Is there a Puzzle in Underwater Mortgage Default?

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Note: Not an official position of the Federal Reserve Bank of Boston, Federal Reserve Bank of Cleveland, or the Federal Reserve System.

Motivation

- Models of mortgage default have long struggled to fit the data on underwater households:
  - Underwater households definition: households whose home value is under the mortgage balance.
  - Early option-theoretic models over-predict default: (Foster and Van Order, 1984; Riddiough, 1991). Life-cycle models typically require unrealistically large default penalties: (Campbell and Cocco, 2015; Hembre, 2018; Laufer, 2018)
  - Low (2023) matches average level of underwater default by incorporating psychic moving costs, but not for deeply underwater households.

- **Research Question:** Do the empirical findings on underwater default necessarily imply that borrowers face high non-pecuniary costs of default?
  - What theoretical benchmark should we use when evaluating the empirical evidence on mortgage default?

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Outline of presentation

1. **Campbell-Cocco model**
   - How can we get it to fit the data?
2. **Our model with housing tenure choice**
3. **Results**
4. **Conclusion**

Campbell-Cocco model, introduction

- Lifecycle model, exogenous housing consumption H_{it}, optimizes over non-housing consumption.
- Exogenous homeownership and mortgage size.
- Cost of default: rent forever.

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Campbell-Cocco model, rent to price (R_{it}/P_{it}) ratios

- Suppose R_{it}/P_{it} is constant. Then, **lower prices** $\rightarrow$ **lower rent** $\rightarrow$ **more strategic default incentives**.
- In reality, real rent is relatively flat while prices fluctuate (Loewenstein and Willen, 2023).
  - R_{it}/P_{it} rose from $\sim$7% to about $\sim$10% between 2007 and 2010.
  - Significantly moderates strategic default incentives.
- Campbell-Cocco R_{it}/P_{it} is actually more extreme:
  - Implies that R_{it}/P_{it} fell from $\sim$7% in 2007 to $\sim$3% in 2010.

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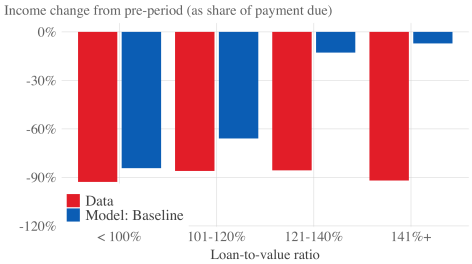
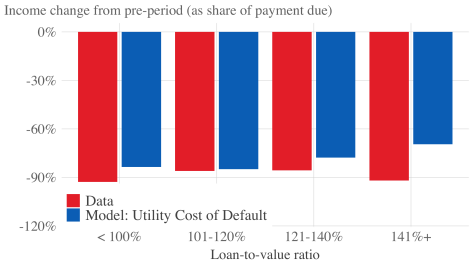
Campbell-Cocco model, calibration results 1

Figure: Income changes conditional on default implied by Campbell and Cocco (2015)'s model, compared with Ganong and Noel (2023) data



(a) Campbell and Cocco (2015)'s model



(b) Campbell and Cocco (2015)'s model with high default stigma

Campbell-Cocco model, calibration results 2

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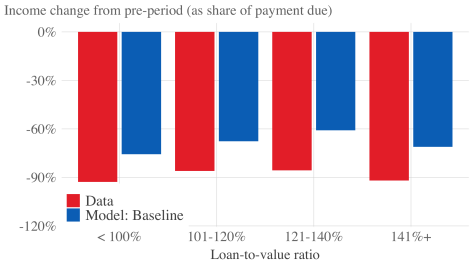
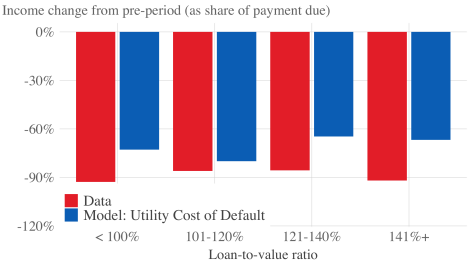


(a) Campbell and Cocco (2015)'s model with constant real rent



(b) Campbell and Cocco (2015)'s model with constant real rent and high default stigma

Is this R_{it}/P_{it} fundamental?

