Collateral Constraints and Macroeconomic Asymmetries

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Important contribution

- Informative empirical evidence on asymmetry in the relation between house prices and household consumption:
  - important to document explicitly the stylized facts about non-linearities

- Structural model with occasionally binding collateral constraint for impatient household:
  - innovative solution and estimation method
  - joint analysis of OBC and ZLB

- Potentially important policy implications:
  - efficiency of redistributive policies towards constrained agent (debt relief measures)
  - nature of financial cycle: less procyclical stimulus from booms towards real economy, but also less costly to lean against the financial cycle during booms

Empirical evidence on asymmetric housing-consumption relation

- Exploit regional variation to document that real house price changes have a larger impact on employment in the service sector, car sales, electricity usage and loan originations when house prices are low.

- Relative weaker effect of high house prices for consumption contrasts with the micro-econometric literature that documents precisely the supporting role of the housing boom for consumption in the 2002-2006 period (e.g. Mian and Sufi 2009-2011-2014), but is consistent with evidence that regional consumption data are more volatile and more sensitive to income shocks when housing collateral is scarce (Lustig and Van Nieuwerburgh 2005-2010).

- Macro evidence is more supportive for the idea that house price shocks became more important in the recent period when they were falling (e.g. Prieto-Eickmeier-Marcellino 2013).

Focus on collateral constraint for households

- The model is focusing exclusively on the collateral channel of housing wealth for household spending:
  - the estimated magnitude of this channel is huge: a 25% correction in house prices decrease consumption by 3,5%. This collateral constraint explains three quarters of the observed consumption decline in the Great Recession.
- The model does not allow for competing channels that could also contribute to this consumption decline:
  - credit supply restrictions: financial institutions hit by defaults, losses on assets and limited access to capital and liquidity will reduce their credit supply by increasing spreads in mortgage rates, by tightening credit standards, by increasing LTV ratio's (JPT 2014), etc.
  - housing and land prices as collateral for firms financing of working-capital and investment: reinforcing feedback effect via employment and income on household consumption (LWZ 2013). These spillover effects between consumption and investment are completely missing in this paper. The housing construction sector can also provide a strong spillover mechanism (Boldrin et al 2013)

Other model issues

- House price boom and bust results from exogenous preference shocks:
  - models that can rationalize house price fluctuations endogenously by interest rates, risk premiums, easier access to credit, mortgage subsidies, expectations etc. would imply a smaller wealth effect from house prices and would attribute the consumption variance to other shocks (Garriga 2012, Favilukis et al 2012,etc.)

- The large transfers of house ownership and huge divergence in consumption responses to house price fluctuations between patient and impatient households is counterfactual:
  - are the results robust with more realistic assumptions on market segmentation (Landvoigt et al 2013)

- Differentiate between the role of endogenously determined binding/slack constraints and exogenous shifts in credit supply:
  - changes in LTV and down payment generally considered as important determinants for debt accumulation and increased homeownership

Estimation method and results

- The authors could do some extra effort to illustrate the evidence in favour of the "occasionally" binding nature of the collateral constraint:
  - confirms evidence against permanently binding financial frictions (Del Negro Schorfheide 2012-2014)
  - compare the marginal likelihood of the model with PBC versus OBC?
- When is the constraint binding/slack?
- Which parameters control this regime switch?
  - weak evidence in data for identification of β' and γ
  - mode of $\rho_J = 0.9934$ (persistence housing demand shock) is at 95% posterior interval
- How much time variation is there in the predictive density?

- The same remarks apply for the ZLB results:
  - explains 1% of consumption decline!
  - what is the expected duration of the ZLB according to the model?
  - does this duration match with yield curve and policy statements on forward guidance?

Additional nonlinear channels

- Simulation exercises with the model using 3e order perturbation method with pruning and assuming permanently binding collateral constraints, suggest that this model has several other important sources of nonlinearity:
  - habit, endogenous labor, risk sharing between patient-impatient agents can all lead to time varying precautionary effects and asymmetric responses to positive and negative shocks;
  - the dynamic collateral constraint is aimed to capture gradual deleveraging: if this constraint is allowed to work asymmetrically it tend to offset the asymmetry of the OBC. Deleveraging works slower and supports consumption in downturns. The magnitude of this mechanism is potentially large;

- the robustness exercise on the solution method that is presented in the paper, is using a simpler version of the model that avoids many of these complications and additional sources of nonlinearity!

