To believe or not to believe: monetary policy and trend in house prices[1]

Grzegorz Wesołowski

National Bank of Poland and Warsaw School of Economics

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[1] The views expressed herein are those of the authors and not necessarily those of the National Bank of Poland or the Warsaw School of Economics.

Plan of the Presentation

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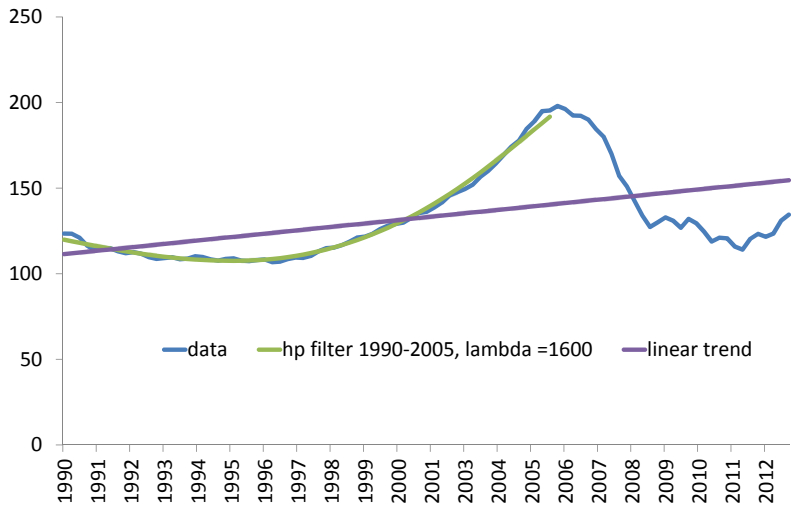
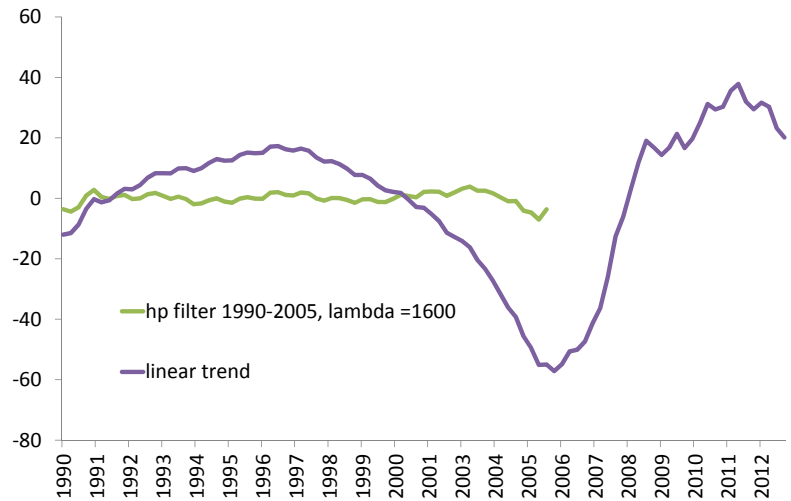
Motivation

Data and trends in house prices (lhs), deviations of house prices from the trends (rhs)





Motivation

- Periods of long-lasting growth in house prices are important for the monetary policy.
- The central bank does not know whether (and when) persistently growing house prices will eventually fall.
- The trend can be perceived in a variety of ways leading do different assessment of the trend and deviations from it.
- I analyze two policy rules:
  - rule that is optimal when the central bank assumes there is a housing shock that leads to the persistent deviations of house prices from the long-run trend
  - rule optimal under the assumption that there is no such a shock and house prices deviate from the trend only due to the impact of other shocks.
  - I compare the performance of these rules in the terms of central bank's loss function.
- I show that the central bank is better off if it assumes that house prices deviate from the trend

Related Literature

- Numerous studies analyzed the optimal response of monetary policy to asset prices (Bernanke and Gertler 2001, Borio and Lowe 2002, Cecchetti 2008, Gilchrist and Leahy 2002).
- Smets (2002) shows that output gap uncertainty reduces the response of the Taylor rule to the current estimated output gap relative to the current inflation.
- Leitemo and Soderstrom (2005) show that the Taylor rule may suffice to stabilize a small open economy in case of uncertainty about „true" mechanism of exchange rate determination.
- In many studies authors compare performance of different policy rules, especially in case when the „true" model of the economy is uncertain (Taylor and Williams 2010, Levin et al 2003).
- The existing studies do not deal with the uncertainty concerning sustainability of house prices.

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Features of the model

- A medium-scale DSGE model with a housing sector building on the important work of Iacoviello (2005).
- Housing serves as a collateral for credit constrained (CC) households and entrepreneurs.

$$b_t \leq mE_t(q_{t+1}h_t\pi_{t+1}/R_t) \tag{1}$$

- Standard features of NK models: monopolistic competition and sticky prices, central bank that follows the Taylor rule, no government.
- Four shocks: technology, mark-up, housing preferences and interest rate.

