Discussion of

The Mortgage Credit Channel of Macroeconomic Transmission

by Daniel L. Greenwald

Vadim Elenev

Johns Hopkins Carey

IMF Macro-Financial Research Conference — Sept 2021

What this paper does

- Puzzling stylized facts
  - Price/rent ratios very sensitive to interest rates (not the case in standard models)
  - Loan-to-value ratios at origination did not increase much during the early 2000s housing boom (so how do we think about "relaxation of credit standards")

What this paper does

- Puzzling stylized facts
  - Price/rent ratios very sensitive to interest rates (not the case in standard models)
  - Loan-to-value ratios at origination did not increase much during the early 2000s housing boom (so how do we think about "relaxation of credit standards")
- Solution: embed institutional features of the U.S. mortgage market in a NK DSGE model
  - Long-term fixed-rate prepayable mortgages
  - subject to *both* LTV and D(P)TI constraints *at origination only*

What this paper does

- Puzzling stylized facts
  - Price/rent ratios very sensitive to interest rates (not the case in standard models)
  - Loan-to-value ratios at origination did not increase much during the early 2000s housing boom (so how do we think about "relaxation of credit standards")
- Solution: embed institutional features of the U.S. mortgage market in a NK DSGE model
- Three contributions
  - Theoretical: *constraint-switching channel* captures endogenous relationship between constraints
  - Quantitative 1: boom explained by relaxation of PTI constraints and its interaction with the LTV constraint
  - Quantitative 2: Rate cuts by the Fed boost aggregate demand because
    - ★ relaxed PTI constraint increases house prices
    - ★ prepayment option allows existing home owners to benefit right away
  - "Methodological": rich yet tractable representation of a prepayable FRM

Overview and Plan

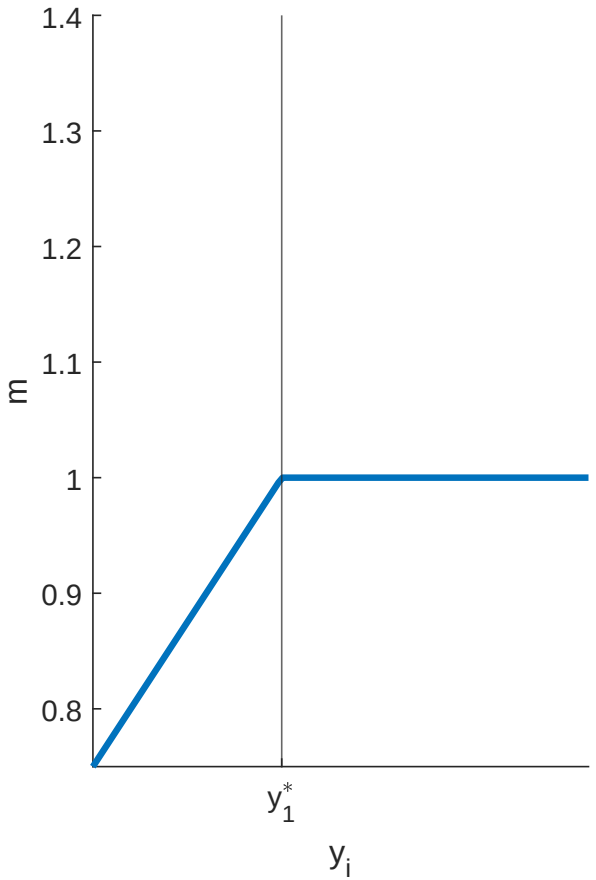
- Very polished "mature" paper currently under revision
- At this stage, my value-add will be:
- Illustrate the *constraint-switching channel*
- Give some ideas for future work