Additional nonlinear channels

- More general, the first order condition for credit constraint agents contain two sources of time-variation in the optimal financing conditions: the Lagrange multiplier on the constraint and the covariance term between marginal utility and asset return.

$$1 = E_t \left(\lambda_t (1-\gamma) m + \frac{u'_{h,t} + \beta' q_{t+1} u_{c,t+1}}{q_t u_{c,t}} \right)$$

$$1 = \beta' E_t \left(-\frac{\gamma \lambda_{t+1}}{\pi_{t+1}} \frac{u_{c,t+1}}{u_{c,t}} + \frac{R_t}{\pi_{t+1}} \frac{u_{c,t+1}}{u_{c,t}} \right)$$

- This second covariance term can be expected to change depending on whether the constraint is binding or not (Mendoza and Schmitt 2006, Lustig and Van Nieuwerburgh 2005): the risk of binding constraints limits the consumption smoothing ability of households and creates an extra motive for precautionary savings, higher consumption volatility, higher covariance between consumption and asset returns and higher risk premiums.

=> Many arguments to go for a full nonlinear solution approach in solving and estimating these type of models

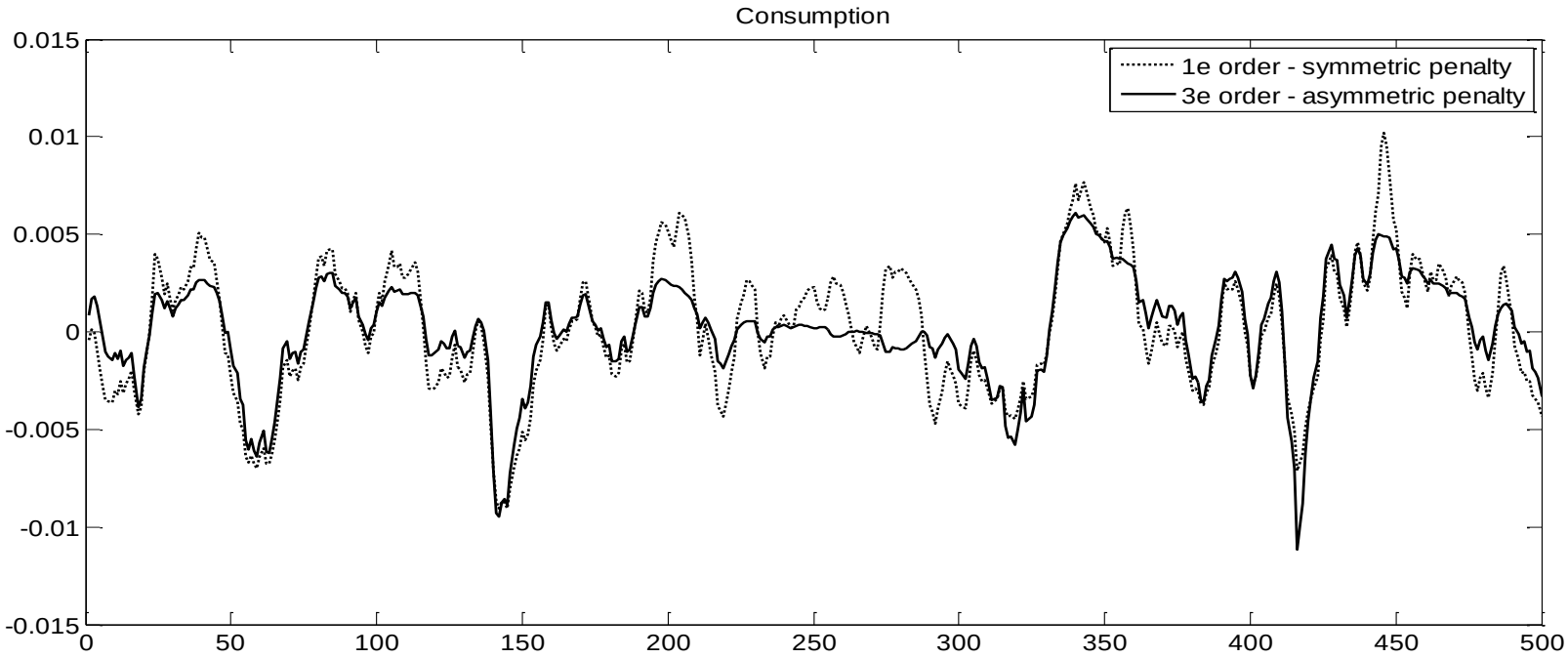
Occasionally binding constraint approximation with penalty function