The central bank

- Backward-looking Taylor rule that includes house prices.
- Backwardness - taken from Iacoviello (2005).
- The inclusion of additional potential response of monetary policy to house prices is motivated by their special role in the economy and interest of this paper.
- If the central bank cares about potential mistake it can make with respect to the assessment of house prices, it should also at least be able to use the information provided by these prices.

$$\frac{R_t}{R} = \left(\frac{R_{t-1}}{R}\right)^{\gamma_R} \left(\left(\frac{\pi_{t-1}}{\pi}\right)^{(1+\gamma_\pi)} \left(\frac{y_{t-1}}{\tilde{y}}\right)^{\gamma_y}\right)^{(1-\gamma_R)} \left(\frac{q_{t-1}}{q}\right)^{\gamma_Q} \exp(\hat{e}_{R,t}) \tag{2}$$

The procedure

- Goal: find less harmful policy approach to the sustainability of house prices.
- The central bank may either assume that there is housing shock or that other shocks are driving house prices.
- In the first case house prices deviate significantly and persistently from the trend. In the second - they are relatively close to it.
- 3 steps:

1. recalibrate the model to have two comperable specifications.
2. optimize Taylor rule in both versions.
3. analyze optimal and incorrect policies in two versions of the model and compare the values of their loss functions.

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Calibration

- Model is calibrated in two versions that reflect the uncertainty concerning the trend in house prices. ▸ Table
- Model with the housing shock assumes that changes in house prices reflect persistent housing shock.
- Model without the housing shock. In this version the housing preference shock is switched off.
- It implies that house prices deviate from the trend due to endogenous response to remaining 3 shocks in the model.
- Recalibration in the model without the housing shock. The volatility of the interest rate shock is increased. ▸ Table
- Other parameters remain unchanged - they are „deep" parameters.

Why recalibration?

- Switching-off the housing shock has an impact on the volatility of other variables which is undesirable.
- The central bank not only perceives house prices in a different way but also other observables (such as output or inflation).
- This would violate the logic of the exercise. The central bank is meant to be unsure just about the nature of house prices.
- Recalibration facilitates the comparison of mistakes made by policymakers in both scenarios.
- The fact that the central bank believes that house prices are close to the trend should not affect the assessment of the productivity or mark-up shocks.
- This assumption does not affect significantly the results. It allows, though, to minimize the difference in the output and inflation volatilities between model variants.

Optimization

- Optimal Simple Rule (OSR) routine in Dynare to find an optimal monetary policy in both variants of the model
- Standard loss function

Definition

$$L = \sigma^2_{\hat{\pi}} + \lambda \sigma^2_{\hat{y}} \tag{3}$$

- $\lambda \in [0; 1]$ as I have no prior knowledge on its appropriate value.
- Different IRFs depending on λ. Here, I present for $\lambda = 0.5$ for illustrative purposes.
- It has to be stressed that the main results are presented as a frontier and do not depend on λ.

Optimization results

- Optimization helps a lot in the stabilization of output gap and inflation. As compared with the historical Taylor rule, optimal rules in both model versions are much better!
- This may be attributable to stronger response of interest rates to output gap and inflation.
- Intuition: If the central bank knew the structure of the economy and parameters it would be much more decisive in its actions.
- IRF: historical rule and optimal rules: Figure.

Optimization results - cnt'd

- In the model without the housing shock, the optimal γ_q is negative.
- Keep calm! It does not mean the central bank lowers R in response to house prices. ▸ Figure
- Explanation: when the central bank strongly reacts to output gap and inflation, γ_q allows the central bank to differentiate shocks and smooth out output gap and inflation over time.
- This is possible when the central bank does not risk fuelling housing boom (as in case of housing shock).

Optimization results - cnt'd

- In the model with the housing shock, an increase in house prices usually results from positive housing shock. More desire for housing implies:

$$j \uparrow \Rightarrow b_{IHH} \uparrow \Rightarrow H_{IHH} \uparrow \Rightarrow q \uparrow$$

while entrepreneurs substitute housing with capital (i.e. with relatively cheap factor of production):

$$j \uparrow \Rightarrow H_{Ent} \downarrow \Rightarrow I \uparrow$$ ▸ Figure

- Thus, too loose monetary policy would fuel house prices together with consumption and investment!
- However, in the model without housing shock: when house prices increase, H_{IHH} becomes an (undesired) relatively expensive source of utility, thus:

$$q \uparrow \Rightarrow C_{IHH} \uparrow \& H_{IHH} \Downarrow$$

and (in some cases): $q \uparrow \Rightarrow I \uparrow \& H_{Ent} \Downarrow$

Optimization results - cnt'd

- Therefore, in the model without housing shock:
- Impatient household can borrow less due to tightening of collateral constraint.
- The central bank attempts to fix this. Thanks to $\gamma_q < 0$ it relaxes CC with the lower interest rate path.
- Thus, „less restrictive policy" helps to stabilize the economy! ▸ Figure

- Why does the central bank have $\gamma_q < 0$ instead of lower γ_y? Not always it is needed to lower interest rate path when output gap increases (compare ▸ Figure with ▸ Figure)
- Lower γ_y would imply too loose policy in general.