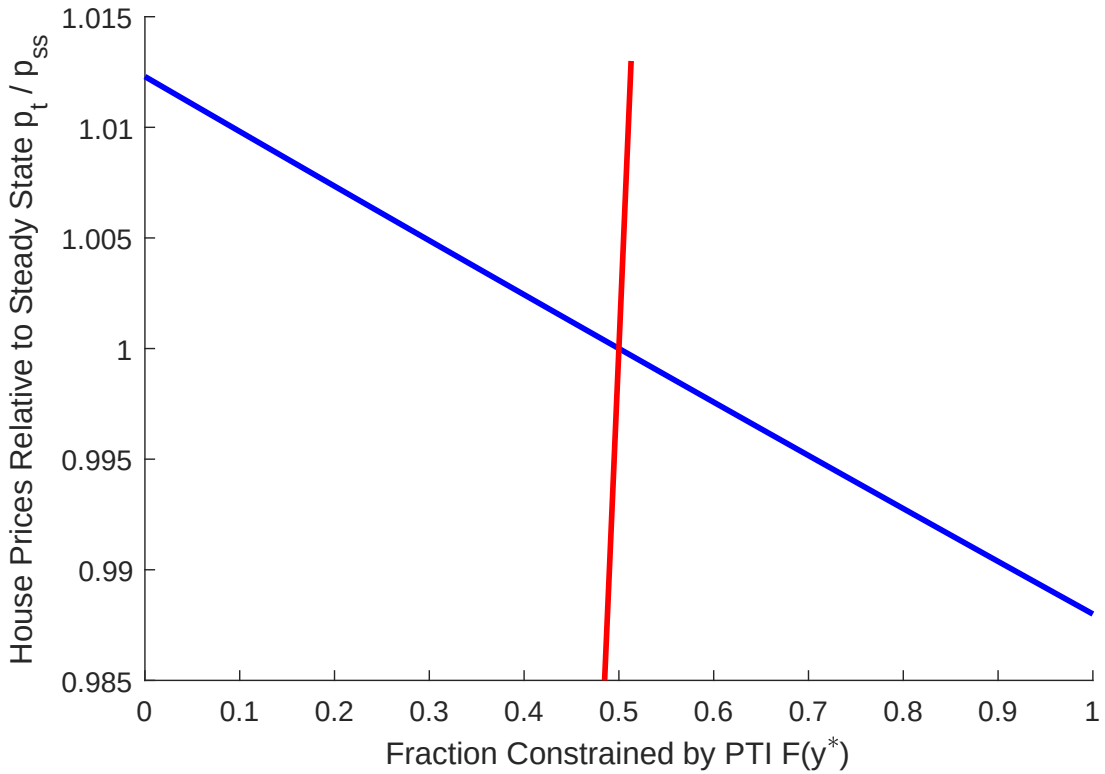
Simple Model

- Setup
  - Small open economy with constant endowments
  - Households $U_i = \sum_{t=0}^{\infty} \beta^t (c_t^i + \log h_t^i)$, $\beta < 1$
  - Consumption good endowment $y_i \sim F(y_i)$, $E[y_i] = 1$, housing endowment $h_i = 1$
  - ROW supplies one-period mortgages at a price of 1
  - HH BC: $c_t^i + m_t^i - p_t h_t^i = y_i - m_{t-1}^i + p_t h_{t-1}^i$
  - D(P)TI and LTV constraints: $m_t^i \leq \min\left\{\theta^{PTI} y_i, \theta^{LTV} p_t h_t^i\right\}$
- Solution
  - FOC for mortgages $\implies$ multiplier on constraint of $1 - \beta$
  - Aggregate constraint binds
    $m_t = \theta^{PTI} \int_0^{y_t^*} y dF(y) + \theta^{LTV} p_t h_t (1 - F(y_t^*))$, where $y_t^* = \frac{\theta^{LTV} p_t}{\theta^{PTI}}$
  - FOC + Market Clearing for housing $\implies$ $p_t = \frac{1+\beta p_{t+1}}{1-(1-\beta)(1-F(y_t^*))\theta^{LTV}}$
    (steady state when $p_t = p_{t+1} = p_{ss}$)
- Consider an unexpected relaxation of each constraint for one period only

Equilibrium: Baseline

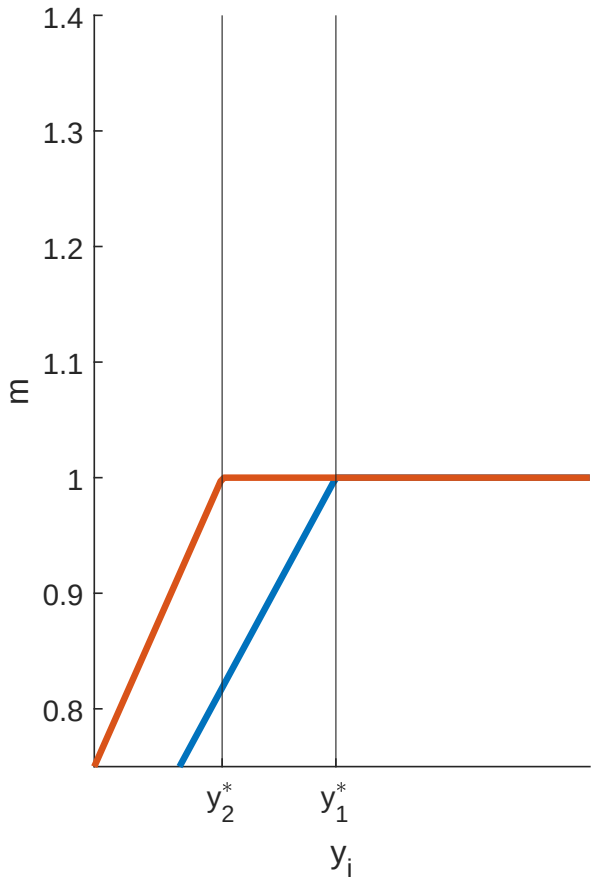
$$m = \min\left\{\theta^{PTI} y_i, \theta^{LTV} p_{ss}\right\} \qquad y_t^* = \frac{\theta^{LTV} p_t}{\theta^{PTI}} \qquad p_t = \frac{1 + \beta p_{ss}}{1 - (1-\beta)(1 - F(y_t^*))\theta^{LTV}}$$