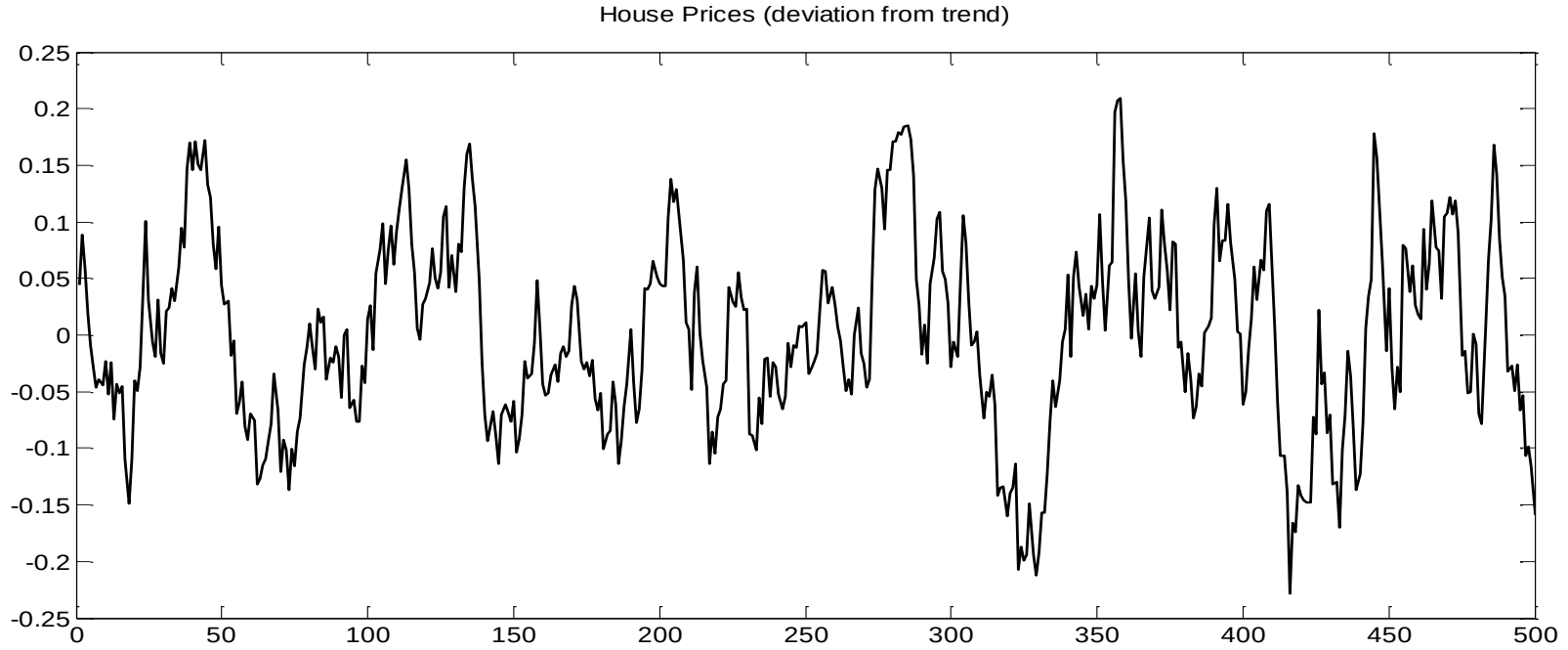
- A penalty function approach provides an alternative method for implementing OBC (see De Wind and Den Haan 2012, Brzoza-Brzezina et al 2013, Dewachter and Wouters 2014):
  - The collateral constraint can be replaced by a continuous non-linear penalty function:

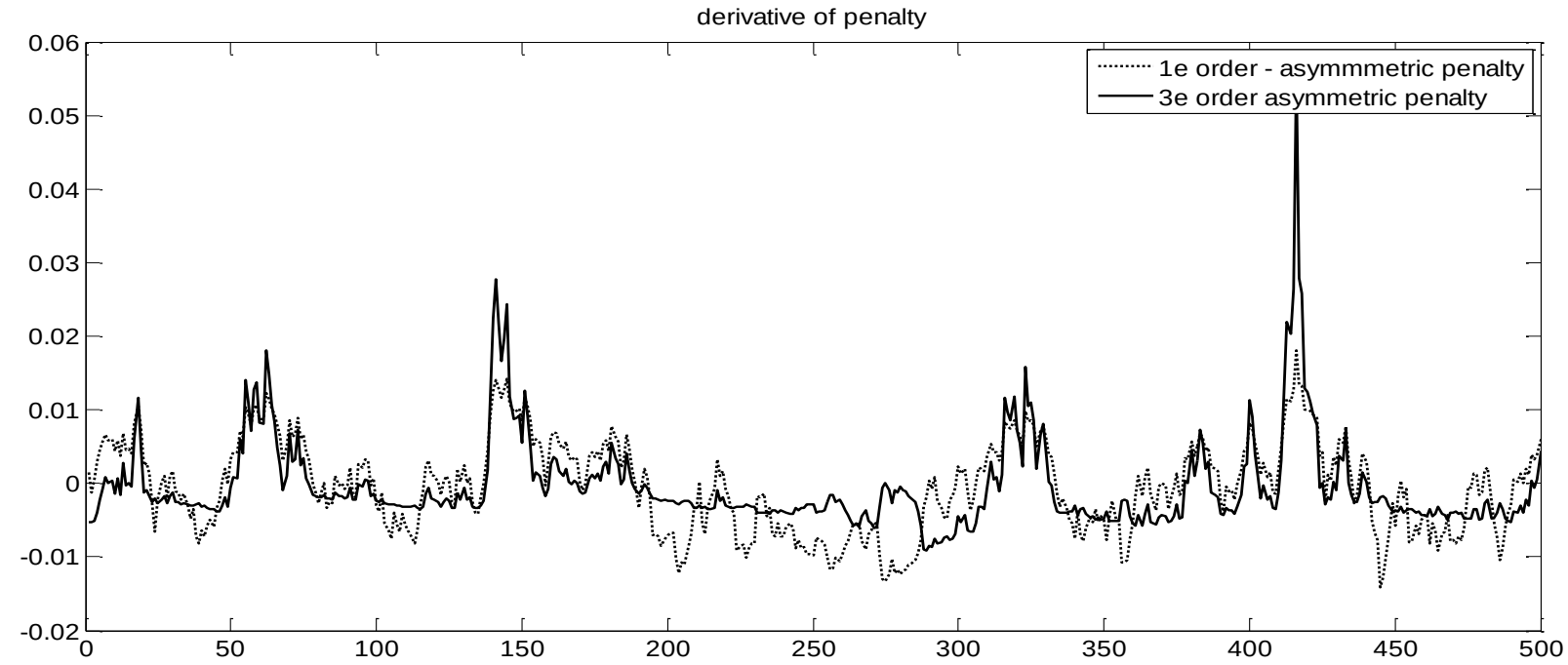
$$P_t = \frac{\eta_1}{\eta_0} \exp\left(\eta_0 \left[b_t - \gamma \frac{b_{t-1}}{\pi_t} - (1-\gamma) m q_t h'_t\right]\right)$$

where h_0 controls the curvature of the penalty function and for $\eta_0 \to \infty$, this penalty approaches the discrete binding constraint with $\lim_{\eta_0 \to \infty} P_t = \begin{cases} \infty \text{ for } [\,] > 0 \\ 0 \text{ for } [\,] \leq 0 \end{cases}$

- This approach allows to use standard higher order perturbation methods:
  - combines the effect of more or less constrained agents depending on their borrowing gap with an active role for risk and precautionary behaviour and other non-linear model features
  - allows for empirical estimation with SMC / particle filter methods.







- Informative reduced form evidence on asymmetric relation house prices – consumption
- Innovative solution and estimation techniques
- Highly policy relevant