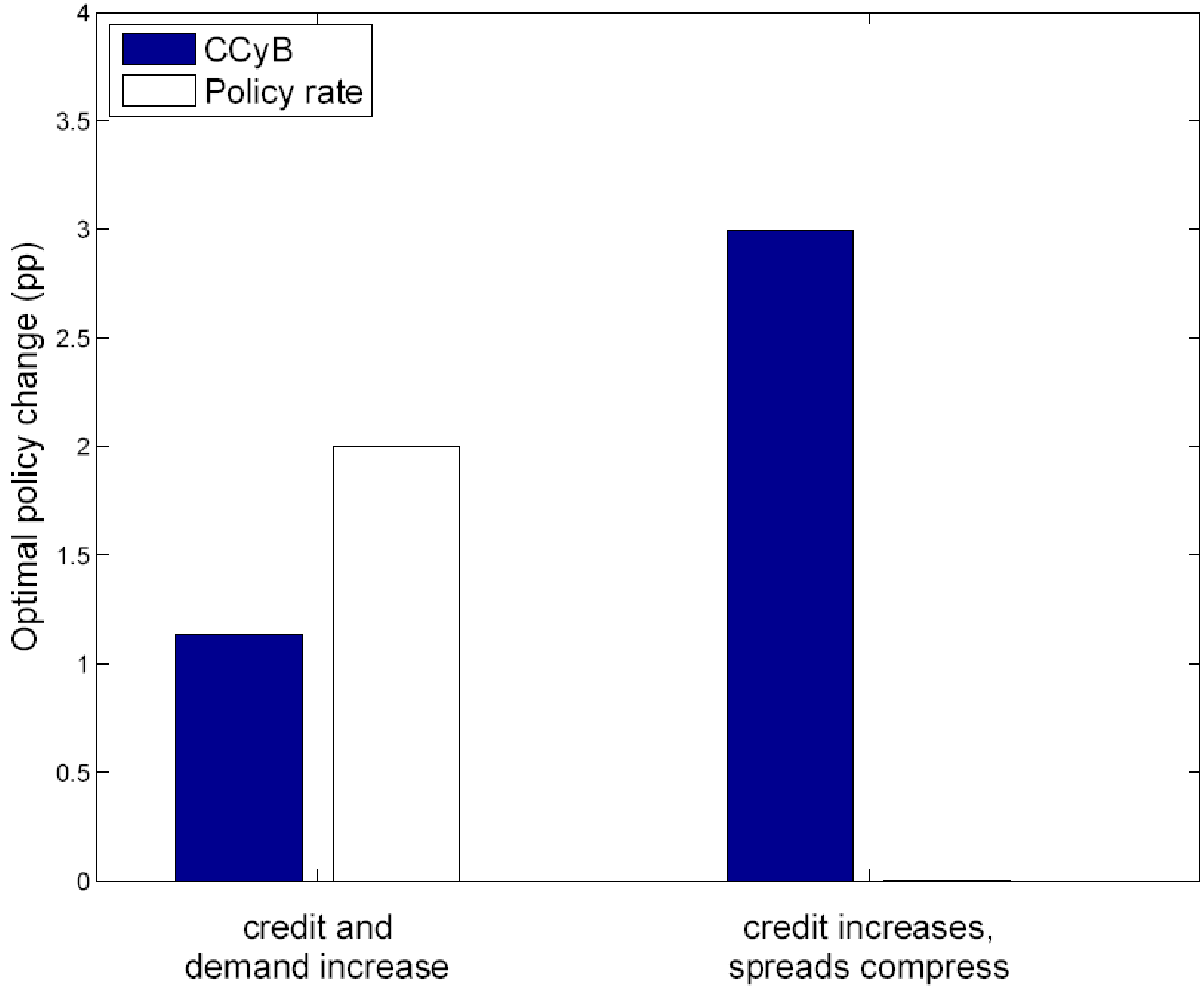
$$\lambda y_1 \left(-\frac{\nu\psi}{\kappa}\right) = \left(\frac{\partial \gamma_1}{\partial k_1} + \frac{\partial \gamma_1}{\partial i_1}\left(\frac{\nu\psi}{\kappa\sigma} - \omega\psi\right)\right)\left(-\frac{\partial L}{\partial \gamma_1}\right)$$

where $\frac{\partial L}{\partial \gamma_1}$ is the expected discounted cost of a crisis