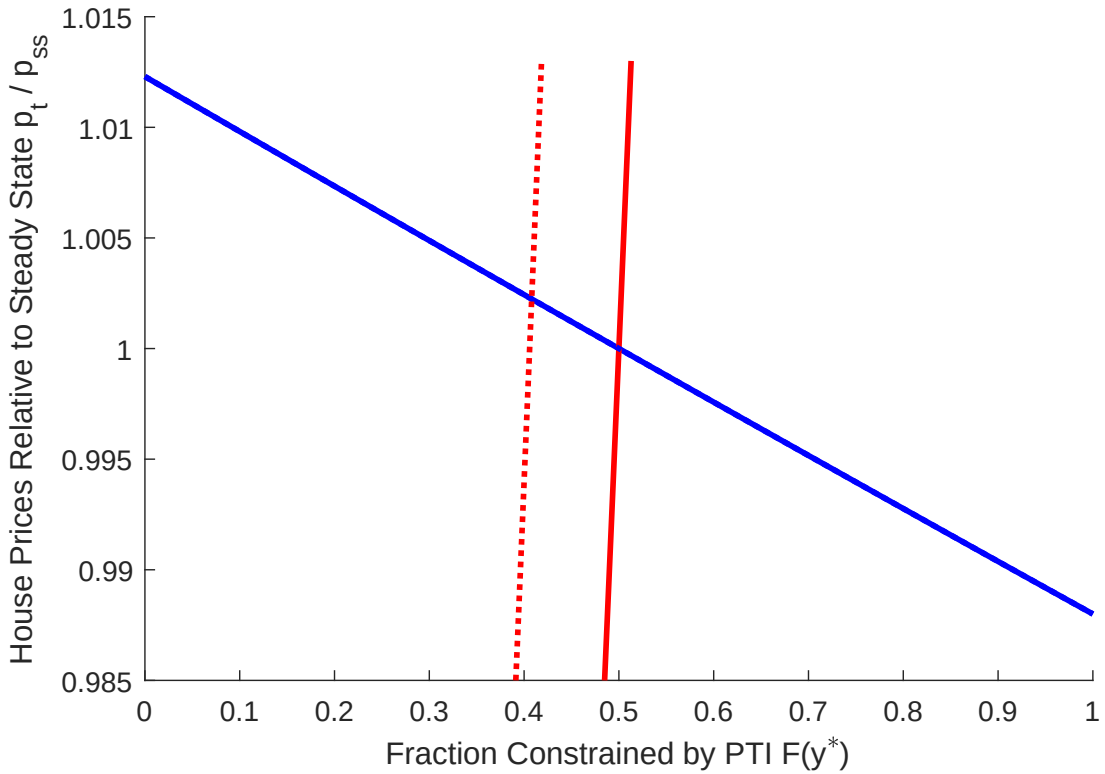




Equilibrium: PTI Relaxation

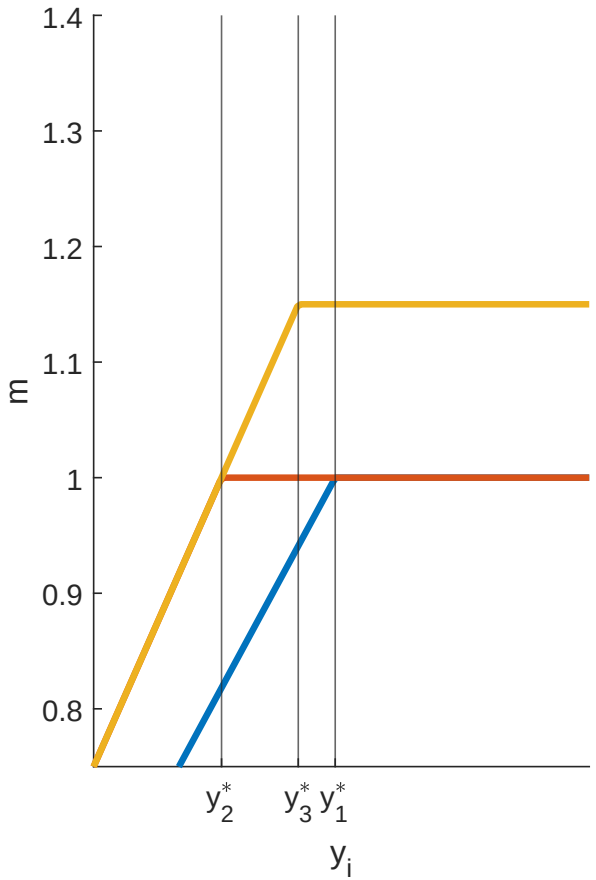
$$m = \min\left\{\theta^{PTI} y_i, \theta^{LTV} p_t\right\} \qquad y_t^* = \frac{\theta^{LTV} p_t}{\theta^{PTI}} \qquad p_t = \frac{1 + \beta p_{ss}}{1 - (1-\beta)(1 - F(y_t^*))\theta^{LTV}}$$

