Monetary and Macroprudential Policy in an Estimated DSGE Model of the Euro Area

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Motivation

▶ In the recent financial crisis a combination of loose monetary and regulatory policies encouraged excessive credit growth, leverage and procyclicality in the financial sector, and a housing boom in many countries.

▶ The combination of credit and housing booms amplifies the business cycle (Claessens et al., 2008).

▶ The best way to avoid a large recession in the future is precisely to reduce the volatility of credit cycles and their effects on the broader macroeconomy.

▶ Conventional monetary policy is too blunt of an instrument. What should be the role of macroprudential regulation?

Motivation

- This debate is particularly relevant in the euro area. Monetary policy is set according to union-wide conditions.

- Southern European countries (Greece, Portugal and Spain) and also Ireland, went through a large boom in the first years of the euro (1999-2007): high credit growth, house price boom, above average real growth and countercyclical spreads.

- Then, when the recession hit in 2007/2008, spreads increased when it was less desirable.

Related Literature

- ▶ NK models under financial frictions (Christiano et al. 2009, Cúrdia and Woodford, 2010): optimal monetary policy is not just price stability but it also reacts to financial variables.

- ▶ Recently, other papers have introduced macroprudential policies in real business cycle or NK models:
    - ▶ Gruss and Sgherri (2009), Bianchi and Mendoza (2011).
    - ▶ MAG (2010a,2010b), Angelini et al. (2011b), Unsal (2011), Kannan, Rabanal and Scott (2009), Bean et al. (2010), Roger and Vlcek (2011).
    - ▶ This conference ...

- ▶ Our paper: estimated DSGE model with "bells and whistles" for the euro area. Compute optimal monetary and macroprudential policies.

Results

- When the ECB minimizes a traditional loss function (output gap and CPI inflation) there is a welfare improvement in reacting to credit aggregates.

- A macroprudential instrument that affects the lending-deposit spread in each country also improves welfare when it helps the ECB achieve its objectives, and also reduces the volatility of credit aggregates.

- But these welfare gains are small compared to optimizing over the coefficients of the Taylor rule.

- The ECB tolerates higher inflation volatility when it pays attention to financial stability. If it does not have a mandate for financial stability, it makes it more difficult for the macroprudential authority to achieve its objectives.

Results

- It is important to note from the start that we do not quantify the welfare gains from:

    - reducing the frequency and cost of financial and banking crises,

    - reducing the probability of tail events materializing,

    - improved macroeconomic and financial environment due to a reduction in volatility and uncertainty.

The Model

- ▶ Two country model of the euro area: core and periphery.

- ▶ In each country there are two types of agents: borrowers and savers.

- ▶ Two sectors: non-durable consumption (tradable) and durable goods (housing, nontradable).

- ▶ Staggered price and wage setting in all sectors.

The Model

- ▶ Other real frictions: adjustment costs to residental investment, habit formation, costly labor reallocation across sectors.

- ▶ Financial frictions: in each country, the lending-deposit spread depends on the balance sheet position/net worth of borrowers.

- ▶ Several shocks to fit the data (13): demand/supply shocks in all countries and sectors, monetary policy, and shocks to domestic and international spreads.

- ▶ Monetary policy conducted by the ECB reacting to euro area CPI inflation only.

Domestic financial intermediaries

Assets	Liabilities
Domestic Credit	Domestic Deposits
	International Bonds

- ▶ Owned by savers in each country. In the home country they pay the ECB reference rate on deposits and bonds R_t, they lend at a rate R_t^L.

The Model

Domestic financial intermediaries

$$R_t^L = R_t F \left(\frac{S_t^B}{P_t^D D_t^B} \right) v_t \eta_t.$$

▶ Generalization of models with borrowing constraints that are always binding (Iacoviello, 2005; Iacoviello and Neri, 2010).

▶ Empirical evidence for the euro area:
  ▸ ECB (2009) mentions that going from an LTV of 50% to 75% increases credit spreads by 0-20 basis points.
  ▸ Going from 75% to 95% implies 20-40 additional basis points.

The Model

International financial intermediaries

- ▶ Trade one bond denominated in euros across countries.

$$R_t^* - R_t = H(\text{Risk shock, Bilateral NFA})$$

- ▶ Owned by savers of each country.