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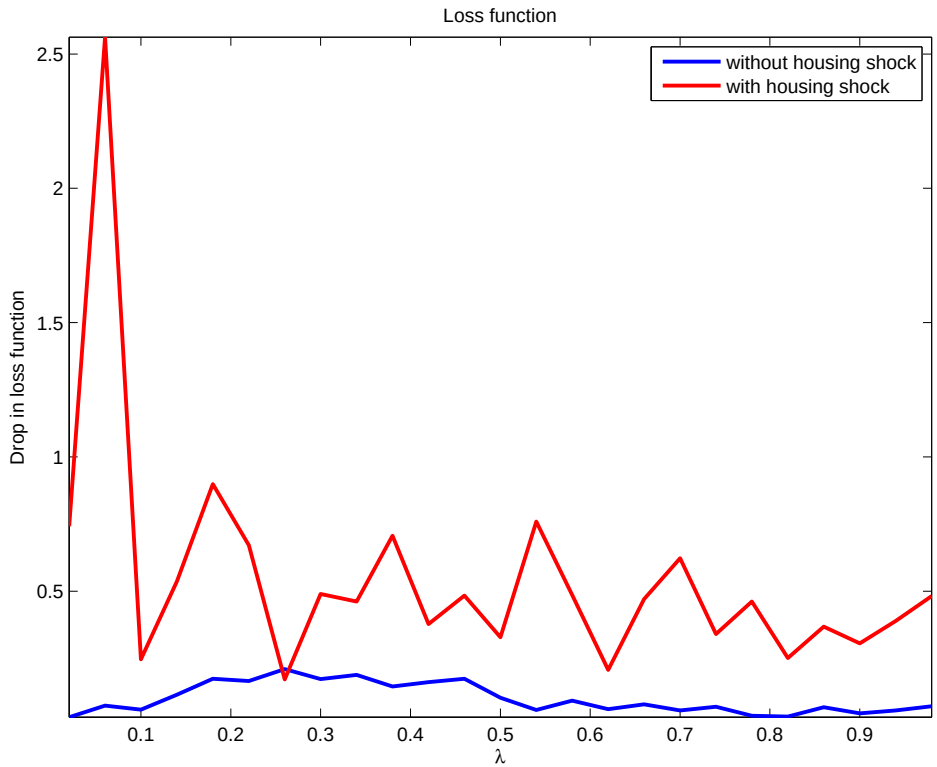
The results

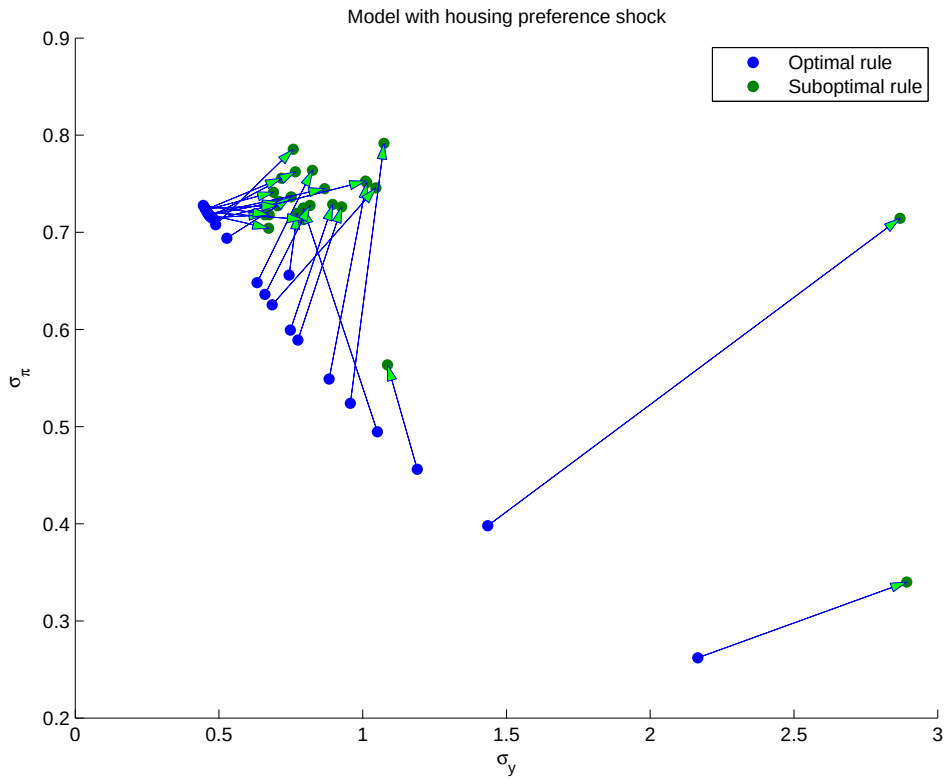
- I check how much the central bank loss increases when the bank applies the incorrect policy.



- The main result:

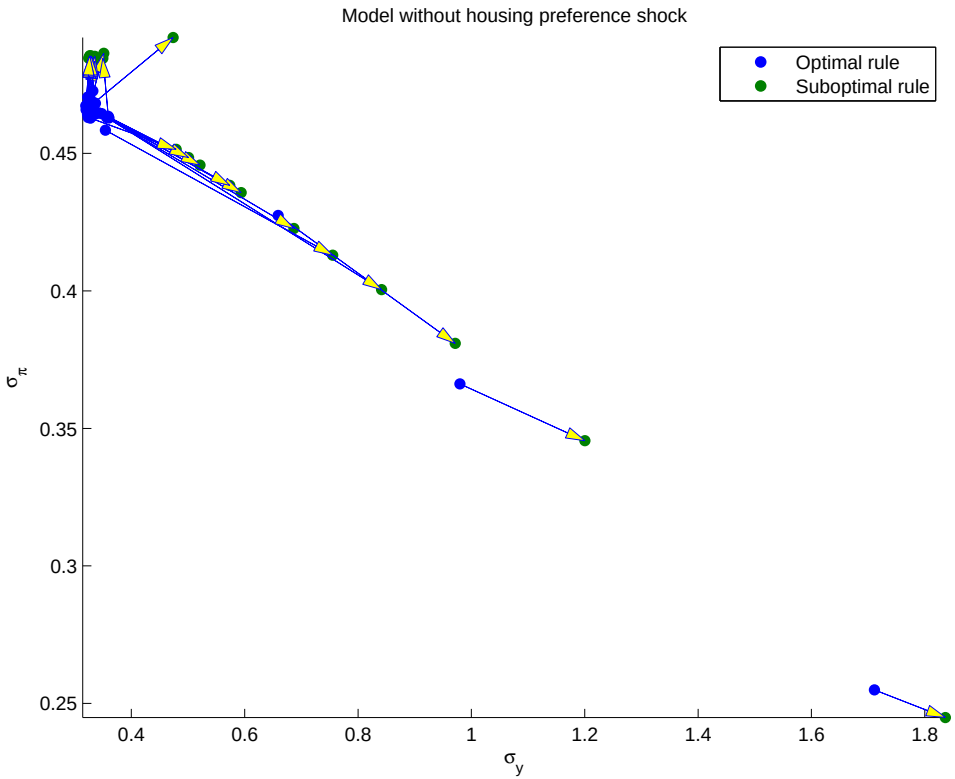
Model with the housing shock

- The most harmful is the shock, that monetary policy was not expecting to occur. ▸ Figure
- Role of negative γ_q.



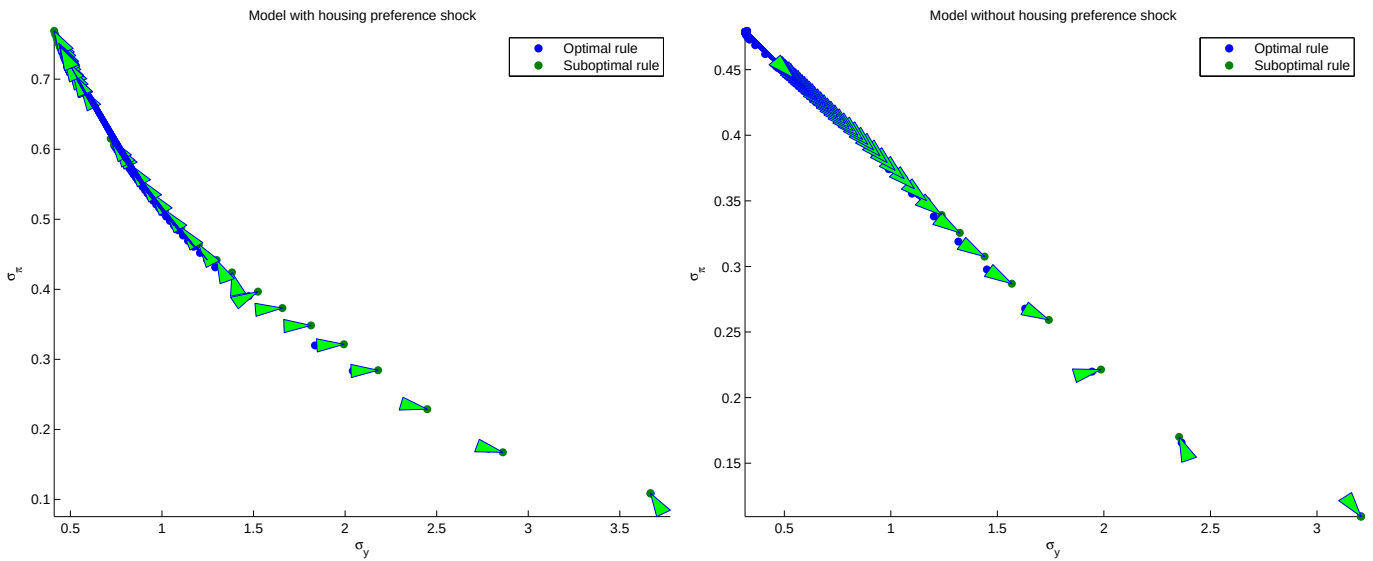
Model without the housing shock

- Wrong policy is hardly harmful.
- In case of $\lambda = 0.5$ too strong decline in investment. ▸ Figure



The role of γ_q in the Taylor rule

- Consider trade off between inflation and output gap volatility.
- Without direct response to house prices this trade off does not seem to worsen.