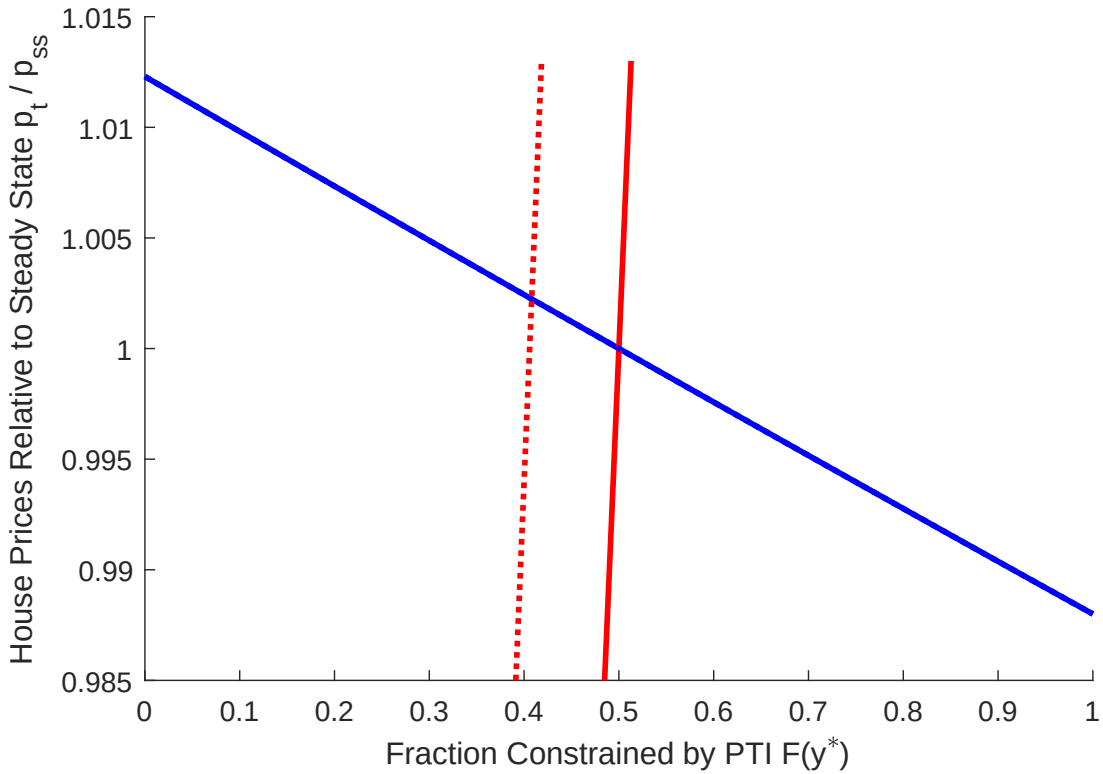




Equilibrium: PTI Relaxation

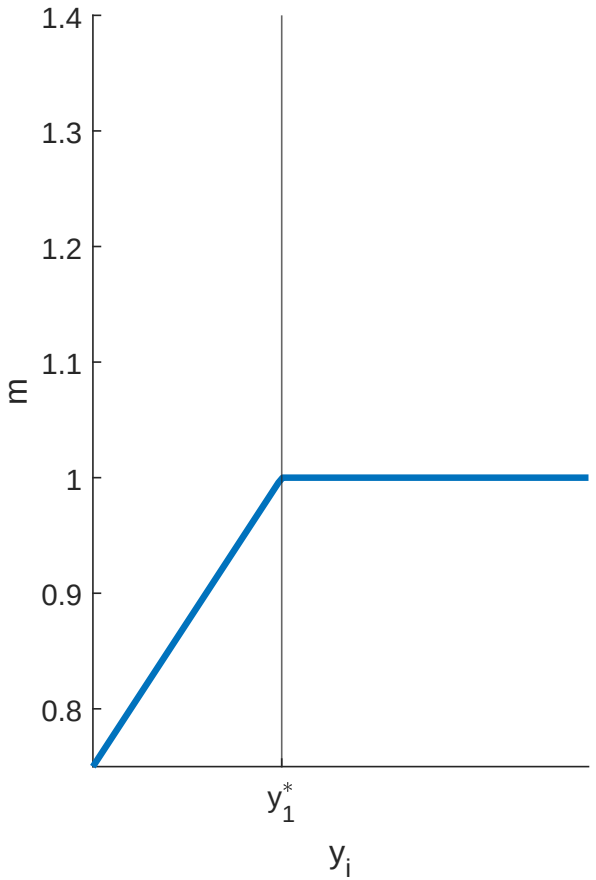
$$m = \min\left\{\theta^{PTI} y_i, \theta^{LTV} p_t\right\} \qquad y_t^* = \frac{\theta^{LTV} p_t}{\theta^{PTI}} \qquad p_t = \frac{1 + \beta p_{ss}}{1 - (1-\beta)(1 - F(y_t^*))\theta^{LTV}}$$