Optimal response to different shocks (1)



Optimal response to different shocks (2)

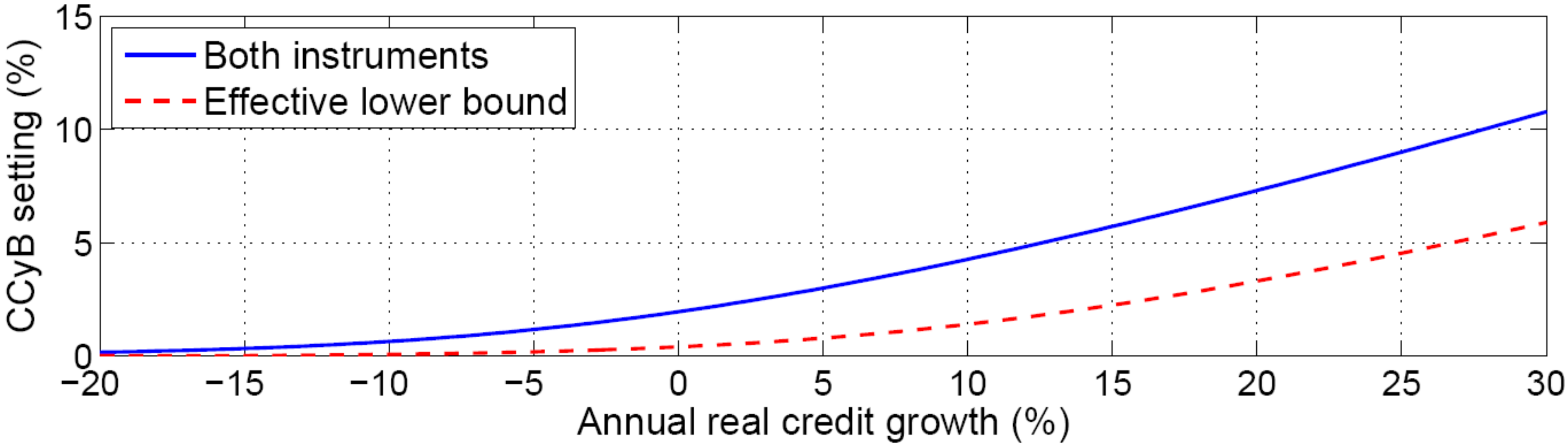


Extensions to the model – summary outcomes

Case	SD(y_1)	SD(π_1)	SD(B_1)	median(γ_1)	SD(i_1)	SD(k_1)	$E(L)$
$\zeta = 0$:							
(i) Benchmark results under CCyB regime	0.11	0.005	5.3	0.77	0.11	1.45	1.37
(ii) Nash policies	0.10	0.005	5.3	0.94	0.10	1.33	1.41
(iii) ELB	0.09	0.030	5.5	1.73	0	0.76	2.61
(iv) Market-based finance	0.09	0.004	5.6	1.46	0.08	1.13	2.32
(v) Risk-taking channel	0.11	0.003	5.8	0.87	0.10	1.45	1.51
(vi) Endogenous crisis severity	0.22	0.010	4.8	0.73	0.21	2.85	1.87

