An Equilibrium Model of Housing and Mortgage Markets with State-Contingent Lending Contracts

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Summary

- Main question: what is the equilibrium mortgage contract when payments can be state-dependent?
- Approach: GE model with endogenous house prices, housing supply, home-ownership. Features aggregate income risk, strategic + liquidity default.
  - Stylized framework + risk neutrality $\implies$ closed-form solutions.
- Main findings:
  1. Unique equilibrium contract: Home Equity Insurance Mortgage (HEIM).
     - Mortgage fully indexed to house prices.
  2. In absence of strategic default, contract would index to wages to minimize liq. defaults.
  3. Misalignment of contract preferences among borrowers $\implies$ potential instability.

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Evaluation

- Elegant paper that uses strong assumptions to generate sharp results.
- May not want to take results completely literally.
  - Full house price insurance on mortgages may be extreme.
- But paper is full of valuable insights about mortgage design.
- Generalizing results implies that standard mortgage with tail house price insurance might be a great contract for the real world.

Interpreting the HEIM Result

- Striking result: unique equilibrium contract is HEIM fully indexed to house prices.
- But this means that the equilibrium ownership arrangement is...renting?
- "Owners":
  - Put zero money down at purchase.
  - On net, pay fixed amount in exchange for housing services.
  - Receive none of the gains and losses on the value of the property.
  - Move out if they can't afford to pay.
- If ownership is effectively identical to renting, should owners still get utility boost θ_i?

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Beyond HEIMs

- This paper can still guide mortgage design even without full HEIMs.
- (Robust) foundation of HEIM result: can't have strategic default at equilibrium.
  - Lender takes losses when borrowers strategically default.
  - Can drop strategic defaulters by lowering payments in default states, raising in non-default states.
- Why complete insurance? Zero cost to ownership/default.
- Indifference condition for owning (ignore liquidity default for now)

$$\underbrace{0}_{\text{rent}} = \sum_s \pi_s \max\Big\{\underbrace{\underline{\theta} + P_1(s) - m(s)}_{\text{keep}}, \underbrace{0}_{\text{default}}\Big\}$$

- No strategic default $\iff$ no variation in $P_1(s) - m(s)$.

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Beyond HEIMs

- With cost of default k

$$\underbrace{0}_{\text{rent}} = \sum_s \pi_s \max\Big\{\underbrace{\underline{\theta} + P_1(s) - m(s)}_{\text{keep}}, \underbrace{-k}_{\text{default}}\Big\}$$

- Now, can have some variation in $P_1(s) - m(s)$, don't need full insurance.
- But still need to make sure $\min_s \underline{\theta} + P_1(s) - m(s) \geq -k$.
- Takeaway: mortgages should include tail insurance, approaching full insurance as default costs (down payment) $\to 0$.
- Note: "skin in the game" important no matter what your forecast of house prices is!

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Liquidity Defaults

- With positive down payment/default cost, need tail insurance, but now have more flexibility on the rest of the contract. What should it look like?
  - P & T: minimize liquidity default by indexing to wages.
- Potential issue: liquidity default in the model if labor income $w(s)l_i$ is less than the mortgage payment $m(s)$, even if above water.
- In practice, borrowers with negative liquidity shocks may be able to sell, or do a short sale. Keeping borrowers above water (e.g., HEIM or tail insurance) might largely fix this.
  - But underwater borrowers can't. Liquidity default = strategic default at specific threshold.
- Many liquidity defaults due to unemployment, effectiveness of indexing to wages unclear.

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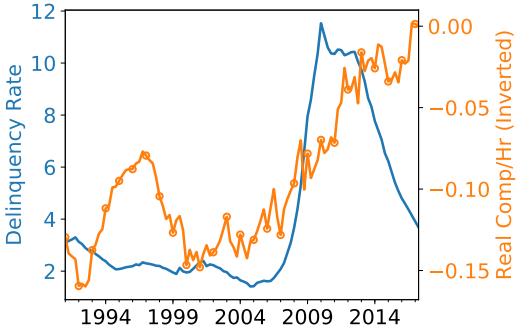
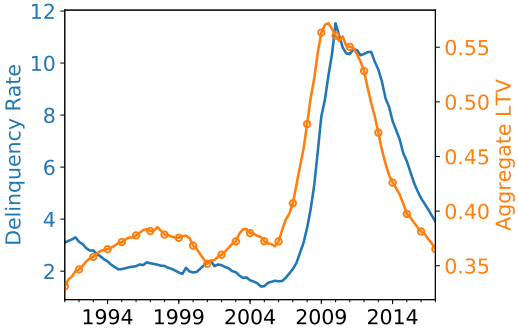
Liquidity Defaults

- Mortgage delinquencies not strongly correlated with real wages.



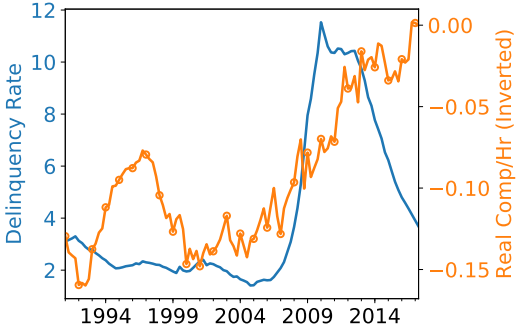
(a) Delinq. vs. Real Comp./Hr (Detrended)



(b) Delinq. vs. Aggregate LTV

Liquidity Defaults

- Aggregate leverage (proxy for prob. underwater) plus 4Q delay delivers near perfect fit.