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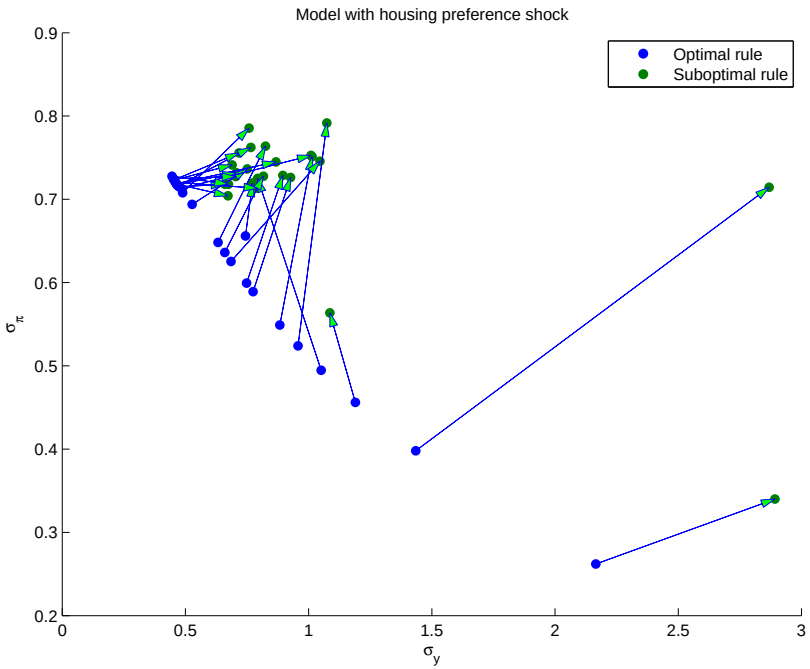
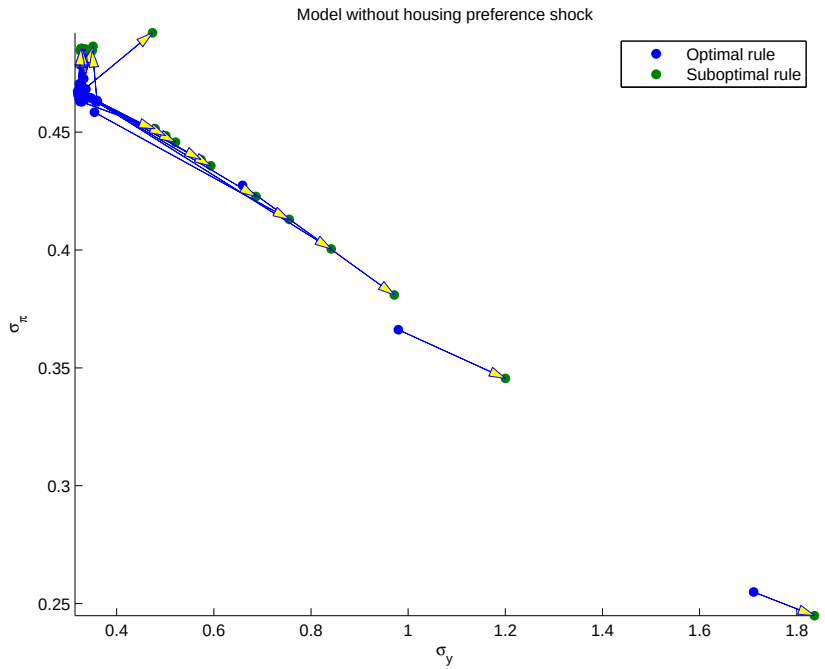
Conclusions

- I show that the central bank is better-off if it assumes that house prices significantly deviate from the trend, i.e. that idiosyncratic disturbances in housing market play a role.
- It means that if the central bank cares about worst-case scenario it should act as if the trend in house prices is temporary.
- The central bank that is not concerned enough about house prices - i.e. it does not include them in the Taylor rule - may be indifferent on whether house prices are close to the trend or not.

Thank you

Inflation and output trade-off





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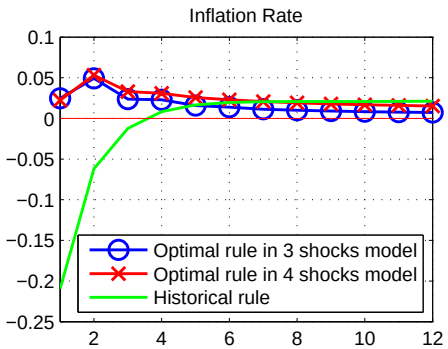
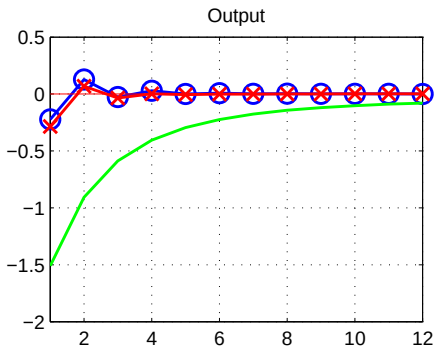
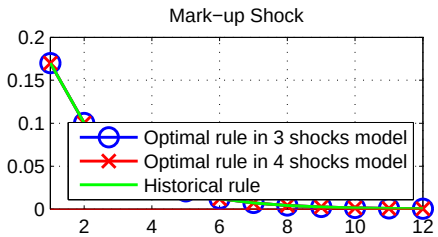
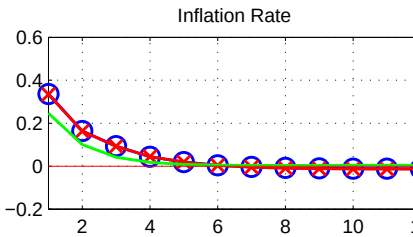
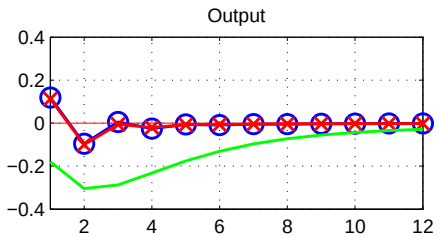
IRF to interest rate and mark-up shocks (λ=0.5)

