THE MACROPRUDENTIAL TOOLKIT: EFFECTIVENESS AND INTERACTIONS

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Introduction

- There has been an increasing use in recent years of macroprudential policies

- In addition to capital requirements, instruments limiting mortgage debt have been introduced, including:

  - limits on loan-to-value ratios (e.g. Canada, HK, Israel, Norway)
  - limits on loan or debt-to-income ratios (e.g. Norway, South Korea, UK)
  - **limits on debt-servicing ratios** (e.g. UK, Canada, HK, Norway, Israel, South Korea)

Motivation

- Macroprudential policies in the UK
- Since its formation, the FPC has adopted a number of these macroprudential policy tools…
  - But do we need them all?
  - That is, suppose we have (counter-cyclical) capital requirements, why tackle the mortgage market separately?
  - And why affordability and/or loan-to-income constraints?

Open questions

- Many open questions remain around the conduct of macroprudential policy, in particular regarding:
  - the interaction of macroprudential tools with each other and with monetary policy
  - the strategy for setting of macroprudential tools

Research Question

- Our goal is to look at two macroprudential policies:
  - Capital requirements
  - Affordability constraints/DSR on mortgage lending
- Calibrating the model for the UK, we examine whether these additional policies
  - help to raise welfare in this model …
  - How they impact on the volatility of house prices, lending and inflation…
  - and how they interact with monetary policy

Affordability Constraints/DSR

- Affordability constraints on mortgage lending can be seen as a proxy for a stress test on households' debt levels
  - Buffer on top of the origination interest rate against which borrowers are assessed, to ensure they can still afford their mortgage, should credit conditions tighten and given their existing nominal household income=>additional channel of monetary and macropru interaction

Our contribution

- Study a broad set of macroprudential tools, including DSR limits, their interactions with each other and with monetary policy
- Direct application for the UK

Methodology

- We use a DSGE model with financial frictions (including loan-to-value limits on mortgage lending)

- We consider three macroprudential tools:
  - limits on loan-to-value (LTV) ratios (baseline)
  - capital requirements on banks
  - limits on debt-servicing ratios (DSR)

General approach

- We examine three versions of the model:
  - Baseline model with Gertler/Karadi banking frictions and loan-to-value limits on mortgage lending (Model 1)
  - Model 1 plus capital requirements (maximum leverage ratio) on banks (Model 2)
  - Model 2 plus affordability constraints on mortgage lending (Model 3)

Experiments

- We look at how the different constraints affect the responses of output, inflation, lending and house prices to shocks …
- … as well as the response of monetary policy to the different shocks …
- … and use these results to explain the effects of each policy on financial and monetary stability …
- … and welfare

Model

- Two types of households – patient and impatient – who get utility out of consumption, housing and leisure.
- Impatient households borrow subject to two constraints :
  - A maximum loan-to-value ratio on mortgage borrowing set by the banks themselves (ie, we take this as a pre-existing feature of the economy)
  - An ‘affordability’ test on mortgage interest payments set by macroprudential policy makers (Model 3)

Model

- Banks lend to households and firms and are subject to two constraints:
  - A maximum leverage ratio set by macroprudential policy makers (capital requirements) (Model 2-3)
  - Gertler-Karadi frictions – depositors have to incentivise bankers to keep their bank open as an ongoing concern rather than ‘run away’ with its assets

Macroprudential tools

- Limits on households' balance sheet: LTV limits or DSR limits:

$$Mortgage\ Loans \leq \rho_L Mortgage\ Loans_{,t-1} + (1-\rho_L) LTV * Housing$$

$$Mortgage\ Loans\ \leq \rho_L Mortgage\ Loans_{,t-1} + (1-\rho_L) \frac{DSR\ * Earnings}{Lending\ rate + stress}$$

- Limits on banks' balance sheet: penalty costs up to a max leverage ratio (or a min capital requirement):

$$\frac{\phi_b}{MaxLev - Lev_t} - \frac{\phi_b}{MaxLev - Eqm\ Lev}$$

Welfare

- Set taxes and subsidies so as to ensure an efficient and symmetric steady state
- Take a quadratic approximation of the weighted sum of the two utility functions
- Welfare in this model depends on the volatilities of:
  - Output
  - Inflation
  - Consumption gap
  - Housing gap

Calibration

- Want to match the ratios of housing wealth to GDP and mortgage debt to quarterly GDP in UK data

Calibration

Parameter	Description	Value
β_P	Discount rate for patient households	0.9925
β_I	Discount rate for impatient households	0.985
j	Weight on housing in utility function	0.1062
ξ	Inverse Frisch elasticity of labour supply	1.83
σ	Proportion of total wage bill going to impatient households	0.33
ε	Elasticity of demand for intermediate goods	6
χ	Size of price adjustment costs	59
ρ	Interest rate inertia in the Taylor Rule	0.8
ϕ_p	Coefficient on inflation in the Taylor Rule	1.5
ϕ_y	Coefficient on output in the Taylor rule	0.125

Calibration

- We assumed all our shocks were AR(1) processes:

$$ln(A_{x,t}) = \rho_x ln(A_{x,t-1}) + \varepsilon_{x,t}, for\ x = z, j\ or\ n$$

- We used UK data on real GDP, real house prices and the spread of effective mortgage interest rates over the base rate to estimate these processes

Results

- Want to know how the different macroprudential policy tools affect the responses of output, inflation, lending and house prices to different shocks
- In particular, which tool is better for smoothing lending and house prices, what we think of as the ‘financial stability’ targets
- And which tool is better for welfare