Parameter Estimation

- Bayesian estimation of most parameters of the model (An and Schorfheide, 2007). Others are calibrated.

- Two "regions": core (Germany, France and Italy), periphery (Spain, Greece and Portugal).

- Six observables per country, aggregated using GDP as weights: private consumption, residential investment, CPI inflation, house prices, lending and deposit rates.

- Sample period: 1995:4-2010:4.

Optimal Monetary Policy

$$L_t^{ECB} = var\left(\Delta p_t^{C,EMU}\right) + \lambda_{ECB}\, var\left(y_t^{GAP,EMU}\right)$$

$$r_t = \gamma_R r_{t-1} + (1 - \gamma_R)\left[\gamma_\pi \Delta p_t^{C,EMU} + \gamma_y y_t^{GAP,EMU} + \gamma_S\left(s_t^{EMU} - s_{t-1}^{EMU}\right)\right]$$

Also

$$r_t = r_{t-1} + \left[\gamma_\pi \Delta p_t^{C,EMU} + \gamma_y y_t^{GAP,EMU} + \gamma_S\left(s_t^{EMU} - s_{t-1}^{EMU}\right)\right]$$

Optimal Monetary Policy

Some reaction to credit aggregates is desirable.

| | $\lambda_{ECB} = .1$ | | | | Std. Dev. | | |
	γ_π	γ_y	γ_s	γ_r	Π^{EMU}	$Y_t^{GAP,EMU}$	L_t^{ECB}
I	1.46^*	-	-	0.86^*	0.39	0.41	0.1688
II		Optimal Rule			0.14	0.39	0.0348
V**	2.46	0.20	-	-	0.14	0.42	0.0380
VI**	2.45	0.19	0.04	-	0.14	0.42	0.0379

Macroprudential Policy

$$R_t^L = v_t R_t F\left(\frac{S_t^B}{P_t^D D_t^B}\right) \eta_t$$

$$\eta_t = \gamma_\eta \mathrm{Y}_t$$

- Y_t is either credit growth or credit/GDP ratio in each country.

Macroprudential Policy

▶ Consider several cases:

1. MP helps the ECB optimize L_t^{ECB}

2. MP has its own loss function:

$$L_t^{MP} = var\left(y_t^{GAP,EMU}\right) + \lambda_{MP}\, var\left(cre_t^{EMU}\right)$$

    2.1 ECB and MP optimize joint loss function $L_t^{ECB} + L_t^{MP}$: coordination.
    2.2 MP moves first and ECB moves second: no-coordination.

Case 1: Macroprudential Policy Helps Monetary Policy

A macroprudential instrument that reacts to credit growth works best.

	γ_π	γ_y	γ_r	γ_η	γ_η^*	Π^{EMU}	$Y_t^{GAP,EMU}$	L_t^{ECB}
			$\lambda_{ECB} = .1$				Std. Dev.	
I	1.46^*	-	0.86^*	-	-	0.39	0.41	0.1688
V**	2.46	0.20	-	-	-	0.14	0.42	0.0380
IX**	2.52	0.21	-	1.11	-	0.14	0.41	0.0373
X**	2.53	0.22	-	0.86	-	0.14	0.42	0.0377
XI**	2.54	0.21	-	0.75	10.00	0.14	0.41	0.0373
XII**	2.62	0.22	-	1.26	0	0.14	0.42	0.0377

Case 2: Macroprudential Has Its Own Objectives

A macroprudential instrument that reacts to credit/GDP works best.

$\lambda_{ECB} = .1, \ \lambda_{MP} = 0.001$

	γ_π	γ_y	γ_η	Π^{EMU}	Y_t^{GAP}	cre_t^{EMU}	L_t^{ECB}	L_t^{MP}
					Std. Dev.			
C	0.83	0.76	1.75	0.25	0.19	0.55	0.067	0.037
NC	2.57	0.22	1.29	0.14	0.42	0.73	0.038	0.179

