Could the boom-bust in the eurozone periphery have been prevented?

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Outline

1. Introduction
2. Model
3. Simulations
4. Conclusions
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4. Conclusions
Motivation

- Boom-bust cycles in the Euro Area after its creation
- Affected periphery: Greece, Ireland, Portugal, Spain
- Internal (mainly housing market) and external (current account) imbalances
- Almost toppled the common currency
- Could reemerge in the future
Imbalances in EA

Note: Solid line - Periphery (GR, IE, PT, ES), dashed line - Core (rest of EA)
Mechanism extensively discussed


Common monetary policy cannot deal with asymmetric shocks

Housing market-oriented macroprudential policy potentially can

- Quint and Rabanal (2014): Macroprudential rule affecting spreads helps reduce macroeconomic volatility and improves EA-wide welfare
- Brzoza-Brzezina et al. (2015): LTV rule applied at national level in the EA periphery improves welfare
- Rubio (2014): Largest gains if imbalances originate in housing market
Could common monetary policy or LTV-based macroprudential policy have prevented the boom-bust in the EA periphery?

Estimated 2-region model of EA:
- Structural and stochastic heterogeneity within EA
- Boom-bust in the periphery was not (just) a typical business cycle

Counterfactual simulations:
- Optimized (common) monetary policy and (region-specific) macroprudential policy
Outline

1. Introduction
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Two regions of a common currency area: periphery (size $\omega$) and core (size $1 - \omega$)

- Patient (lenders) and impatient (borrowers) households
- Housing in utility
- Borrowers face collateral constraint
- Standard production sector
- Real rigidities: habits, investment adjustment costs
- Nominal rigidities: sticky wages, sticky prices, indexation
Saver’s problem

- Relative size: $\omega_P$
- Maximize expected utility

$$\begin{equation}
E_0\left\{ \sum_{t=0}^{\infty} \beta_P^t \left[ \varepsilon_{u,t} \frac{(c_P,t - \xi_c \bar{c}_P,t-1)^{1-\sigma_c}}{1-\sigma_c} + \varepsilon_{u,t\varepsilon,\chi,t} A_X \frac{(\chi_P,t - \xi_\chi \bar{\chi}_P,t-1)^{1-\sigma_\chi}}{1-\sigma_\chi} - A_n \frac{n_P,t^{1+\sigma_n}}{1+\sigma_n} \right] \right\}
\end{equation}$$

subject to the budget constraint

$$\begin{align*}
P_t c_P,t + P_\chi,t [\chi_P,t - (1 - \delta_\chi)\chi_P,t-1] + \tau_P,t + D_P,t \\
\leq W_P,t n_P,t + R_k,t k_P + \Pi_P,t + R_{t-1} D_P,t_{t-1}
\end{align*}$$
**Borrower’s problem**

- Relative size: \( \omega_I = 1 - \omega_P \)
- Maximize expected utility \((\beta_I < \beta_P)\)

\[
E_0 \left\{ \sum_{t=0}^{\infty} \beta_I^t \left[ \varepsilon_{u,t} \frac{(c_{I,t} - \xi c_{\bar{c},t-1})^{1-\sigma_c}}{1-\sigma_c} + \varepsilon_{u,t}\varepsilon_{\chi,t} A_{\chi} \frac{(\chi_I,t - \xi_{\chi} \bar{\chi}_{I,t-1})^{1-\sigma_{\chi}}}{1-\sigma_{\chi}} - A_n \frac{n_{I,t}^{1+\sigma_n}}{1+\sigma_n} \right] \right\}
\]

subject to the budget constraint

\[
P_{t} c_{I,t} + P_{\chi,t} [ \chi_{I,t} - (1 - \delta_{\chi}) \chi_{I,t-1}] + \tau_{I,t} + R_{L,t-1} L_{I,t-1} \\
\leq W_{I,t} n_{I,t} + L_{I,t}
\]

and the collateral constraint as in Iacoviello (2005)

\[
R_{L,t} L_{I,t} \leq m_{\chi,t} E_t \{ P_{\chi,t+1} \} (1 - \delta_{\chi}) \chi_{I,t}
\]
Policy

