Garriga and Hedlund (2018)

* Study how arrangements in the mortgage market impact the dynamics of housing (boom-bust episode) and the economy.
* Incomplete markets and endogenous adjustment costs.
* In response to mortgage rates and credit conditions, the model generate movements in house prices, residential investment, and homeownership consistent with US boom-bust.
* Propagation to the macroeconomy asymmetric with much higher consumption sensitivity during the bust than the boom.
* ARM increases the sensitivity of house prices to credit conditions relative to FRM w/o refinancing.
* Macropru can mitigate fragility by reducing the magnitude of house price movements w/o curtailing homeownership.
* Credit expansion + low costs of borrowing + low returns to safe assets ⇒ house price boom that’s not driving by growth in income, productivity, or rents.
* High LTV makes the economy more vulnerable to changes in aggregate conditions such as income/employment risk or the cost of borrowing.
  + Under these conditions, decline in house prices can generate sizeable declines in economic activity followed by slow recovery as the demand for new houses is low and also the demand for non-durables is low, because HH have to reduce debt burden.
* Some households default, making credit more expensive for new borrowers.

Model

* Quantitative GE model.
* To overcome a Modigliani-Miller irrelevance on the contract structure in the HH sector, the model includes frictions such as incomplete markets, mortgage default, and endogenous adjustment costs.
* Continuum of individuals face uninsurable income risk.
* Rental units smaller than housing units.
* Default option, which is priced by the lender.
  + Depends on the individual’s condition and the aggregate condition.
* Long-term nature of mortgage allows distinction between downpayment constraints on new purchases from collateral constraints on existing loans when option to refinance is available.
* With refinancing, households have another motive to own a house as it provides insurance against transitory income shocks.
* LTV and DSTI constraints.
* Endogenous transaction costs, where the liquidity properties of the housing market depend on where in the housing cycle the HH is.

Calibration

* Replicate key features prior to the housing boom
  + Homeownership
  + Sales
  + Foreclosures
  + Joint distribution of assets, housing wealth, and mortgage debt
    - Allows capturing aggregate wealth in terms of financial assets and housing net of mortgages, but also its distribution across HHs.
  + The boom-bust experiment allows the model to replicate the dynamics and magnitudes of house prices, home ownership rates, housing defaults, and time-on-the-market.
  + During the bust, the model matches the consumption elasticity to house price movements as estimated by Mian, Rao, and Sufi (2013).

House price movements generated by

* Productivity/income
* Preference towards housing
* Credit conditions – low mortgage rates and loose LTV and DSTI constraints
* Shocks are unanticipated and are considered to be permanent!
* Bust is generate by an immediate tightening of credit conditions and slow worsening of income prospects, via increasing the risk in the labor market.

Eliminating the ability to refinance dampens the size of the housing boom, but dramatically increases foreclosures and slows the recovery, despite reducing the magnitude of the housing bust.

ARMs expose homeowners to interest rate risk, and a recession with a tightening of interest rates exacerbates the crisis. This is particularly bad for high LTV HHs.

Macroprudential policies

* Tighter LTV dampens the boom and the bust. These policies are particularly effective when the initial mortgage rate is low.
  + Suggesting that the optimal LTV should not be invariant to the underlying cost of borrowing as this policy operates by reducing the financial fragility of the economy.
* Tighter DSTI dampens the appreciation of the house values w/o curtailing homeownership.
  + However, it has limited success in reducing the overall fragility of the number of active borrowers increases.

Important literature:

* Garriga, Manuelli, and Peralta-Alva (2012) – Model of market segmentation to study the dynamics of house prices during the boom and the bust.
  + Collapse in house prices, induces a large and persistent recession due to deleveraging.
* Iacoviello and Pavan (2013) – response of consumption to negative shocks in the balance sheet or income.
* Kaplan and Violante (2014) – with illiquid shocks, the response can be pretty large (wealthy hand-to-mouth)
* KMV (2016) – illiquidity as a result of exogenous transaction costs

Literature exploring the foreclosure dynamics (exogenous house prices):

* Such and Guler (2014)
* Corbae and Quintin (2014)
* Campbell and Cocco (2014)
* Hatchondo et al. (2014)

Literature exploring the foreclosure dynamics (endogenous house prices):

* Garriga and Schlagenghauf (2009)
* Chatterjee and Eyigungor (2014)
* Arsland, Guler, and Temel (2015)

Housing liquidity is exogenous in both.