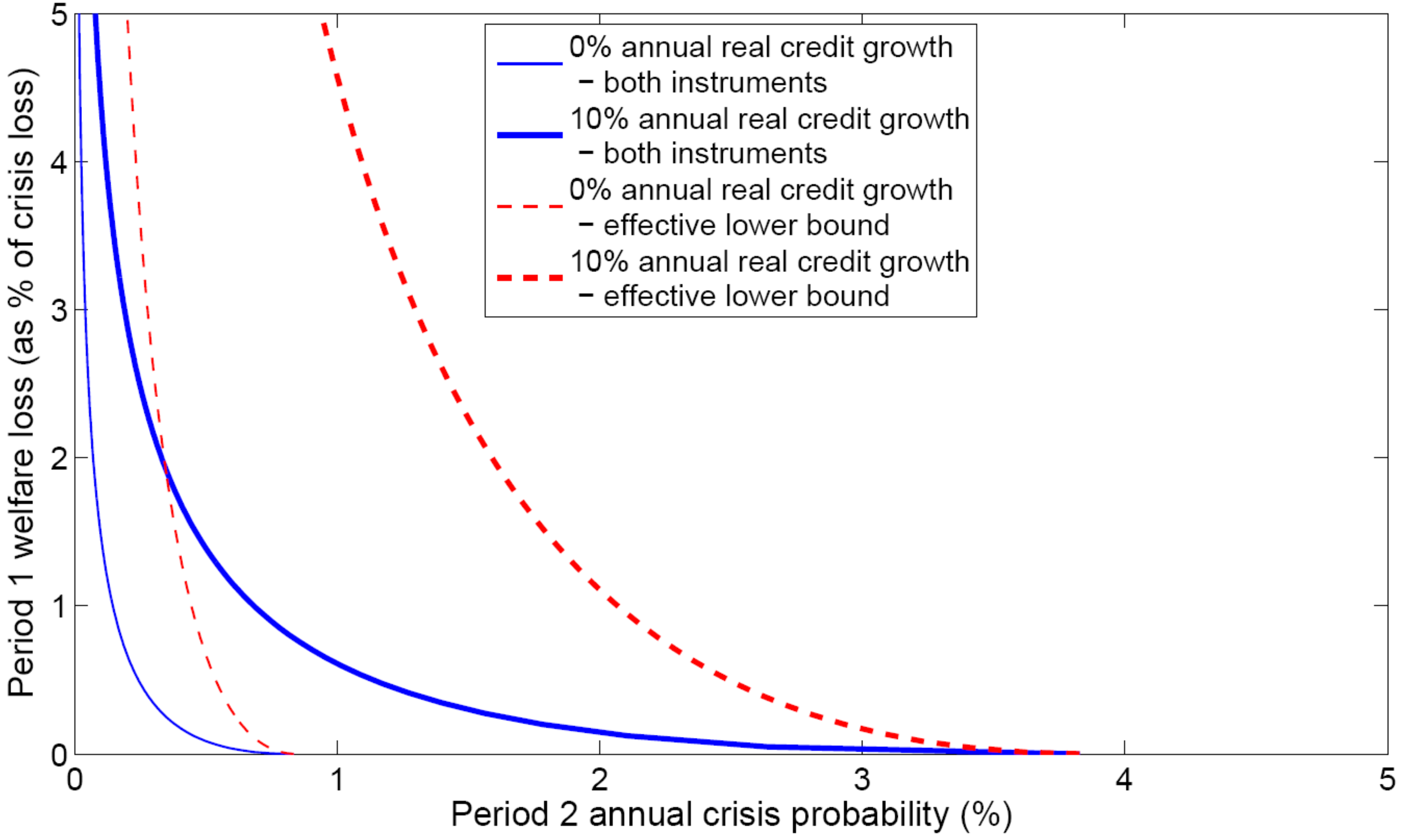
- Table shows model simulations in response to a *credit shock*
- Several extensions make outcomes significantly worse
- In all variants, the CCyB remains the key financial-stability tool

Implications of the effective lower bound (1)



- If monetary policy is constrained by the effective lower bound, use the CCB less or later as greater consideration is needed for its effects on aggregate demand

Implications of the effective lower bound (2)



