Why Do Borrowers Default on Mortgages? A New Method For Causal Attribution

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\(^1\)The views expressed are those of the presenter and not necessarily those of the Bank of England, the MPC, the FPC or PRC.
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**Life Events**

- Adverse events $\Rightarrow$ mortgage payments too high relative to income
- Default (3 missed payments) possible even with **positive home equity**
- May not be able to remortgage or to sell house in time
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- Default even if can afford to continue making mortgage payments
- 40% of defaulters could make mortgage payment without reducing consumption (Gerardi et al., 2017)
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Issues

- Difficult to measure all life events; mortgage affordability
- Policy implications on principal vs payment reduction
This Paper

- What share of mortgage defaults are *strategic*?
- Novel data linking *monthly income* with monthly mortgage servicing
- Novel method to circumvent measurement error of life events

Evidence:

\[ \text{Income path prior to default very similar for above and below water defaulters} \Rightarrow \text{Almost all below water defaults due to life events too} \]

Estimate: only 3% of defaults strategic; little variation until very high LTV

Bhutta et al. [2017]: 25%(50%) of defaults are strategic at LTV of 148%(174%)
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Assumptions

1. Above-water defaults are due to life events
2. Income is a noisy measure of life events
3. Average fall in income same for above/below water borrowers after life event

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Evaluation

- Great contribution combining novel methodology and data
- Sharp empirical results on minimal role of strategic default
- Further support for effectiveness of payment over principal reduction (Ganong and Noel, 2020)
- Doesn’t imply *ex ante* LTV regulation ineffective
  - could still limit default, loss given default, and consumption responses
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Discussion:
- Measurement error in LTV
- What is strategic default?
- Validity of theoretical assumptions
A. Measurement Error in LTV

- Regressing default on noisy measure of life event \( \Rightarrow \)
  - Attenuation bias, underestimate importance of life events
  - Overestimate role of strategic default

**This paper**: estimate income path prior to default for above/below water:

\[
\frac{Income_t}{Income_{pre}} = \lambda + \kappa I(LTV > 100) + \gamma I(t = -2, -1, 0) + \beta I(t = -2, -1, 0) I(LTV > 100) + \varepsilon
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- Noise in life event moved to LHS, but noise in LTV dummy remains:
  - Difference between estimated house prices and sale prices: s.d. \( \approx 20\%
  - This error may be higher in when markets are less liquid (Giacoletti, 2021)
  - Also difference between estimated house prices and perceived house prices

- Attenuation bias for the LTV coefficients
  - \( \Rightarrow \) **underestimate** strategic default
A. Measurement Error in LTV

- **Possible solution #1**: alternative definition of above water (in paper)
- **Possible solution #2**: restrict sample based on time since house purchase
- **Possible solution #3**: Use Instruments for
  \[
  \mathbb{I} (LTV > 100), \ \mathbb{I} (t = -2, -1, 0) \mathbb{I} (LTV > 100)
  \]

  Use second noisy measure of house prices to construct \( \widetilde{LTV} \)

  Use \( \mathbb{I} \left( \widetilde{LTV} > 100 \right), \ \mathbb{I} (t = -2, -1, 0) \mathbb{I} \left( \widetilde{LTV} > 100 \right) \) as instruments

  Assumption: measurement errors in \( \mathbb{I} (LTV > 100) \) uncorrelated
    - Example: Corelogic vs Zillow?
B. What is Strategic Default?

- **Life event** is anything which causes default when LTV ≤ 100
  - loan-modification program that incentivises default would be a “life event”

- **Strategic default** is a non-life event which causes default (when LTV > 100)
  - Relatively narrow definition compared to existing literature

- **Challenge**: no role for default decision to be based on expected LTV
  - May default on house **when in positive equity** if expect prices to fall
  - Expect negative equity by the time house could be sold
  - Default motivated by value of house, but classified as life event
  - ⇒ underestimate strategic default
C. Validity of Theoretical Assumptions

- **Assumption 2 (Conditional Exogeneity)**

\[ \{ Y(0,1), Y(1,0), Y(1,1) \} \perp T^* | G \]

- After conditioning on equity (G) no third factor that causes life event (T*) and default decision (Y)

- Hard for this to fail given broad definition of life event
  - For above water, *anything* causing default is a life event
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- **Assumption 3 (Noisy Measure of Treatment)**

\[ \{ T(0), T(1) \} \perp (T^*, Y, G) \]

- Sensitivity of income \((T)\) to life event unrelated to life event, default, home equity

- Broad definition of life event makes it easier for this assumption to fail
C. Validity of Theoretical Assumptions

Example: falling house prices leading to fall in income:

- Could cause above water borrowers to default $\Longleftrightarrow$ it’s a life event
- However, the fall in house prices *also* makes negative equity more likely
- Those with **biggest income fall** more likely to have **negative equity**
  - $\Longleftrightarrow$ failure of Assumption 3 & underestimate strategic default

Further examples: borrower characteristics, age, risk-aversion etc
Straightforward to add controls but unclear how maps to theory
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- Could cause above water borrowers to default $\implies$ it’s a life event
- However, the fall in house prices *also* makes negative equity more likely
- Those with **biggest income fall** more likely to have **negative equity**
  - $\implies$ failure of Assumption 3 & underestimate strategic default
- This is also mirrored in the regression

$$
\frac{Income_t}{Income_{pre}} = \lambda + \kappa I(LTV > 100) + \gamma I(t = -2, -1, 0) + \beta I(t = -2, -1, 0) I(LTV > 100) + \varepsilon
$$

- Ratio of current to previous house prices $\frac{HP_t}{HP_{pre}}$ will be:
  - Negatively correlated with $I(t = -2, -1, 0) I(LTV > 100)$
  - Positively correlated with $\frac{Income_t}{Income_{pre}}$
- $\implies$ underestimate $\beta$ and so **underestimate strategic default**
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**Further examples**: borrower characteristics, age, risk-aversion etc

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C. Validity of Theoretical Assumptions

**Question:** is there an extension of Proposition 1 where:

- Assumption 3 is weakened to hold conditional on further covariates $X$

$$\{ T(0), T(1) \} \perp (T^*, Y, G) | X$$

- And share of underwater defaults caused by life events conditions on $X$?

$$\alpha \equiv \frac{E(T|Y = 1, G = 1, X) - E(T|G = 1, X)}{E(T|Y = 1, G = 0, X) - E(T|G = 1, X)}$$

- If so, $X$ would then be added as controls in the regression

- Would strengthen the identification if it’s possible

- Further evidence to support Assumption 3 if extension not possible
D. Additional Questions/Clarifications

- Share of strategic default also estimated using quantile regression
  - Analogous version of Proposition 1 for conditional quantiles $Q_q(Y|G = 1)$?

- Clarification on LTV robustness exercises
  - Is the 60% alternative LTV cut-off comparing LTV above/below 60?
  - Or LTV below 60 with LTV above 100?

- How are the standard errors in the baseline regression treated?

- More details on mortgages in dataset e.g. term, whether ARM vs FRM, when originated, geographical spread
Summary

- Great paper tackling important question
- Novel data and method to produce sharp empirical estimates
- Suggest further work to ensure not underestimating strategic default
References