MODEL

* Infinitely lived HHs
* For renters,
* For homeowners,
* Households supply labor endowment, , where follows a Markov chain and transitory shock drawn from a distribution.
* Price of apartment services is constant, .
* Consumption sector, , where is labor.
* Housing sector, .
* Housing depreciates
* **Housing illiquidity**
* Directed search in housing market, where the probability of buying/selling depends on the price quoted and market tightness.
  + Keeping track of cross-sectional distributions can be inhibiting when solving for equilibrium labor market dynamics.
  + Use block recursivity to eliminate the need to keep track of cross-sectional distributions.
  + With brokers, market tightness only depends on the distribution of income, assets, and debt through its impact on house prices, .
  + Absent the brokers, market tightness would depend nonparametrically on , and household would need to forecast the evolution of each tightness independently.
  + Block recursivity simplifies the problem to:
    - Solve for the dynamics of
    - And substituting it into the market tightness equations for buyers and sellers.
* Lending allowed but borrowing only allowed through mortgages.
* **Credit illiquidity**
  + Banks price default risk into new mortgage contracts
  + Mortgages do not have a predefined maturity date. Thus, amortization is endogenous.
    - “Mortgages in the model stand in for all forms of mortgage debt (beyond 30-year first liens) by not having a predefined maturity date, and as a result, amortization is endogenous.”
    - Homeowners can prepay without penalty but must pay a cost to extract equity through refinancing.
    - Mortgage payments and debt evolves according to .
      * This is the infinite horizon constant amortization formula, which means that if this minimum payment is met, the mortgage debt stays constant forever.
      * Mortgage payments is a choice.
    - When the bank repossesses the house, they lose a fraction of proceeds. Defaulters are shut out of the mortgage market with a probability .

Results:

* The structural model is used to assess the relative contributions of higher productivity and cheaper credit to the housing boom.
  + Typical business cycles do not produce large booms in house prices.
  + However, if accompanied by a decline in mortgage rate and lax down payment requirements, the model matches the house price boom.
* Lose credit on its own does not lead to increase in *homeownership*, because the general equilibrium effect of increase in house prices offsets the effect of cheaper credit.
  + Productivity boom increases the homeownership.
  + The partial equilibrium effect is offset by the general equilibrium effect.
  + Even though with lose credit homeownership does not change, but HHs buy bigger houses.
* Credit expansion amplifies the boom in aggregate *consumption* (using the house as an ATM).
  + Contrary to subprime narrative, the credit boom increases consumption disproportionately among middle and high-income HHs, but not among low-income.
* Productivity boom decreases *leverage* for all income groups, particularly high-income.
  + When accompanied by lower mortgage rates and loose down payments, leverage increase across all income groups, not just among subprime borrowers.
* Refinancing plays a very big role in driving the house prices and in generating the consumption boom for homeowners. Renters are unaffected if there is not any refinancing.
* ARMs lead to more vulnerability during the bust, but also have a faster impact during recovery.
* LTV constraints
  + Dampens the size of the housing boom 🡪 increases homeownership rate
  + Reduced foreclosures and reduced consumption fall
  + This policy operates by reducing the financial fragility of the economy.
* PTI constrains
  + Reduce house price appreciation but not by as much as the LTV constraint.
  + Increases significantly the homeownership rate due to the broad limitations in housing spending.
  + PTI still induces too much credit relative to LTV caps, and does not reduce the fragility to credit reversals.
    - Endogenous response in aggregate credit not as large as in the baseline, it is spread out over a large fraction of HHs.
    - As a result, the same credit tightening generates a sizeable decline in house prices and a large spike in foreclosures.