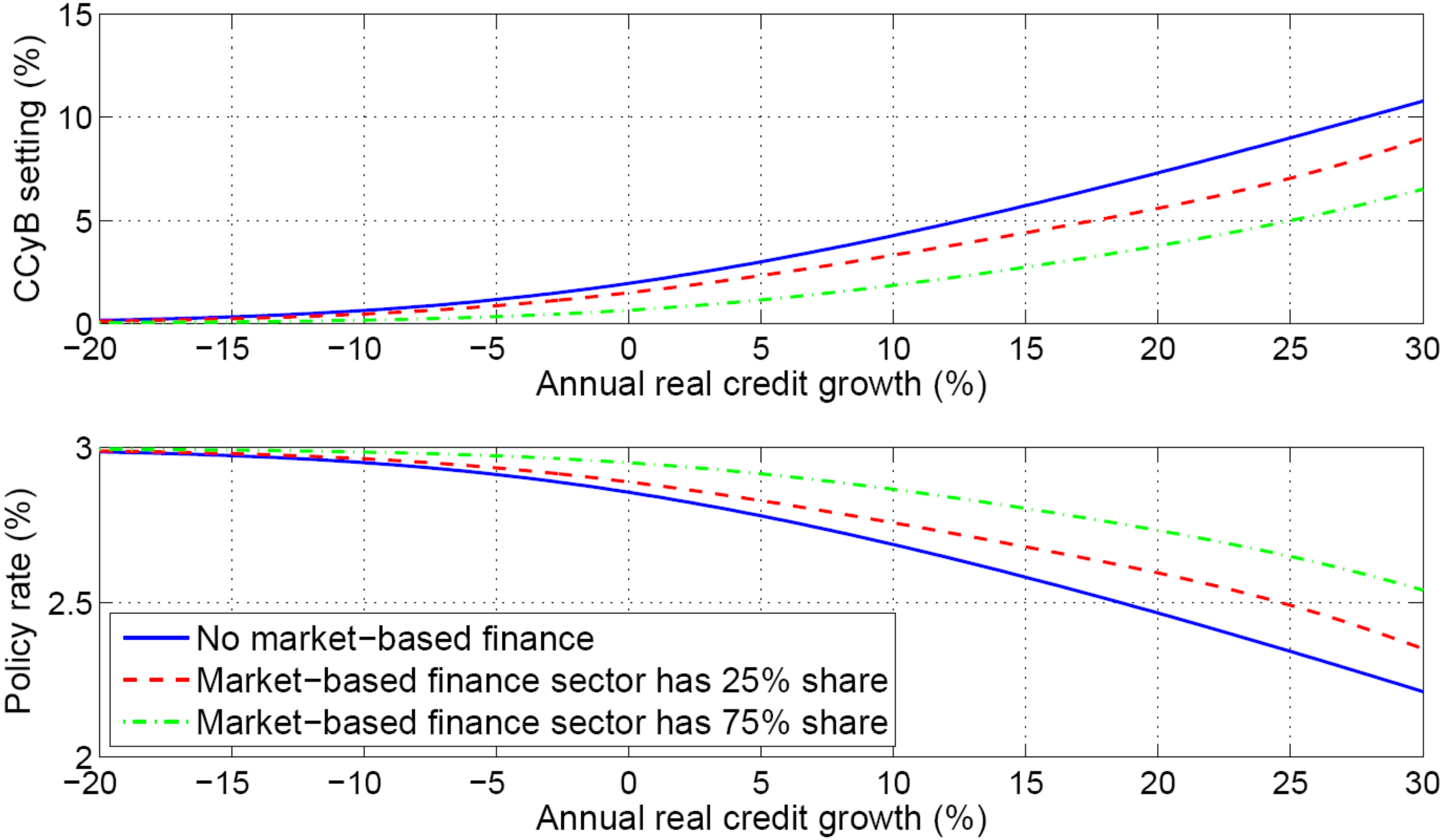
Introducing market-based finance

- Assume $\gamma_1 = b\gamma_1^B + (1-b)\gamma_1^M$,
  - $\gamma_1^B = \frac{\exp(h_0 + h_B B_1^B + h_k k_1)}{1+\exp(h_0 + h_B B_1^B + h_k k_1)}$ - probability of banking crisis
  - $\gamma_1^M = \frac{\exp(h_0 + h_B B_1^M)}{1+\exp(h_0 + h_B B_1^M)}$ - probability of market-based crisis
  - b - share of lending in banking sector