- **Monetary policy**

\[
\frac{R_t^*}{R^*} = \left( \frac{R_{t-1}^*}{R^*} \right)^{\gamma_R^*} \left[ \left( \frac{\tilde{\pi}_t^*}{\pi^*} \right)^{\gamma_{\pi}^*} \left( \frac{\tilde{y}_t^*}{y^*} \right)^{\gamma_y^*} \right]^{1-\gamma_R^*} \varepsilon_{R,t}^*
\]

where

\[
\tilde{\pi}_t^* \equiv (\pi_t)^{\omega} (\pi_t^*)^{1-\omega} \quad \text{and} \quad \tilde{y}_t^* \equiv \omega y_t + (1 - \omega) y_t^*
\]

- **Macroeconomic policy**

\[
\frac{m_{\chi,t}}{m_{\chi}} = \left( \frac{l_t}{l} \right)^{\gamma_l} \left( \frac{p_{\chi,t}}{p_{\chi}} \right)^{\gamma_p}
\]
Production

- Intermediate goods: Monopolistic competition, Cobb-Douglas production function, Calvo pricing

\[ f_{H,t}(i) + \frac{1 - \omega}{\omega} f^*_{H,t}(i) + i_{\chi,t}(i) = \varepsilon_{z,t} k(i)^\alpha n_t(i)^{1-\alpha} \]

- Final goods (private and public consumption): Perfect competition

\[ c_t + g_t = \left[ \eta \frac{1}{\phi} f_{H,t}^\phi + (1 - \eta) \frac{1}{\phi} f_{F,t}^\phi \right] \frac{\phi}{\phi-1} \]

- Housing producers: Perfect competition, stochastic investment adjustment cost as in Christiano et al. (2005)

\[ \chi_t = (1 - \delta_\chi) \chi_{t-1} + \varepsilon_{i_{\chi,t}} S_{\chi,t} i_{\chi,t} \]

- Housing units produced using only domestic intermediates
Other sectors

- Labor market: Monopolistic competition, Calvo wage setting as in Erceg et al. (2000)
- Banks: Monopolistic competition, stochastic spreads, collect deposits at home and (potentially) from abroad

\[ \omega_I L_{I,t} = \left[ \int_0^1 L_t(j) \frac{1}{\mu_{L,t}} \, dj \right]^\mu_{L,t} \]

- Fiscal policy: Balanced budget, stochastic government spending

\[ \omega_I T_{I,t} + \omega_P T_{P,t} = g_t = \bar{g} \cdot y_t \cdot \varepsilon_{g,t} \]
Estimation

- 17 shocks in the model
- 17 observable variables for core and periphery:
  - GDP
  - Consumption
  - Residential investment
  - Housing loans
  - House prices
  - HICP inflation
  - Interest rate on housing loans
  - Money market rate
  - Net exports (periphery only)
- Quarterly data 1995q1-2012q3 (end date before the ZLB)
- Bayesian methods
- Prior assumptions from literature
Estimation results - structural parameters

- Periphery more rigid than core
Responses to common housing demand shock

- **GDP**
  - Periphery
  - Core

- **Housing investment**

- **House prices**

- **Current account balance**
Periphery hit by more inertial and more volatile shocks

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Posterior Mean</th>
<th>Posterior St. Dev.</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\rho\chi$</td>
<td>0.98</td>
<td>0.01</td>
</tr>
<tr>
<td>$\rho^*\chi$</td>
<td>0.96</td>
<td>0.01</td>
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<tr>
<td>$\rho\chi$</td>
<td>0.76</td>
<td>0.03</td>
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<tr>
<td>$\rho^*\chi$</td>
<td>0.54</td>
<td>0.05</td>
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<tr>
<td>$\sigma\chi$</td>
<td>0.19</td>
<td>0.02</td>
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<tr>
<td>$\sigma^*\chi$</td>
<td>0.10</td>
<td>0.02</td>
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<tr>
<td>$\sigma\chi$</td>
<td>0.24</td>
<td>0.04</td>
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<tr>
<td>$\sigma^*\chi$</td>
<td>0.13</td>
<td>0.02</td>
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Variance decomposition