- Model with endogenous housing tenure choice is necessary to contexualize R_{it}/P_{it} in utility terms.
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Model

Model features:

1. Endogenize housing tenure choice in terms of owning and renting as well as the choice of mortgage balances.
2. Allow for heterogeneity in endogenous house sizes as well as market segmentation in terms of the largest houses being only available via owning (Kaplan et al., 2020).
3. Calibrate our model to match the households' life-cycle ownership decisions, mortgage choice and Payment to income ratio by LTV.

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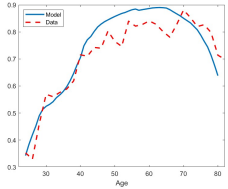
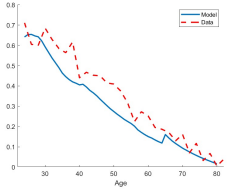
Calibration: Selected Parameters

Parameter		Value	Target
β	Discount factor	0.92	LTV
η	Housing Share	0.2	PTI
ϕ	Substitutability	1.5	PTI and LTV
ψ	Utility cost of default	0.15 (CEV 0.7%)	Default rates
b_0	Bequest Motive	20	Homeownership Rate & Mortgage Loan
b_1	Bequest Motive	1	of Senior Households

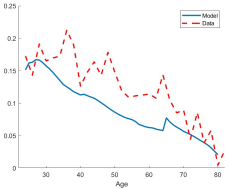
Calibration: Targeted Moments



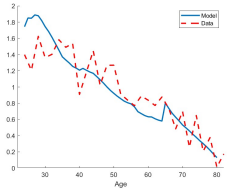
(a) Homeownership Rates



(b) Loan-to-Value Ratios

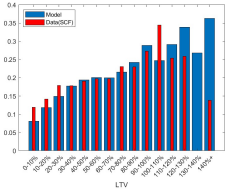


(c) Payment-to-Income Ratios

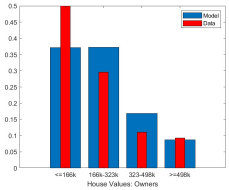


(d) Debt-to-Income Ratios

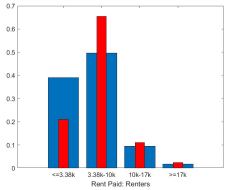
Calibration: Non-Targeted Moments



(a) Average PTI by LTV

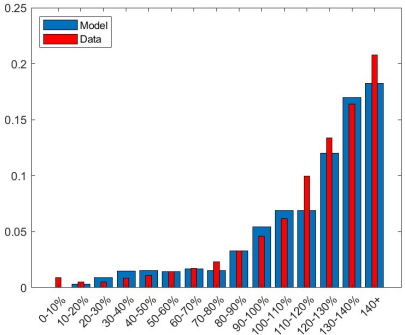


(b) Distribution of House Values among Owners

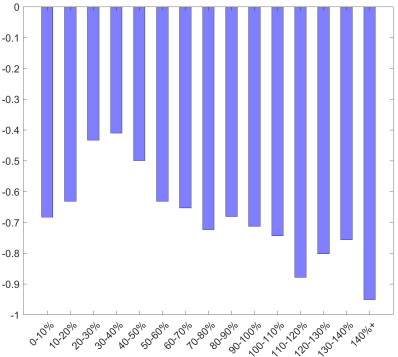


(c) Distribution of Rents among Renters

Result: Model Implied Income Change Given Default



(a) Default Rate



(b) Income Change before Default as a Fraction of Mortgage Payment

Counterfactual: Forebearance is Effective in Reducing Default

	Default Rate	Foreclosure Rate
Baseline	2.34	0.97
Forbearance Steady State	1.32	0.83

- With a 1-year forebearance option, households take larger mortgages & end up with higher LTVs, but despite this effect in steady state default and foreclosure both decline.

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Implications

- **For mortgage research**:
  - Are non-pecuniary costs such as shame and social management important for mortgage default (White, 2010)?
  - We show that deviation from rational benchmarks are more difficult to identify from data than previously thought.
- **For financial stability policy**:
  - Changes the financial welfare interpretation of forbearance policies.
  - Add to the theoretical basis for liquidity based policies (e.g. forbearance).
  - Suggestive evidence of "triple trigger" default, where flow incentives (i.e., flow utility of owning versus renting) may matter as much as stock incentives (i.e., being underwater).

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