- CCyB (k_1) cannot increase resilience in market-based sector

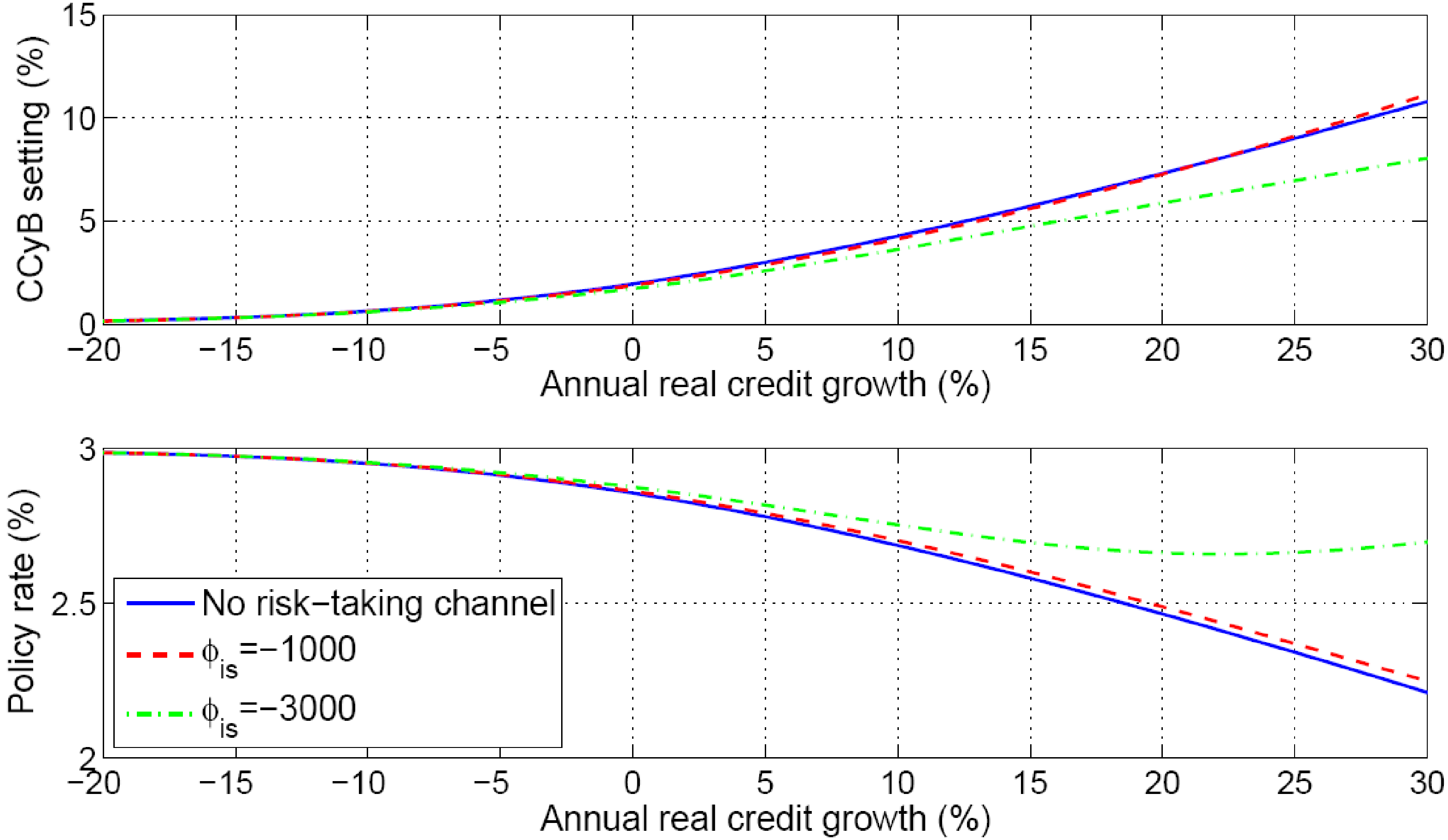
- Bank and market-based lending determined by:
  - $B_1^B = \phi_0^B + \phi_i i_1 + \phi_s^B s_1 + \xi_1^B$
  - $B_1^M = \phi_0^M + \phi_i i_1 + \phi_s^M s_1 + \xi_1^M$
  - $\phi_s^B < 0$, $\phi_s^M > 0$ - CCyB causes credit to leak to market based sector

