Discussion of Supply Restrictions, Subprime Lending and Regional US Housing Prices

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Supply Restrictions, Subprime Lending and Regional US Housing Prices
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Summary

- **Big picture: Asymmetry in role of elasticity**
  - effect of elasticity may differ between booms and busts

- Analyzes effect of demand shocks and supply restrictions in a reduced form supply and demand model of the housing market
  - durability of housing supply means that supply is perfectly inelastic in bust regardless of long run supply elasticity

- Empirical model estimates simultaneous equations system of home price changes, housing supply changes, and subprime lending
  - model estimated separately for boom and bust period
  - identification from regulatory and geographic supply restrictions
Theoretical Model

Two versions of the model:

1. Demand does not depend on credit availability:
   \[ p_{i,t} = \nu_{0,i,t} + \nu_{1,i,t} h_{i,t} \]

2. Financial Accelerator: Demand depends on credit availability which is nonlinearly increasing in home prices.

In version without financial accelerator, the same downward shift in demand in the bust has exactly same effect on prices and quantities in both a market with high LR supply elasticity and low LR supply elasticity.

Key insight is that, in the SR in a bust, change in quantity supply from bust is exactly the same - 0!!

- same insight as Glaeser and Gyourko (2005, JPE)
- Haughwout, Peach, Sporn, and Tracy (2012) and Liu, Nowak, and Rosenthal (2013) make a similar point
Theoretical Model
Version with Financial Accelerator

- In version with financial accelerator
  - demand depends on availability of credit according to
    \[ p_{i,t} = \tilde{\nu}_{0,i,t} + \eta b_{i,t} + \nu_{1,i,t} h_{i,t} \]
  - availability of credit depends non-linearly on home prices
    \[ b_{i,t} \leq \begin{cases} 
    \kappa_0 + \kappa_1 p_{i,t}, & \text{for } p_{i,t} > p_{i,t-1} \\
    \kappa_0, & \text{for } p_{i,t} \leq p_{i,t-1} 
    \end{cases} \]

- Financial accelerator increases price response in more inelastic cities in boom periods
Theoretical Model
Version with Financial Accelerator

- Paper states that price drop is significantly larger in more inelastic cities when there is a financial accelerator
  - for same drop in demand in inelastic and elastic cities?
  - or assuming drop in demand is greater in elastic city?
  - conditional on being at same equilibrium in period 2?
  - for same period 2 equilibrium, seems to me that same sized drop in $\bar{v}_{0,i,t}$ will have same effect on prices both with and without financial accelerator

- Paper needs to clarify math and intuition for this assertion
Empirical Model: Boom Period
Without Financial Accelerator

- Estimates simultaneous equations system for changes in home prices and changes in housing quantities in boom

- Conducts simulations of response of price to demand shock (proxied by increase in subprime volume)

Equations without financial accelerator:

\[ D : \Delta p_i^{Boom} = \alpha_1 + \beta_{1,\Delta h} \Delta h_i^{Boom} + \beta'_{1,x} x_i^{Boom} + \varepsilon_{\Delta p,i} \]
\[ S : \Delta h_i^{Boom} = \alpha_2 + \left( \beta_{2,\Delta p} + \beta'_{2,\Delta p \times Reg} Reg_i \right) \Delta p_i^{Boom} + \beta'_{2,z} z_i^{Boom} + \varepsilon_{\Delta h,i} \]

- Not obvious that this is how elasticity affects supply
### Table 2: The boom period model, 2000–2006