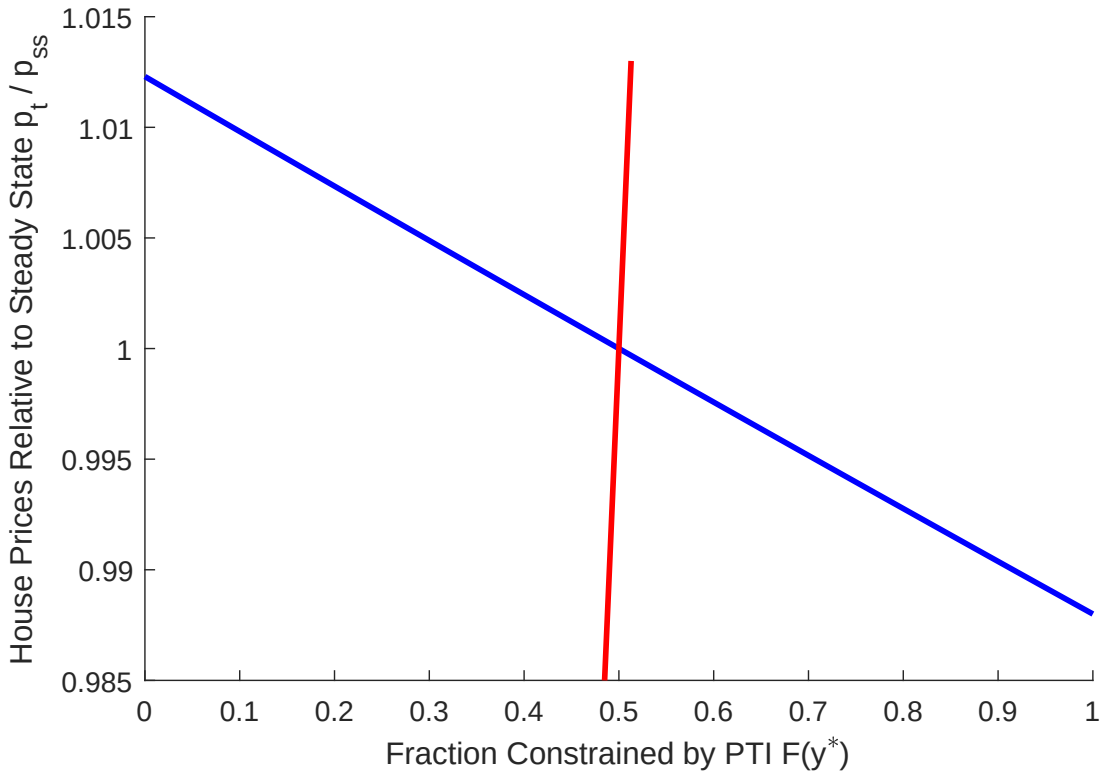




Equilibrium: Baseline

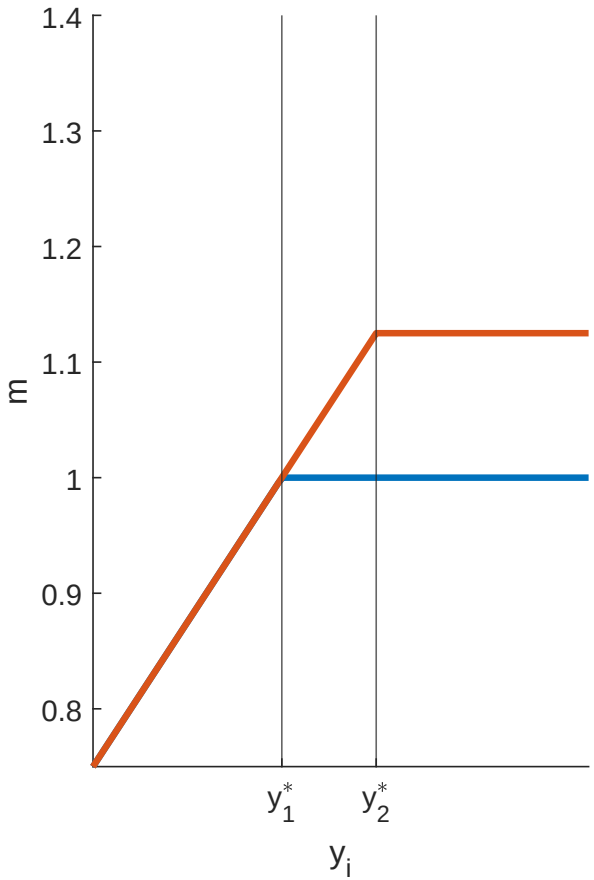
$$m = \min\left\{\theta^{PTI} y_i, \theta^{LTV} p_{ss}\right\} \qquad y_t^* = \frac{\theta^{LTV} p_t}{\theta^{PTI}} \qquad p_t = \frac{1 + \beta p_{ss}}{1 - (1-\beta)(1 - F(y_t^*))\theta^{LTV}}$$

