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Monetary and macroprudential policies under rules and discretion

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HIGHLIGHTS

- Optimal policy in a simple New Keynesian model featuring collateral constraints and banks is considered.
- The discretionary policy outperforms rules when there is cooperation between policymakers.
- If policies cannot be coordinated, pre-commitment to policy rules is preferable.

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ABSTRACT

We study the policy design problem faced by central banks with both monetary and macroprudential objectives. We find that a time-consistent policy is preferred to a widely-studied class of simple monetary and macroprudential rules. When interest rates adjust to macroprudential policy in an augmented monetary policy rule, improved outcomes result. When policy authority is split between institutions, strategic interactions between discretionary policymakers can result in notably poor outcomes.

1. Introduction

Central banks are increasingly responsible for meeting both 'traditional' monetary objectives – control of inflation, and stabilization of output – and newer macroprudential objectives, aimed at ensuring financial stability. Along with new macroprudential responsibilities have come new policy tools. How to set multiple instruments to meet multiple stabilization goals has thus become the principal policy design problem for many central banks. For example, amongst the 58 national institutions surveyed by Edge and Liang (2017), the central bank is the sole macroprudential authority in 14 cases, and is chair or co-chair with significant influence over decision-making in a further 18 cases. However, there are some important exceptions where the central bank plays no such lead role—the Federal Reserve being chief amongst these.

In this note we assess the performance of two possible strategies that policymakers in control of monetary and macroprudential tools might follow. The first is to follow the time-consistent policy ('discretion'). Under discretion, policy is reoptimized each period, given current economic conditions (De Paoli and Paustian, 2017). The second strategy is to follow simple feedback rules for monetary and macroprudential instruments. As simple policy rules such as the Taylor rule are found to perform well in the context of monetary policy, it is a natural step to also specify simple rules for macroprudential instruments. Indeed, this practice has been widely followed in the macroprudential policy literature (Angelini et al., 2014; Suh, 2014). Beating discretion should be a low hurdle for well-designed rules to cross (Kydland and Prescott, 1977).

The main message of this note is that in a standard model, and with a standard cooperative policy problem, commitment to policy rules produces worse outcomes than discretion. Our observation

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Table 1
Calibrated parameter values.

Parameter	Description	Value
β_s	Discount factor S-type	0.99
β_b	Discount factor B-type	0.96
J	Housing utility parameter	0.1
η	Inverse Frisch elasticity	1
α	Share of S-type labour in production	0.6
ε	Elasticity of substitution, final goods	6
θ	Calvo price parameter	0.75
ζ	Elasticity of substitution, loans	40
κ	Bank capital adjustment cost parameter	50
ν	Steady state capital ratio	15%
m	Steady state LTV ratio	65%
ξ	Implied bank pay-out rate	2.7%
ρ_A	Persistence of productivity shock	0.95
σ_A	Standard dev. productivity shock	0.86
σ_{NW}	Standard dev. net worth shock	2.16
Selected steady states		
Variable	Description	Value
R	Gross deposit rate	1.01
$R_b - R$	Spread between loan and deposit rates	2.6%
H_b	Share of B-type housing	.26
C_b/Y	Share of B-type consumption	.56
B/Y	Debt-to-output ratio	.97

is important because to date the vast majority of studies have used such rules. We identify a source of the poor performance of standard policy rules, and suggest a modification that produces a substantial improvement. We go on to show that, in the absence of policy cooperation, the interaction between discretionary policymakers produces poor outcomes. In institutional settings where a significant degree of separation exists between monetary and macroprudential authorities, having each pre-commit to follow a rule is then the preferred policy strategy.

2. A DSGE model with borrowing constraints and banks

In this section we summarize the key features of the New Keynesian model we use in our analysis. Except in certain unimportant details, the model is a special case of that presented in Angelini et al. (2014) in which there are no capital-producing firms, no physical capital accumulation, and no loan rate stickiness. The complete set of model equations may be found in Appendix. Parameter definitions may be found in Table 1.