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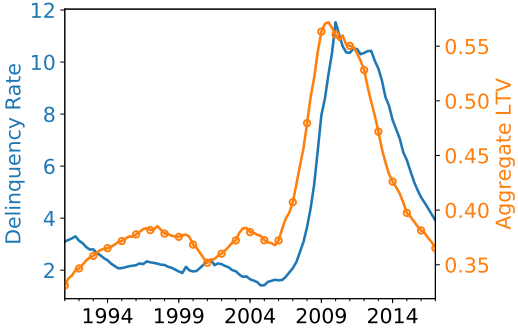

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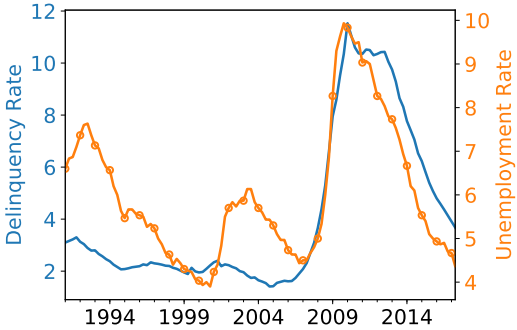
Liquidity Defaults

- Unemployment more correlated with delinquency, but only when leverage high.



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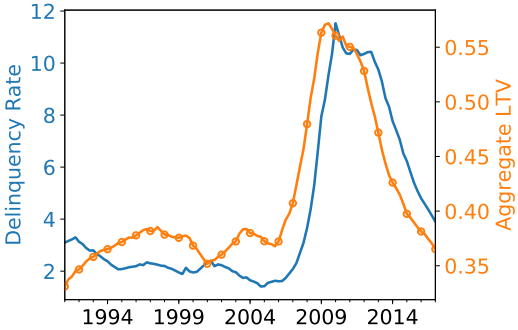

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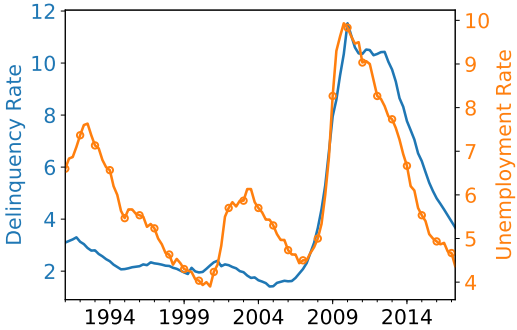
Liquidity Defaults

- Takeaway: keeping borrowers above water may be the most effective way to prevent liquidity defaults.



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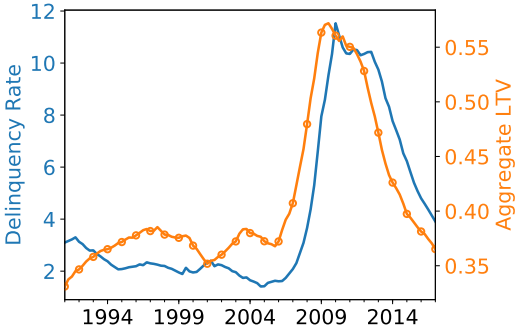

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Liquidity Defaults

- On the other hand, liquidity defaults in the model could easily stand in for risk sharing.
  - Otherwise absent in the model due to risk neutrality.
  - Index payments to wages $\implies$ consumption smoothing.
- Contract minimizing liq. defaults very similar to contract maximizing expected utility

$$\min_{m(s)} \sum_s \pi_s G\left(\frac{m(s)}{w(s)}\right) = \max_{m(s)} E\left[-G\left(\frac{m(s)}{w(s)}\right)\right].$$

- But wages move much less than interest payments, benefits of aggregate wage insurance might be small (Lucas calculation).
- Takeaway: outside of strategic default region, standard mortgage contract may be okay!

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Instability

- P & T instability result: equilibrium may not exist at all.
- Key is tension between different types of borrowers:
  - Low ownership utility borrowers have highest value from default option, dislike full HEIM.
  - Medium ownership utility borrowers prefer low average payment, like full HEIM.
  - High ownership utility borrowers want to minimize liq. default risk, dislike full HEIM.
- All intuitive and relevant forces, existence depends on balance of groups.
- Standard mortgage with tail insurance might relieve tension, improve stability.
  - Low average payment without overinsurance in normal times.

Conclusion

- Impressive paper full of important insights.
- Intuition is robust, even if results not taken literally.
- Standard mortgage contract with tail house price insurance worth considering!
- Related: Greenwald, Landvoigt, Van Nieuwerburgh (2017) study implications in model with levered intermediaries.
  - Agg. house price indexation increases financial fragility by destabilizing bank balance sheets.
  - Good reason not to provide full insurance when you don't need to.
  - But no equilibrium strategic default/tail insurance argument should still go through!