Houses as ATM:
Mortgage Refinancing and Macroeconomic Uncertainty

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House Prices

- can the boom/bust in U.S. residential house prices?

Source: S&P Dow Jones Indices LLC
Shaded areas indicate US recessions - 2014 research.stlouisfed.org
(1) Run-up in U.S. Household Debt

- account for (i) the run-up in household debt...
(2) Slow Deleveraging of U.S. Households

- account for (i) the run-up in household debt and (ii) subsequent slow deleveraging

![Graph showing the slow deleveraging of U.S. Households from 2006 to 2014. The shaded areas indicate US recessions from 2008 to 2009.](research.stlouisfed.org)
(3) U.S. Household Consumption Boom and Bust

- account for (i) the run-up in household debt , (ii) subsequent slow deleveraging and (iii) the household consumption boom and bust
U.S. Car Sales

Source: U.S. Department of Commerce: Bureau of Economic Analysis

Shaded areas indicate US recessions - 2014 research.stlouisfed.org
Possible Approaches

1. clever **econometrics**: identify the effect of exogenous house price variation on consumption in the cross-section of households etc

2. **equilibrium model**: prices clear all (financial/goods) markets

3. **structural model of portfolio choice and consumption ✓**
   - feed in the observed [exogenous] path for house prices and the (long/short) interest rates
   - check whether the households’ choices in aggregate match those in the data [without clearing any markets]
CMR Structural Model of Household Finance

1. housing market
   ▶ rent [pay a fixed fraction of income]/buy [purchase a unit of house] decision
   ▶ exogenous process for house/price income ratio $h_t$ [agents fully understand this stoch. process]

2. incomplete asset markets
   ▶ long-term fixed-rate loans (mortgages)
   ▶ short-term loans (HELOCs)
   ▶ default technology [default leads to renting]
   ▶ collateral constraints
   ▶ exogenous process for short-term rates $r_t$ [agents fully understand this stoch. process]

3. idiosyncratic/aggregate income risk
   ▶ Counter-Cyclical Variation in Idiosyncratic Risk
   ▶ idiosyncratic income shock $y_{it}$
   ▶ aggregate income growth $z_t$

State space includes aggregate state variables $(r_t, h_t, z_t)$
aggregate choices by risk-averse (and slightly paranoid) rational agents who completely understand the asset price dynamics look like the ‘data’

1. **consumption dynamics**: *relaxing* of collateral constraints $\rightarrow$ run-up in debt and consumption boom
2. **debt dynamics**: *tightening* of collateral constraints $\rightarrow$ sharp consumption drop and slow deleveraging
   - you purchase a unit of an asset (‘house’)
   - asset keeps appreciating (though rents are not going up);
   - you cannot sell a little bit of the house / selling the house is costly
   - instead, you borrow to de-cumulate wealth (short the other asset)
   - you consume more (because you really feel wealthier)

owners in this model are subject to large wealth shocks
harder to smooth their consumption
Figure 8: Model-implied aggregate time series. This figure plots the model-implied aggregate time series (solid lines) for real consumption growth (all households), debt-to-income ratio (all homeowners), and the cash-out share and rate ratio of refinance loans from 1988 to 2012. The dashed lines in Panels A, C, D represent the data counterpart. The dashed line and dotted line in Panel B represent two alternative measures of debt-to-income ratio based on the data from the Flow of Funds and the SCF, respectively.

The advantage of the first empirical measure is that it is available at an annual frequency. The second empirical measure uses the triennial Surveys of Consumer Finances for years 1989, 1992, 1995, 1998, 2001, 2004, 2007, and 2010. We compute the average ratio of total debt collateralized by the household’s primary residence (including both first mortgage and second-lien borrowing, such as home-equity loans and HELOCs) to total household income across all households in the bottom 80% of the wealth distribution that we targeted in estimation. The model is able to replicate the dramatic run-up in debt-to-income ratios starting in the mid-1990s and through the later 2000s: the ratio peaks at about 1.2 in the model in year 2007, before cresting in 2008-2009 and declining roughly back to its 2005 value of approximately one by 2012. This is somewhat lower than the average in the SCF data, which peaks at 1.6 in 2010 (the most recent survey available). The FFA series follows similar dynamics as the data,
Aggregate Dynamics in GE Model

- In CMR model, prices do not adjust
  - Exogenous dynamics for real risk-free rate
  - **No connection** between real risk-free rate and collateral asset value

- In equilibrium model, asset prices adjust during crisis:

\[ r \downarrow, h \uparrow \]

- Scarcity of collateral (binding collateral constraints) pushes down the real risk-free rate below the rate of time preference and increases the value of the collateral asset
- Deterioration in risk-sharing/increased motive for precautionary savings also pushes down the real risk-free rate below the rate of time preference and increases the value of the collateral asset
- Large decrease in real risk-free rate and increase in the value of the collateral stock
- These price adjustments will mitigate aggregate consumption decline
Top/bottom quintile of debt/income distribution in 2006. Average household solid line.
Other Questions

- risk sharing: why is there so little risk sharing in this model?
  - the unconditional volatility of household consumption growth equals the unconditional volatility of household income growth
  - lots of opportunities for self-insurance by accumulating assets plus access to default
  - possibly related to the way we accumulate housing wealth in this model

- very few home-owners in model relative to data, but model matches aggregate dynamics...

- what if default risk is priced properly? [are banks in your model making money/losing money on average]

- what happens to defaults in the model during the crisis?
Conclusion

1. CMR produce state-of-the-art household finance model to study macro dynamics

2. **collateral constraints/idiosyncratic risk** play a key quantitative role in macro dynamics before and during crisis
   - model produces large consumption drop and slow de-leveraging
   - key ingredients: you cannot fine-tune your holdings of the housing asset/ house prices and rents evolve independently

3. our models work better if we fix prices
   - housing collateral scarcity during crisis: why does the price of the collateral not increase? (maybe haircuts increase)
   - risk-free asset scarcity during crisis: why does the real risk-free rate not drop precipitously? (ZLB?)