Households and housing

There are two household types, savers (s) and borrowers (b). Borrowers choose consumption (C_b), housing (H_b), and hours worked (N_b) so as to maximize:

$$\mathbb{E}_0 \sum_{t=0}^{\infty} \beta_b^t \left[\log C_{b,t} + J \ \log H_{b,t} - \frac{N_{b,t}^{\eta}}{\eta} \right]$$

Their budget constraint is:

$$C_{b,t} + \frac{R_{b,t-1}}{\Pi_t} B_{t-1} + q_t \left(H_{b,t} - H_{b,t-1} \right) = B_t + w_{b,t} N_{b,t} - \overline{NW} \varepsilon_t^{NW}$$

where R_b is the gross nominal loan rate, Π the inflation rate, B the quantity of one-period loans, q the real house price, w the real wage, and ε_t^{NW} an i.i.d. shock that redistributes a fraction of borrowers' steady state net worth ($\overline{NW}$) to savers. A binding borrowing constraint is in force. It depends on the expected value of housing collateral and a 'loan-to-value ratio' (m):

$$\mathbb{E}_t \left[\frac{R_{bt}}{\Pi_{t+1}} \right] B_t = m \mathbb{E}_t \left[q_{t+1} H_{b,t} \right] \quad (1)$$

Patient saver households have a lower rate of time preference than impatient borrower households. Savers choose consumption (C_s), housing (H_s), and hours worked (N_s) so as to maximize:

$$\mathbb{E}_0 \sum_{t=0}^{\infty} \beta_s^t \left[\log C_{s,t} + J \ \log H_{s,t} - \frac{N_{s,t}^{\eta}}{\eta} \right]$$

subject to the budget constraint:

$$C_{s,t} + d_t + q_t \left(H_{s,t} - H_{s,t-1} \right) = R_t \frac{d_{t-1}}{\Pi_t} + w_{s,t} N_{s,t} + T_t + \overline{NW} \varepsilon_t^{NW}$$

where d is the quantity of deposits, R the gross nominal deposit interest rate, and T the dividends from firms and financial intermediaries. As housing is in fixed supply, market clearing requires $H_b + H_s = 1$ as in Eq. (A.21).

Firms

The production sector follows a standard New Keynesian setup. There is a continuum of monopolistically competitive firms indexed by $j \in [0, 1]$. Each firm j produces a differentiated good according to the production function:

$$Y_t(j) = A_t N_{s,t}(j)^{\alpha} N_{b,t}(j)^{1-\alpha}$$

where A_t is an AR(1) productivity process. In each period, firm j chooses the amount of labour to use in production such as to maximize their profit subject to the constraint that their output equals the demand for their good:

$$Y_t(j) = Y_t^d(j) = \left(\frac{P_t(j)}{P_t} \right)^{-\varepsilon} \left(C_{s,t} + C_{b,t} \right)$$

Prices are adjusted infrequently according to a Calvo scheme with a probability of prices being reset of $1 - \theta$. At any time t, when a firm j has a chance to reset its price, it chooses its price $P_t(j)$ so as to maximize:

$$\mathbb{E}_t \sum_{k=0}^{\infty} (\theta \beta_s)^k \left(\frac{C_{s,t}}{C_{s,t+k}} \right) \left[\left(\frac{P_t(j)}{P_{t+k}} \right)^{1-\varepsilon} \left(C_{s,t+k} + C_{b,t+k} \right) - mc_{t+k|t}(j) \left(\frac{P_t(j)}{P_{t+k}} \right)^{-\varepsilon} \left(C_{s,t+k} + C_{b,t+k} \right) \right]$$

where $mc_{t+k|t}(j)$ is the real marginal cost in period $t + k$ of a firm j who last reset its price in period t.

Banks

Banks are composed of two units: a competitive wholesale unit that manages the bank's balance sheet, and a monopolistically competitive retail unit that costlessly differentiates wholesale loans into retail products. Wholesale banks raise deposit funding at the policy interest rate R, and incur costs whenever their capital ratio – equity K_b divided by total loans – deviates from its time-varying regulatory target ν:

$$R_{wt} = R_t - \kappa \left(\frac{K_{bt}}{B_t} - \nu_t \right) \left(\frac{K_{bt}}{B_t} \right)^2$$

Retail bank lending takes the form of one-period nominal loans. Retail banks apply a markup to wholesale loan rates (R_w) such that the nominal loan rate faced by borrowers (R_b) is:

$$R_{bt} = \frac{\zeta}{\zeta - 1} R_{wt}$$

Banks build equity capital through retained earnings. Shareholders have a return-on-assets target, implying that dividends are proportional to assets, ξB. The real resources the bank has at its disposal