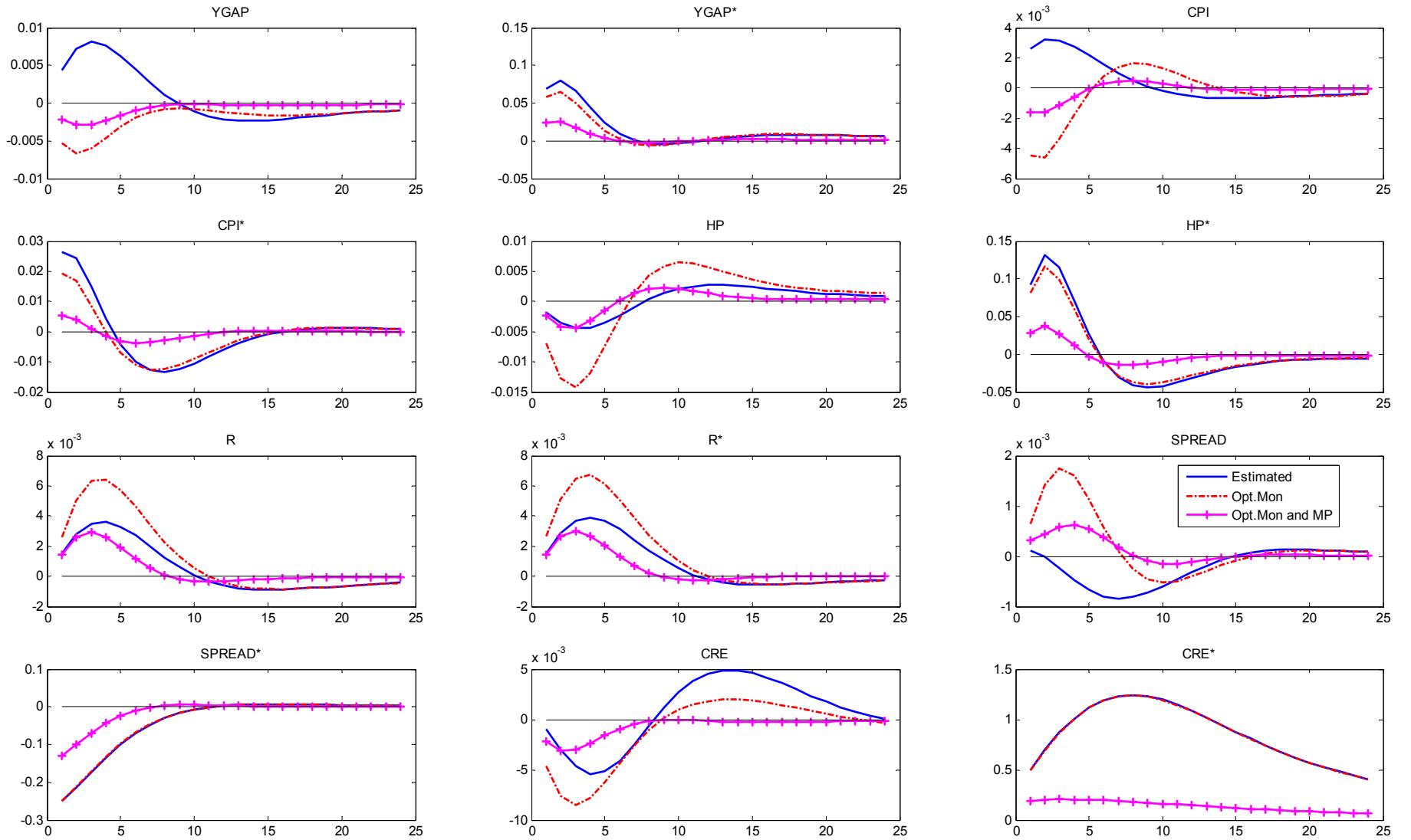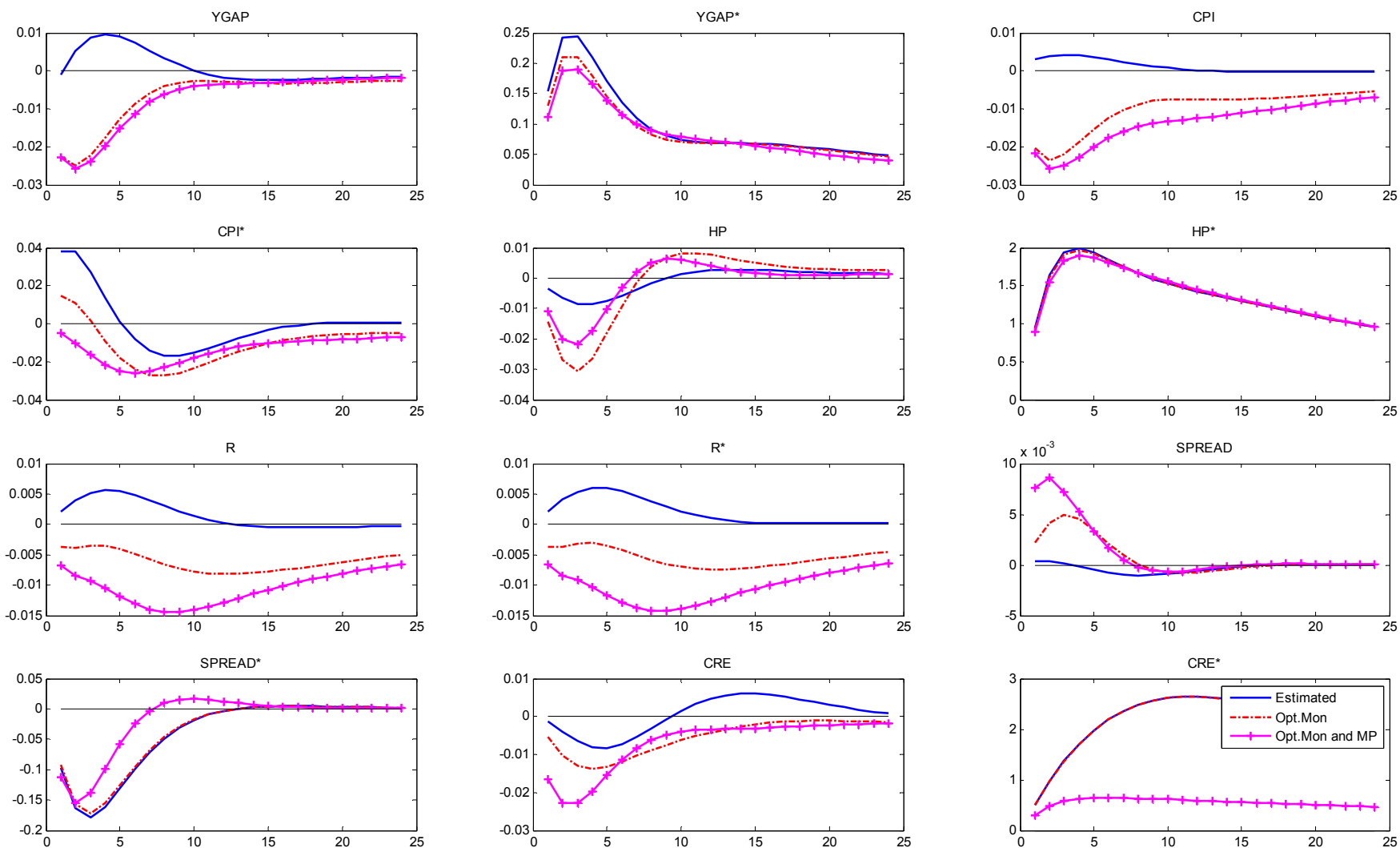Figure 6: Risk-Premium Shock, Lending-Deposit Periphery

Figure 7: Housing Demand Shock, Periphery

Implementation

- Financial shock: to offset a spread of 50 basis points (on an annualized basis), an increase of 4 percentage points in the capital-asset ratio is needed (Angelini et al., 2011).

- Housing demand shock: spreads should rise between 20-25 basis points (annualized) after shock (at horizon 3-8 quarters) with respect to the case of no-macroprudential. Tightening of 2 percent in the capital-asset ratio.

- But in the boom phase, countries faced a series of large shocks so capital requirements alone will not do it. Combination of tools? (Crowe et al., 2011; Lim et al., 2011).

Conclusion

▶ Macroprudential policy helps improve welfare, since it helps to reduce the volatility of main macroeconomic variables.

▶ But it is not a substitute for monetary policy for aggregate demand management, even in a model with credit frictions. The most important welfare improvements come from monetary policy optimizing the coefficients of the Taylor rule.

▶ Macroprudential policy reduces the volatility of credit aggregates, so it is likely to bring other benefits not included in the model. Need to extend medium-large scale macroeconomic models to include non-linearities and interconnectedness of financial systems.