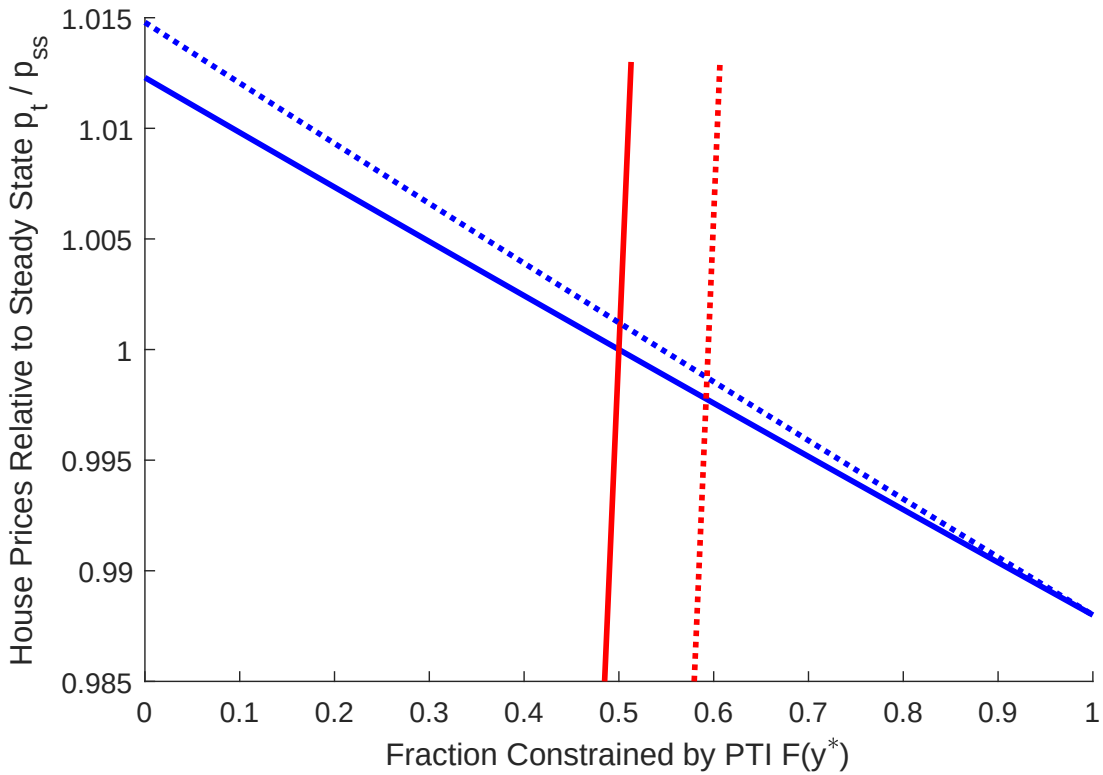




Equilibrium: LTV Relaxation

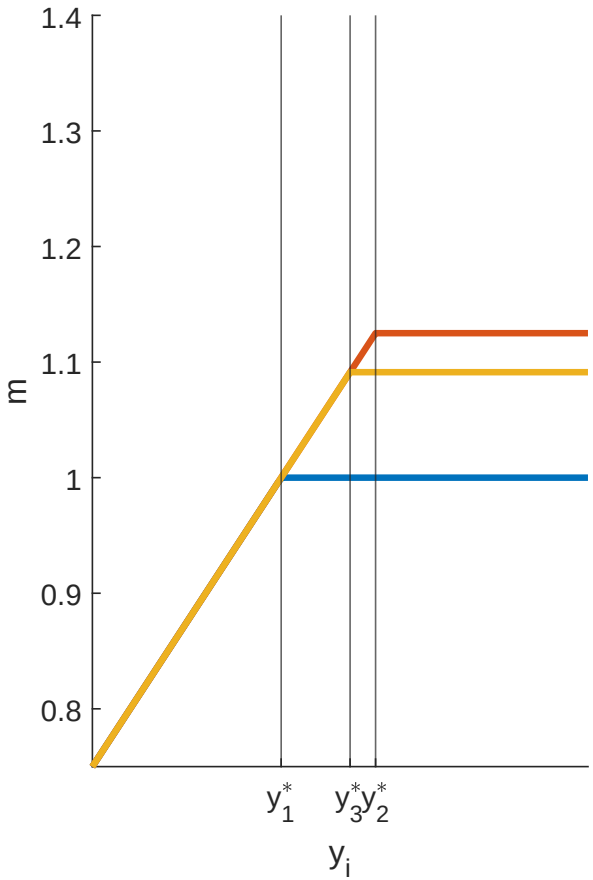
$$m = \min\left\{\theta^{PTI} y_i, \theta^{LTV} p_t\right\} \qquad y_t^* = \frac{\theta^{LTV} p_t}{\theta^{PTI}} \qquad p_t = \frac{1 + \beta p_{ss}}{1 - (1-\beta)(1 - F(y_t^*))\theta^{LTV}}$$

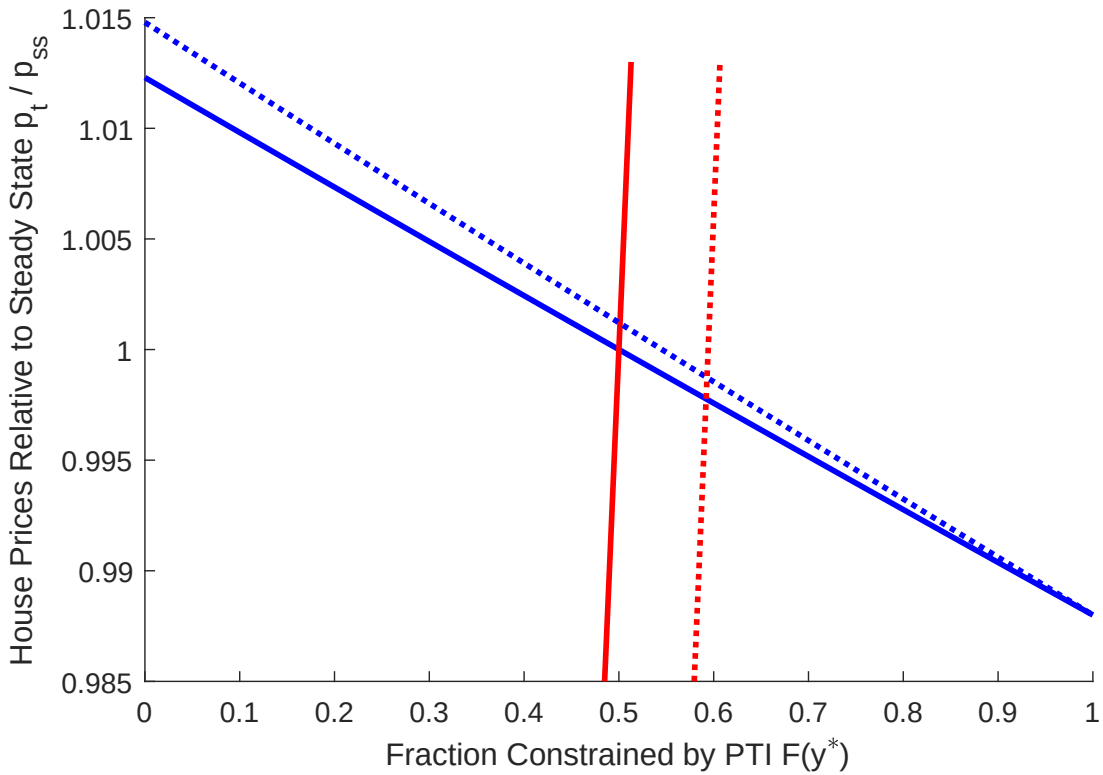




Equilibrium: LTV Relaxation

$$m = \min\left\{\theta^{PTI} y_i, \theta^{LTV} p_t\right\} \qquad y_t^* = \frac{\theta^{LTV} p_t}{\theta^{PTI}} \qquad p_t = \frac{1 + \beta p_{ss}}{1 - (1-\beta)(1 - F(y_t^*))\theta^{LTV}}$$





Simple Model: Takeaways

- By itself, relaxing either constraint $\uparrow$ house prices
- But in combination,
  - PTI relaxation: $\uparrow\uparrow$ house prices
  - LTV relaxation: $\uparrow\downarrow$ house prices
- Mapping to the main model
  - $\downarrow$ rates $\implies$ $\downarrow$ payment $\sim \uparrow \theta^{PTI}$
  - $\uparrow$ house prices $\implies$ $\uparrow$ consumption **only** if you get a new loan
  - Option to prepay $\implies$ share of new loans > 1 / maturity