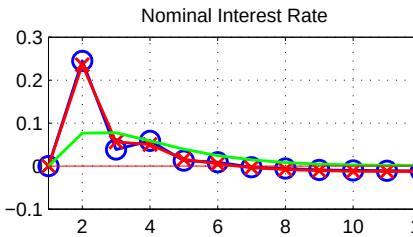


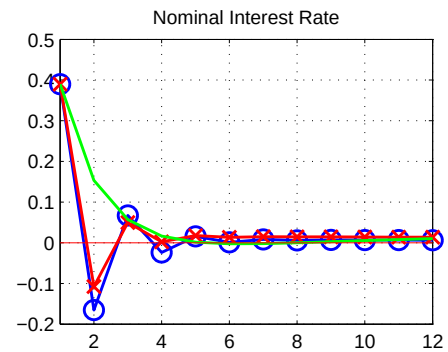


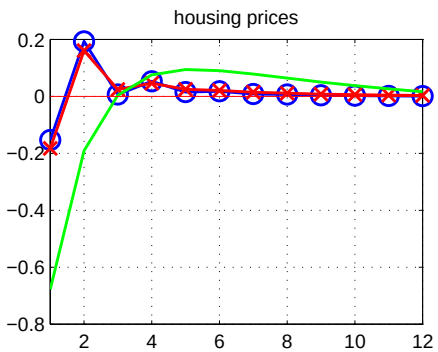








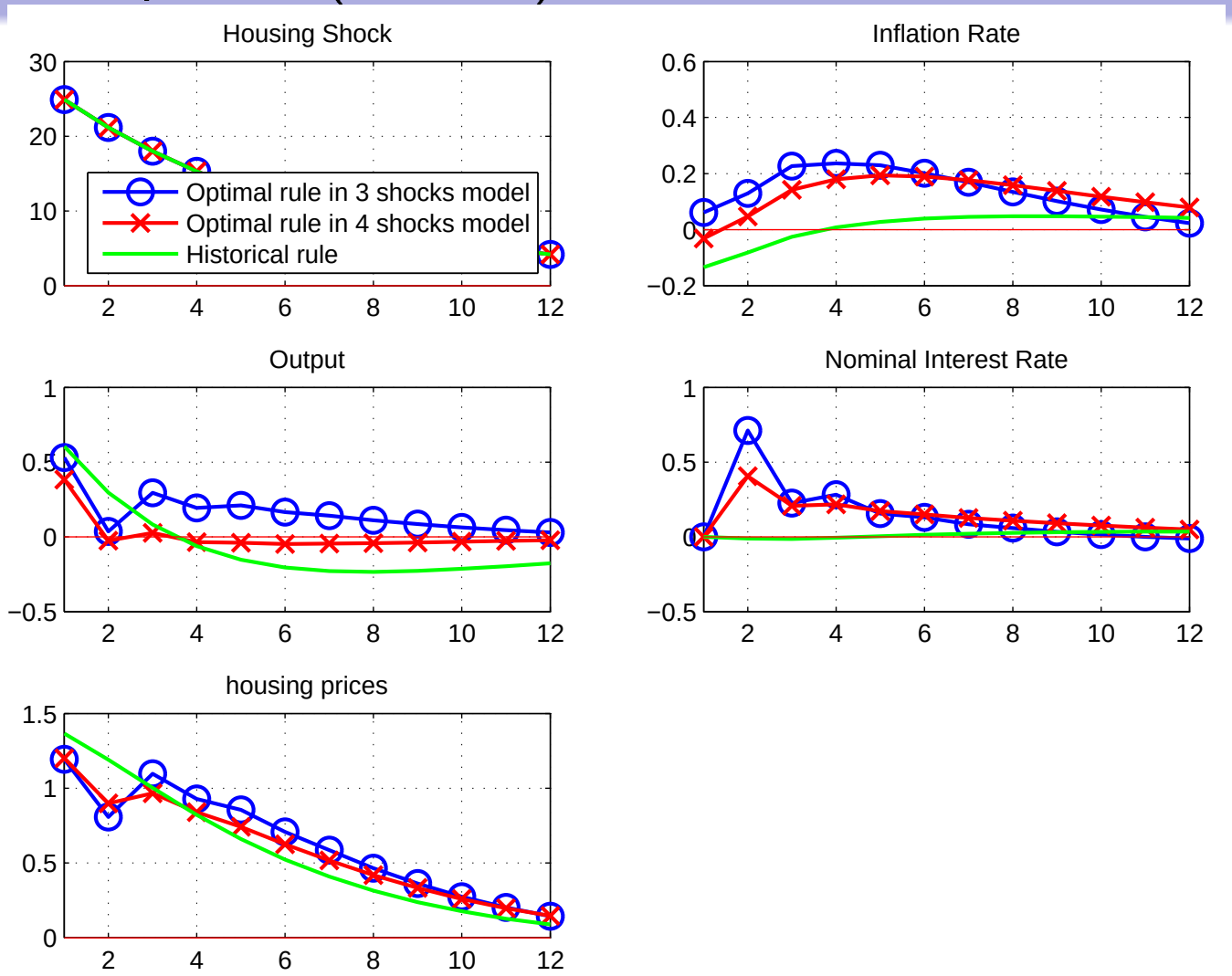