Implications of market-based finance



- As macroprudential policies become less effective, there is a stronger role for monetary policy to 'lean against the wind'

Implications of a large risk-taking channel of monetary policy



- Lower interest rates make the CCB less effective at reducing lending growth
- Potential role for monetary policy in some circumstances

Conclusion and next steps

- Developed simple framework for modelling monetary and macroprudential policy
  - encapsulates many hypotheses & trade-offs in a parsimonious manner
  - key role for macroprudential policy throughout; monetary policy often a strategic substitute but instruments can be complements
  - identify circumstances in which monetary policy may be needed
- Next steps / extensions
  - incorporating product-based macroprudential tools
  - open economy considerations

Reserve Slides

Some Related Literature

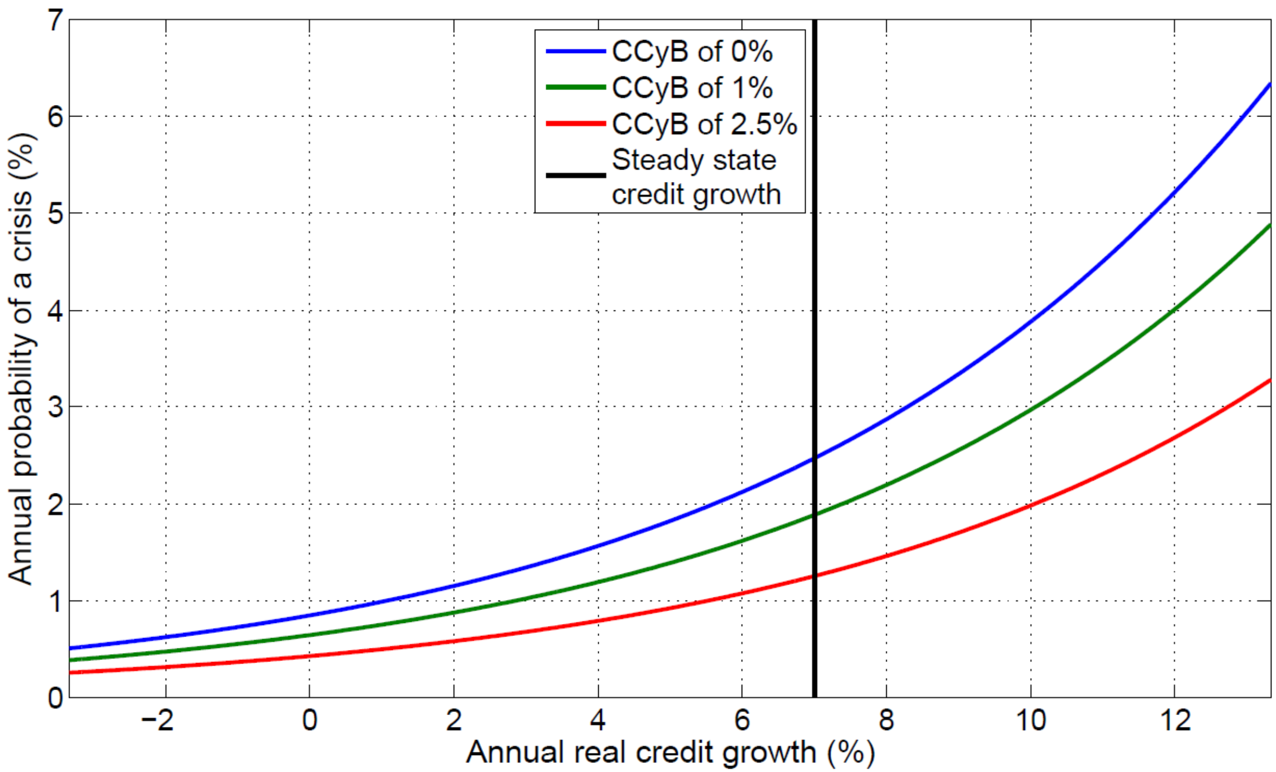
- Monetary-macroprudential policy interaction in DSGE model
  - Bean *et al* (2010), Angelini *et al* (2012), Beau *et al* (2012), De Paoli and Paustian (2017), Collard *et al* (2015)

