An Agent-Based Model of the Housing Market

By Many

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Preliminaries

• There is no paper that describes the agent-based model in detail

• I got the slides yesterday morning
Logic

• Macroeconomic models must appreciate heterogeneity if we are to understand (dangerous) trends in economy

• Heterogeneity needed to appreciate importance of non-price terms in driving trends (LTV, collateral)

• The best way of empirically using heterogeneity to understand trends is an agent-based model
Logic

• Macroeconomic models must appreciate heterogeneity if we are to understand (dangerous) trends in economy [agree]

• Heterogeneity needed to appreciate importance of non-price terms in driving trends (LTV, collateral) [agree, some qualification]

• The best way of empirically using heterogeneity to understand trends is an agent-based model [could be convinced]
Representative Agent-Based Models

• If we are serious about understanding dangerous trends, we must depart from representative-agent based models

• Big drawbacks

1. No room to appreciate importance of debt
2. Consumption-risk sharing fails spectacularly in the data
3. “Shocks” in representative agent-based models very unsatisfactory (although perhaps also true of models based on heterogeneity!)
Most Important Source of Heterogeneity?

1. Geanakoplos – heterogeneity in beliefs leads naturally to leverage, LTV, price movements

2. Heterogeneity in exposure to binding borrowing constraints (or cash-in-advance constraint)
   - Corporate finance approach (BG, KM, HK, BS)
   - Household finance approach (EK, GL, MP)
   - Matters for thinking of most important “exogenous” shocks – potential issue with LTV versus interest rates framing?
Taking these Models to Data?

• In a series of papers with Atif Mian, we have “tested” constraint-based models by taking seriously their cross-sectional implications.

• Example, among those facing constraint, examine income, leverage, HP, consumption, etc.

• Can be done in real time ("Bad Leverage" paper).

• Key difference with agent-based modeling – less structure imposed on empirical estimation.
Example: Household Debt, 2002 - 2007

1. Determine who are marginal borrowers who have a very high elasticity of borrowing with respect to credit availability

   • My measure: Subprime share or CC utilization rates
Step #2: Credit and Marginal Borrowers

2. Has the flow of credit to these marginal borrowers increased substantially relative to non-marginal borrowers?  
   YES

Loosened borrowing constraint

Mortgage Originations Growth Low versus High Credit Quality

House Price Growth Low versus High Credit Quality

- Blue line: Lowest Credit Quality Quintile
- Red dashed line: Highest Credit Quality Quintile

House prices indexed to 1992

- Credit quality quintiles: Lowest, Highest
- Graph shows growth trends over time.
Step #3: Income Growth of Marginal Borrowers

3. Is the relative increase in the flow of credit to marginal borrowers driven by productivity/permanent income shocks? NO.
Comparing Approaches

• Advantages of the agent-based model

1. Easier to assess quantitative significance
2. Can easily model counter-factual policy
3. Model provides discipline on data moments that are “interesting”

• Disadvantages

1. Too tied to specific theory, LTV
2. Lack of transparency (can be overcome)
3. Model manipulation too easy
Final Note

• General equilibrium is extremely difficult, both with more reduced form approach and agent-based modeling

• Empirical macro studies using micro data becoming more popular, but must always think carefully about GE effects

• Mainstream macro will only buy into heterogeneity if GE effects carefully considered
Conclusion

• Think seriously about precisely the advantages structure gives you

• Augment study with simple comparative statics to illustrate how model works

• I’m definitely interested to see more …