Comment 1: Role of Default

- No default in the model
- Calibrated to relatively safer pool of conforming loans, not many defaults except during GFC
- How would results change? Three channels
  - Lower house prices lead to defaults, increased supply of houses & foreclosure externalities further depress prices
  - Foreclosure-caused depreciation $\sim$ negative supply shock, necessitating MP response
  - Default as an alternative to prepayment
- To generate boom & bust in the model, need (1) PTI relaxation, (2) low rates, (3) high house price expectations, (4) slight LTV relaxation
- With (5) amplification generated by defaults, probably explain $> 100\%$ of the bust. Need more modest deviations from RE?

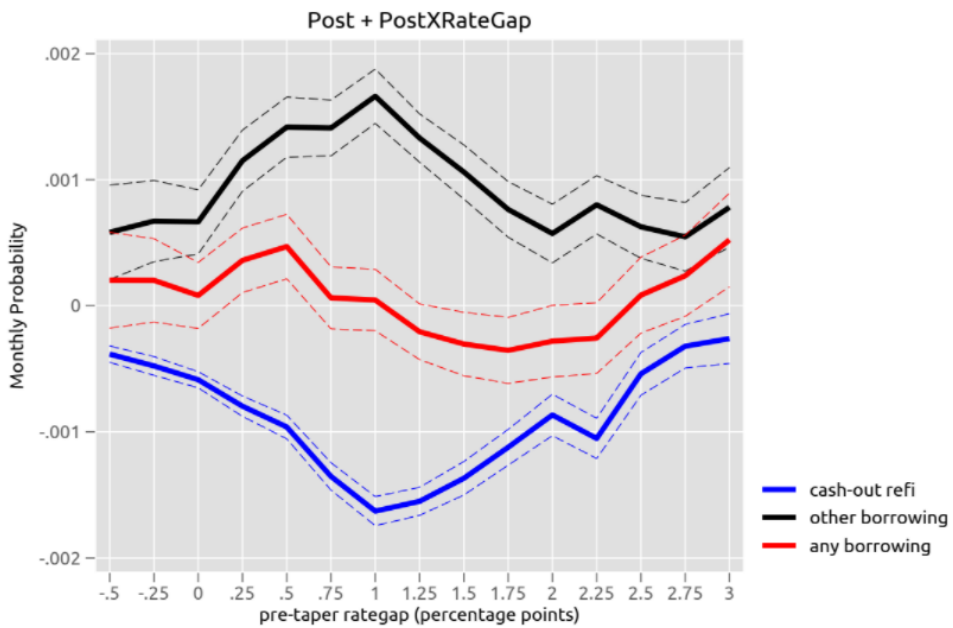
Comment 2: Transmission from House Prices to Output

- Model: driven almost entirely by cash-out refinancing

Comment 2: Transmission from House Prices to Output

- Model: driven almost entirely by cash-out refinancing
- What do borrowers do with equity extracted through a cash-out refi? Annenberg et al (2021):
  - 1/3 used to pay down other debt e.g. HELOCs, credit cards, etc.
  - A MP shock *just to the long rate* barely decreases total borrowing – fewer cash-outs but more short-term borrowing

Figure 6: Extensive Margin Results



Comment 2: Transmission from House Prices to Output

- Model: driven almost entirely by cash-out refinancing
- What do borrowers do with equity extracted through a cash-out refi? Annenberg et al (2021):
  - 1/3 used to pay down other debt e.g. HELOCs, credit cards, etc.
  - A MP shock *just to the long rate* barely decreases total borrowing – fewer cash-outs but more short-term borrowing
- HH debt portfolio choice suggests an additional type of monetary policy state dependence
  - Normal times: conventional MP $\uparrow$ shock moves short rates more than long rates
    - ★ ST borrowing $\downarrow\downarrow$, ambiguous effect on mortgage borrowing (direct $\downarrow$, substitution $\uparrow$)
    - ★ Total borrowing $\downarrow \implies$ consumption $\downarrow$
  - At the ZLB: unconventional MP only moves long rates. Taper Tantrum as $\uparrow$ UMP shock (QE opposite):
    - ★ ST borrowing $\uparrow$, mortgage borrowing $\downarrow$
    - ★ Total borrowing ambiguous: weak MP pass-through

Concluding Thoughts

- Important, comprehensive, well-written paper
- Institutional credit standards key to understanding strong MP mortgage passthrough, boom-bust dynamics
- Effects depend on *interaction* of PTI and LTV constraints
- MP transmission affected by options to (1) default, (2) borrow elsewhere – next papers?