return

return

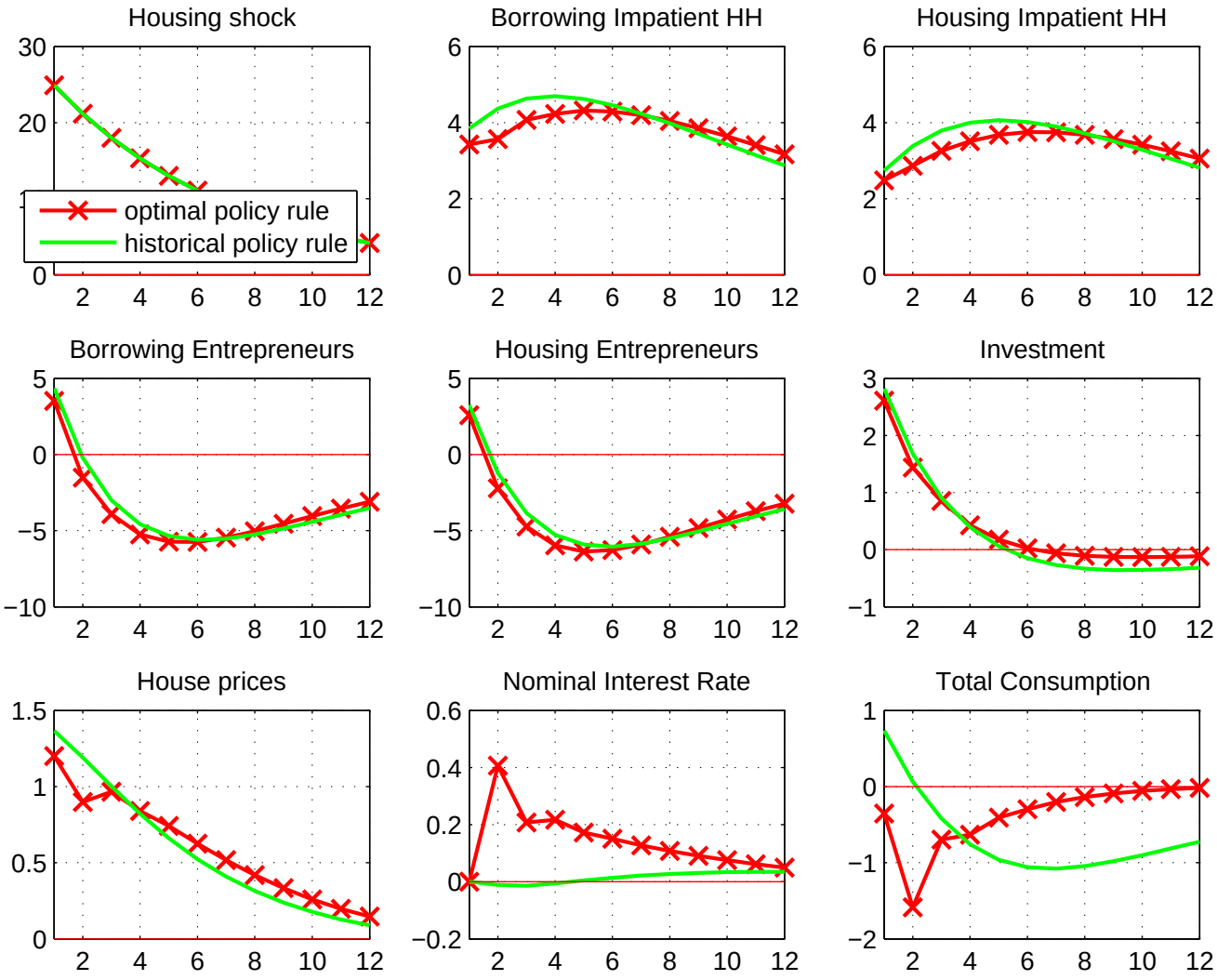
IRF to house prices (λ=0.5)



return

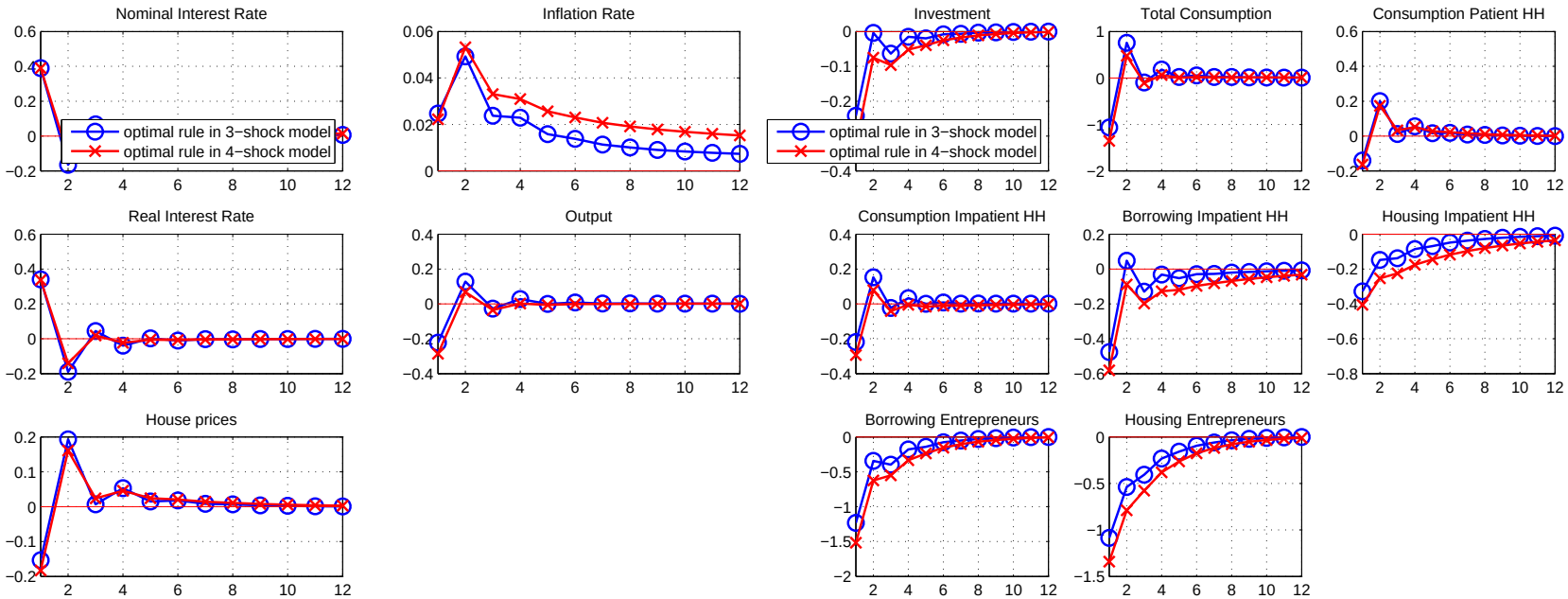
return2

IRF to house prices (λ=0.5)