- Our model
  - Woodford (2012), Ajello *et al* (2016), Svensson (2016)

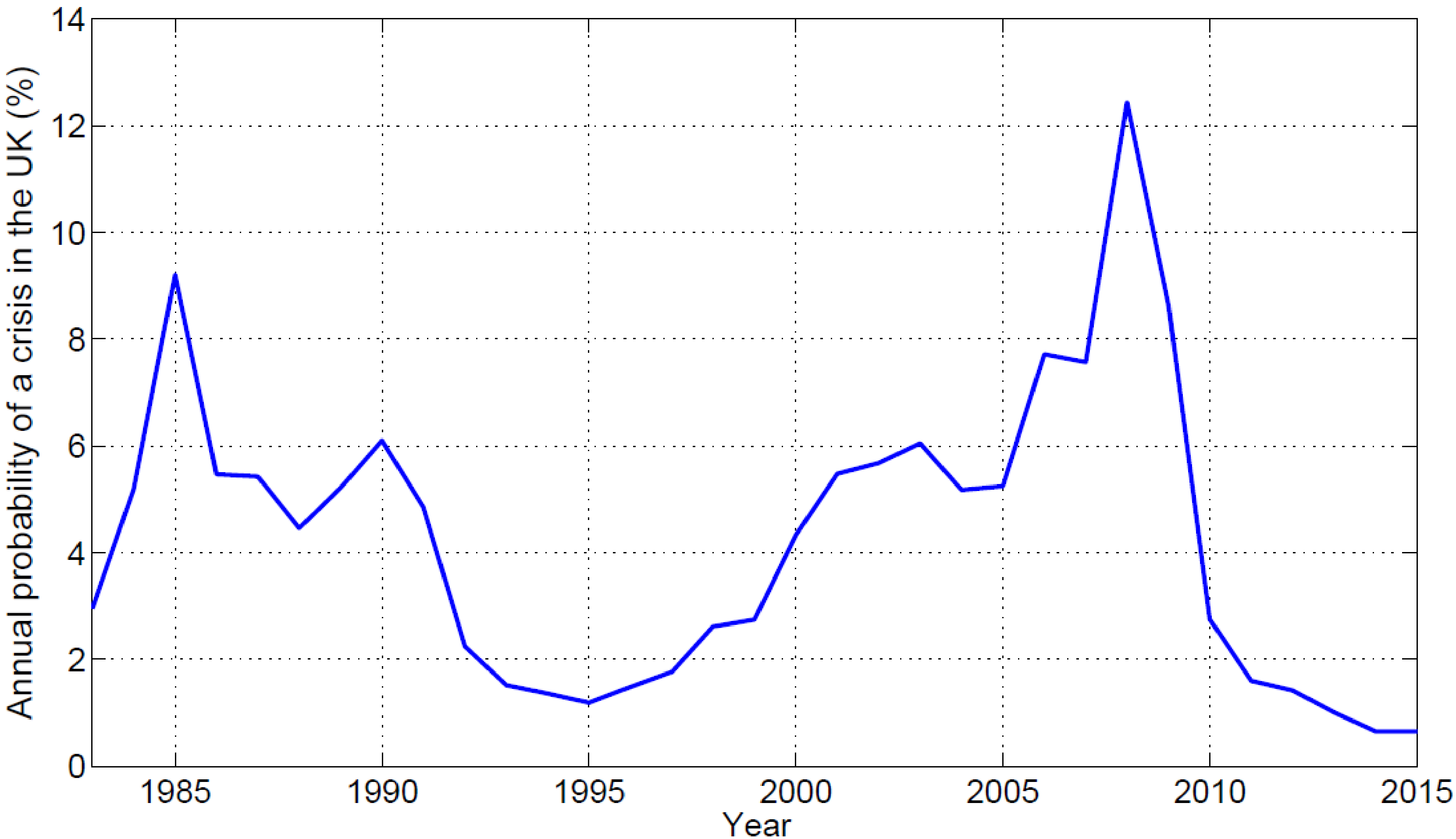
- Policy-oriented discussions of monetary-macroprudential policy interaction
  - Eichengreen *et al* (2011), Svensson (2011, 2014), IMF (2013), Yellen (2014), Smets (2014)