<table>
<thead>
<tr>
<th>Variable</th>
<th>Shock</th>
<th>Housing demand</th>
<th>Housing supply</th>
<th>Other demand</th>
<th>Other supply</th>
<th>Monetary</th>
<th>Foreign</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP (c)</td>
<td></td>
<td>25.8</td>
<td>7.8</td>
<td>27.2</td>
<td>21.8</td>
<td>12.3</td>
<td>5.1</td>
</tr>
<tr>
<td>GDP (p)</td>
<td></td>
<td>41.2</td>
<td>17.3</td>
<td>7.2</td>
<td>13.3</td>
<td>4.4</td>
<td>16.7</td>
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<tr>
<td>Loans (c)</td>
<td></td>
<td>20.9</td>
<td>27.5</td>
<td>7.9</td>
<td>38.7</td>
<td>2.0</td>
<td>3.0</td>
</tr>
<tr>
<td>Loans (p)</td>
<td></td>
<td>43.9</td>
<td>17.4</td>
<td>2.3</td>
<td>30.3</td>
<td>0.3</td>
<td>5.9</td>
</tr>
<tr>
<td>House prices (c)</td>
<td></td>
<td>43.4</td>
<td>17.8</td>
<td>6.5</td>
<td>20.6</td>
<td>10.9</td>
<td>0.8</td>
</tr>
<tr>
<td>House prices (p)</td>
<td></td>
<td>55.1</td>
<td>22.7</td>
<td>4.2</td>
<td>10.8</td>
<td>2.0</td>
<td>5.2</td>
</tr>
</tbody>
</table>
Historical decompositions in periphery

Housing loans

House prices

- Initial values
- foreign
- risk premium
- monetary
- other supply
- other demand
- housing supply
- housing demand
Historical decompositions in periphery

GDP

Net exports
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Optimized policies

- Monetary and macroprudential policies optimized to maximize area-wide welfare

\[ U \equiv \omega [\tilde{\omega}_P U_P + \tilde{\omega}_I U_I] + (1 - \omega) [\tilde{\omega}_P^* U_P^* + \tilde{\omega}_I^* U_I^*] \]

where \( \tilde{\omega}_i = \omega_i (1 - \beta_i) \), for \( i = \{P, I\} \) (see e.g. Rubio, 2011)

- Second-order approximation

- Counterfactual simulations start in 4q1998
Counterfactual monetary policy
Counterfactual macroprudential policy
Counterfactual monetary-macroprudential mix
Welfare gains on counterfactual paths

<table>
<thead>
<tr>
<th>Agent</th>
<th>Policy</th>
<th>Monetary policy</th>
<th>Macroeconomic policy</th>
<th>Both policies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient (periphery)</td>
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<td>-0.00</td>
<td>-0.00</td>
<td>-0.00</td>
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<td>Impatient (periphery)</td>
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<td>1.12</td>
<td>1.20</td>
<td></td>
</tr>
<tr>
<td>Patient (core)</td>
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<td>-0.00</td>
<td>-0.00</td>
<td>-0.00</td>
</tr>
<tr>
<td>Impatient (core)</td>
<td>0.26</td>
<td>0.24</td>
<td>0.26</td>
<td></td>
</tr>
<tr>
<td>All agents</td>
<td>0.16</td>
<td>0.23</td>
<td>0.24</td>
<td></td>
</tr>
</tbody>
</table>
Conclusions

- Estimated 2-region model of EA
  - Boom-bust in periphery driven by housing market shocks
  - Periphery more vulnerable to boom-busts

- Counterfactual policy experiments:
  - Monetary policy could have smoothed output, but not housing market nor current account
  - Macroprudential policy: could have smoothed credit cycle and limited build-up of external imbalances

- Caveats:
  - Optimized monetary policy hits ZLB
  - Optimized macroprudential policy quite active