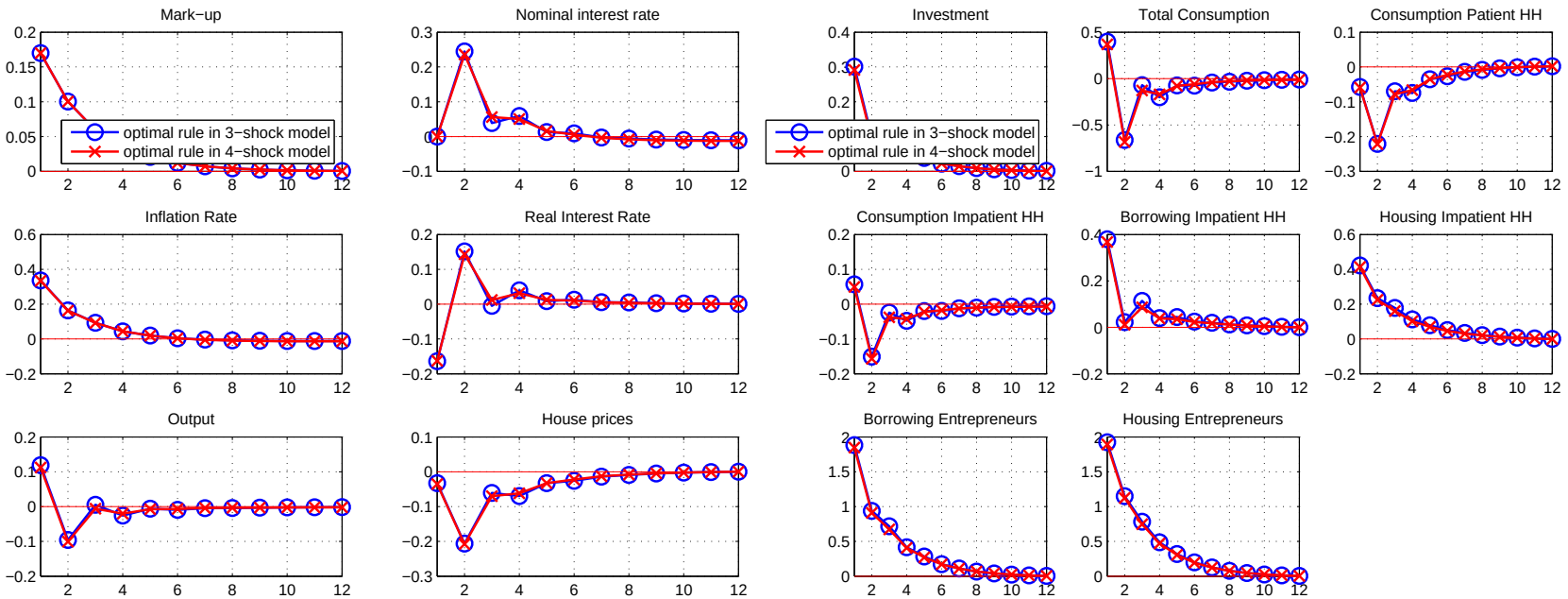
return

IRF to interest rates (λ=0.5)



return
return2
return3

IRF to mark-up shock (λ=0.5)



return

Selected calibrated parameters (the same value in the models)

Description	Parameter	Value
Discounting rates:		
Patient households	β'	0.99
Impatient households	β''	0.95
Entrepreneurs	β	0.98
Preferences:		
Weight on housing services	j	0.1
Labor supply aversion	η	1.01
Factors of production:		
Patient HH wage share	α	0.64
Variable capital share	μ	0.3
Housing share	ν	0.03
Other technology parameters:		
Variable capital adjustment cost	ψ	2
Variable capital depreciation rate	δ	0.03
Housing adjustment cost	ϕ	0
Sticky prices		
Steady-states gross markup	X	1.05
Probability of not changing prices	θ	0.75
Loan-to-values		
Entrepreneur	m	0.89
Household	m''	0.55
Autocorrelation of shocks		
Technology	ρ_A	0.03
Mark-up	ρ_u	0.59
Standard deviation of shocks		
Technology	σ_A	2.24
Mark-up	σ_u	0.17

return

Calibrated parameters that have different values in the models and standard deviation of key variables

Description	Parameter	model with housing shock	model without housing shock
Autocorrelation of shocks			
Housing	ρ_j	0.85	0
Standard deviation of shocks			
Monetary policy	σ_R	0.29	0.39
Housing	σ_j	24.89	0

Description	Variable	model with housing shock	model without housing shock
Output	$\hat{y}$	1.8565	2.0723
Inflation	$\hat{\pi}$	0.4822	0.4647
Housing prices	$\hat{q}$	2.6030	0.9870
Nominal interest rates	$\hat{R}$	0.3987	0.4813

return