<table>
<thead>
<tr>
<th>Variables</th>
<th>$\Delta p_{\text{boom}}$</th>
<th>$\Delta h_{\text{boom}}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\Delta h_{\text{boom}}$</td>
<td>-13.27</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(-4.94)***</td>
<td></td>
</tr>
<tr>
<td>$\Delta p_{\text{boom}}$</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>(3.72)***</td>
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<tr>
<td>una $\times \Delta p_{\text{boom}}$</td>
<td>-0.21</td>
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<tr>
<td></td>
<td>(-2.32)***</td>
<td></td>
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<tr>
<td>wrl $\times \Delta p_{\text{boom}}$</td>
<td>-0.77</td>
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<tr>
<td></td>
<td>(-3.64)***</td>
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<tr>
<td>$\Delta s_{p_{\text{boom}}}$</td>
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<tr>
<td></td>
<td>(6.20)***</td>
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<tr>
<td>$\Delta \text{HH income}_{\text{boom}}$</td>
<td>5.96</td>
<td>0.21</td>
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<tr>
<td></td>
<td>(5.62)***</td>
<td>(1.90)*</td>
</tr>
<tr>
<td>$\Delta \text{c. cost}_{\text{boom}}$</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>(-3.45)***</td>
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<tr>
<td><strong>Controls</strong></td>
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<tr>
<td>una</td>
<td>0.12</td>
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<tr>
<td></td>
<td>(1.48)</td>
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<tr>
<td>wrl</td>
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<tr>
<td></td>
<td>(-2.49)***</td>
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<tr>
<td>HH income$_{1996}$</td>
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<td>-0.17</td>
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<td></td>
<td>(1.83)*</td>
<td>(-1.92)*</td>
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<td>log pop$_{1996}$</td>
<td>-0.13</td>
<td>-0.01</td>
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<td></td>
<td>(-2.41)***</td>
<td>(-1.33)</td>
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<td>pop density$_{1996}$</td>
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<td>(0.47)</td>
<td>(-0.28)</td>
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<td>unemp$_{1996}$</td>
<td>-2.22</td>
<td>-1.81</td>
</tr>
<tr>
<td></td>
<td>(-1.23)</td>
<td>(-3.90)***</td>
</tr>
</tbody>
</table>

**Std. error and correlations**

| $\varepsilon_{\Delta p_{\text{boom}}}$ | 0.287 |
| $\varepsilon_{\Delta h_{\text{boom}}}$ | 0.230 |

**Vector normality test**

χ²(4) = 22.314 | 0.0002 | ***

**Obs.**

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Empirical Model: Boom Period
Without Financial Accelerator

- Simulates how much prices change in response to 1% increase in subprime by solving for prices and using coefficients of simultaneous equation model

- Increase in subprime is interpreted as demand shock

- As elasticity decreases
  - prices increase more
  - housing supply decreases more
Empirical Model: Boom Period
With Financial Accelerator

Subprime lending:

\[ \Delta sp_i^{Boom} = \alpha_3 + \beta_{3,\Delta p} \Delta p_i^{Boom} + \beta'_{y} y_i^{Boom} + \varepsilon_{\Delta sp,i} \]

- Assumption is that subprime captures increase in lending that results from rising home prices
  - not entirely clear that this is reasonable

- Why not just allow home prices to nonlinearly affect demand to be consistent with the theoretical model?
Empirical Model: Boom Period
With Financial Accelerator

- Finds that effect of supply elasticity is amplified in model with financial accelerator
- Finds that growth of subprime is higher the more inelastic the housing supply is
- Finds that home price growth is positively associated with subprime growth
Empirical Model: Bust Period

- Adds another demand equation
  \[ \Delta p_i^{Bust} = \mu + \gamma_{\Delta p} \Delta p_i^{Boom} + \gamma_{\Delta h} \Delta h_i^{Boom} + \gamma_{\omega}^' \omega_i^{Bust} + e_i \]

- Finds that supply elasticity remains relevant in bust
  - consistent with Huang and Tang (2012) for the US

- However, supply elasticity seems to matter less in bust than in boom
  - paper needs to spend more time discussing the magnitudes of the differences in the bust and boom
  - consistent with Hilber and Vermeulen (2013) for the UK

- Seems more natural to estimate a completely separate system for the bust period given the theoretical model
Contrasts with Glaeser, Gyourko, and Saiz (2008) who find no relationship between elasticity and price response in bust

Need to explain why the results differ from Glaeser, Gyourko, and Saiz (2008)
  - different data?
  - different sample period?
  - different empirical approaches?
Conclusion

- Basic point regarding asymmetry of effect of supply elasticity is intriguing

- Need more clarity regarding why financial accelerator reverses this intuition

- Empirical model seems a bit *ad hoc* and not that tightly related to theory