Results: Stochastic simulations

	σ_L	σ_q	σ_{GDP}	σ_π
Baseline model	15.07%	15.52%	5.31%	5.80pp
Adding capital requirements	14.76%	15.37%	5.25%	5.90pp
Adding affordability constraint	5.43%	17.79%	1.94%	2.73pp

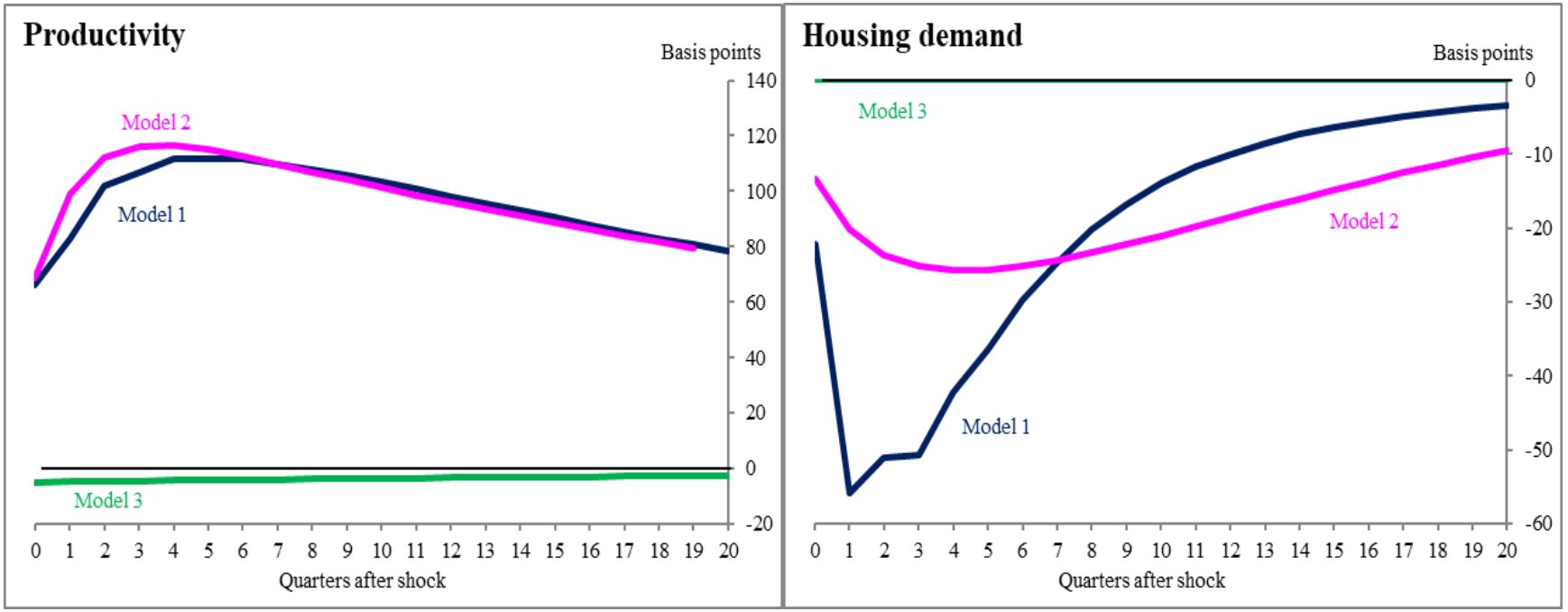
- Introduction of capital requirements reduces volatility in lending, output and house prices
- Introduction of DSR greatly reduces volatility of lending, output and inflation …
- … but increases volatility of house prices

Welfare Results

	σ_{GDP}	σ_{π}	σ_{cgap}	σ_{Hgap}	L
Baseline model	5.31%	5.80pp	5.99%	16.81%	0.0744
Adding capital requirements	5.25%	5.90pp	5.61%	15.33%	0.0763
Adding affordability constraint	1.94%	2.73pp	3.57%	11.12%	0.0153

- Introduction of capital requirements lowers welfare as it increases the volatility of inflation
- Introduction of affordability constraint greatly increases welfare as it reduces the volatility of everything (except real house prices) by a lot!
- $\mathcal{L} \approx \hat{y}_t^{\,2} + 20.8481\pi_t^2 + 0.1159\tilde{c}_t^{\,2} + 0.0094\widetilde{H}_t^{\,2}$

Monetary policy response



- Adding an affordability constraint and capital requirements means less need for monetary policy to respond to shocks
- Macroprudential policy may support the objectives of the monetary policymaker

Tentative conclusions

- Macroprudential policy is potentially welfare improving
- Intervening in the housing market can improve welfare by isolating real activity from housing demand shocks
- Affordability constraints, in particular, achieve this result

Tentative conclusions

- Macroprudential policy reduces the need for monetary policy to intervene in response to shocks
- Affordability constraints, in particular, completely eliminate the need to monetary policy makers to worry about housing demand shocks
- But, the presence of capital requirements and affordability constraints weakens the effect of a given change in interest rates on inflation

Further work

- Need to allow policy to vary over the cycle and conduct an ‘optimal simple rule’ exercise
  - Holding macroprudential policy fixed, calculate the optimal Taylor rule coefficients
  - Holding the Taylor rule fixed, calculate the optimal degree of countercyclicality in capital requirements and/or *stress*
  - Then combine these exercises
- **Deal with the two pairs of occasionally binding constraints in our model!**