Calibration and estimated crisis probability

- Interpret time period as 3 years to capture credit building up over a longer horizon and policy implementation lags
- Most of the model is calibrated to broadly match UK empirical evidence
- Crisis probability equation based on estimation on cross-country dataset



Implied UK crisis probability



Calibration

Parameter	Description	Parameter	Notes
Standard parameters			
β	Discount Factor	0.97	Matches r*=1%
σ	Interest-rate sensitivity of ouptut	0.6	Burgess et al. (2013)
κ	Slope of the Phillips Curve	1	Burgess et al. (2013)
λ	Weight on output stabilisation	0.05	Standard welfare-based
i^*	Long-run natural nominal rate of interest	3%	Rachel and Smith (2015)
CCyB transmission mechanism			
ψ	Effect of the CCyB on credit spreads	0.2	BCBS (2010a), 1pp CCyB increases loan spread by 20 bps
ω	Effect of spreads on the IS curve	1	Cloyne et al. (2015)
ν	Effect of spreads on the Phillips Curve	0.4	Franklin, Rostom and Thwaites (2015)
Financial conditions equation			
ϕ_0	Average real credit growth	0.21	Sample mean, 1980-2007
ϕ_i	Coefficient on interest rates	-1.5	Cloyne et al. (2015)
ϕ_s	Coefficient on spreads	-6	Cloyne et al. (2015)
Crisis probability equation			
h_0	Constant	$-1.7 + 0.11h_k$	Estimated using a cross-country dataset
h_B	Sensitivity of crisis probability wrt credit growth, B	5.18	
h_k	Sensitivity of crisis probability wrt to CCyB, k_1	-27.8	
Period 2 parameters			
$y_{2,c}$	Deviation of output from target in crisis state	-0.041	4.1% lost output per year, Close to Brooke et al. (2015)
$\pi_{2,c}$	Deviation of inflation from target in crisis state	0	No effect
$y_{2,nc}$	Deviation of output from target in non-crisis state	0	Steady state
$\pi_{2,nc}$	Deviation of inflation from target in non-crisis state	0	Steady state
ζ	Additional weight on E(crisis cost)	Varied	–
Shocks			
$SD(\xi_1^y)$	Standard deviation of demand shocks	0.0125	Similar to risk premium shock in Burgess et al. (2013)
$SD(\xi_1^\pi)$	Standard deviation of cost-push shocks	0.0011	Similar to markup shock in Burgess et al. (2013)
$SD(\xi_1^B)$	Standard deviation of credit quantity shocks	0.16	Set to match historical data
$SD(\xi_1^s)$	Standard deviation of credit spread shocks	0.006	Matches data on UK banks' CDS premia

Impulse responses