

Can Time-Varying Risk Premia and Household Heterogeneity Explain Credit Cycles?

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Overview

- ▶ Motivation: three hypotheses for cause of house price boom (and subsequent bust).
 - **Subprime View:** credit expansion.
 - **Expectations View:** overoptimism.
 - **This paper:** rational reaction to fundamental risk.
- ▶ Key state variable is **credit dispersion**.
 - Difference in expected default frequency (**EDF**) between current and past year's cohort.
- ▶ Empirics: predicts real economic activity.
 - Credit dispersion 1 s.d. \uparrow implies 1pp \downarrow in regional GDP growth, 0.5pp \downarrow in regional emp. growth.
- ▶ Model: structural portfolio choice model with disaster risk.
 - Housing demand and leverage move negatively with disaster risk, generating booms and busts.
- ▶ This discussion: what is credit dispersion and how should we interpret results?

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Credit Dispersion

- ▶ Use option-pricing methodology to compute **1-year probability of default** (Merton, 1974).

$$EDF_{i,t}^{New} = \Phi \left(\frac{\log B_{i,t} - \log V_{i,t} - \mu_{i,t} + \frac{1}{2}\sigma_{i,t}^2}{\sigma_{i,t}} \right)$$

assuming borrowers default immediately once underwater.

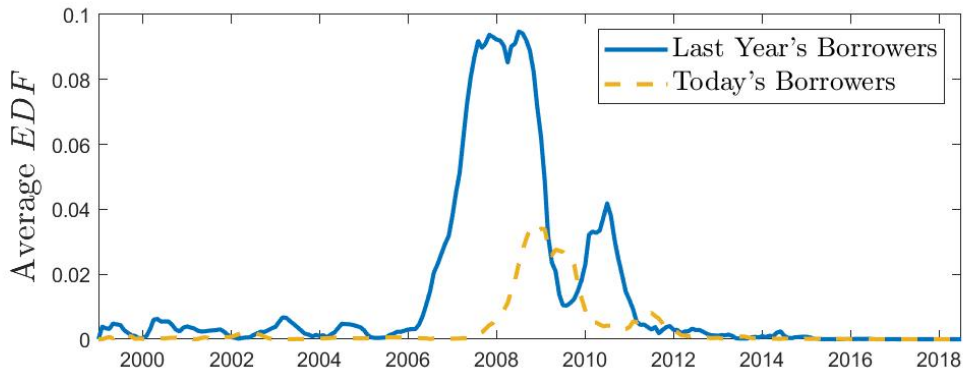
- ▶ $\mu_{i,t}$ and $\sigma_{i,t}$ are taken as rolling 12-month growth rate + GARCH estimate.
- ▶ Restrict sample to mortgages without private mortgage insurance ($B_{i,t} \leq 0.8 \cdot V_{i,t}$).
- ▶ Credit dispersion is difference between *EDF* for current borrowers at time t and *EDF* for lagged cohort of borrowers (“repayers”) at time t :

$$EDF_{i,t}^{Repayers} = \Phi \left(\frac{\log B_{i,t-1} - \log V_{i,t-1} - 2\mu_{i,t} + \frac{1}{2}\sigma_{i,t}^2}{\sigma_{i,t}} \right)$$

Credit Dispersion

- ▶ Average EDFs of both current and previous cohort have substantial variation, but mostly from lagged cohort (“Repayers”).

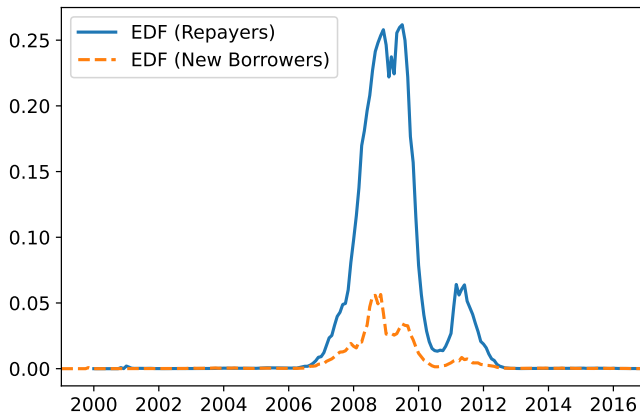
Panel A: Average EDFs across all MSAs



Source: Fannie Mae

Decomposing Credit Dispersion

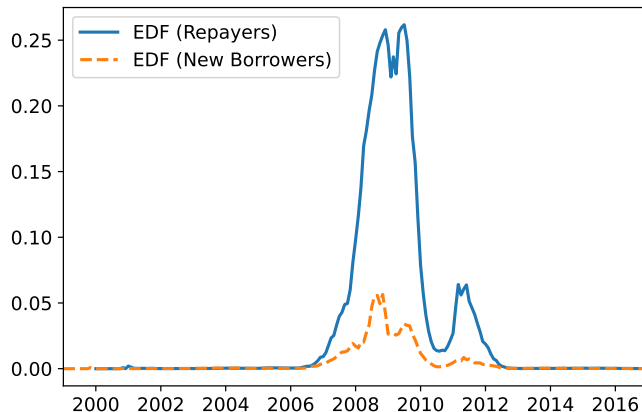
- ▶ I reproduced this figure using a few shortcuts (only Fannie Mae loans, use rolling 12-month st. dev. instead of GARCH, aggregate at ZIP-3 level).



Source: Fannie Mae

Decomposing Credit Dispersion

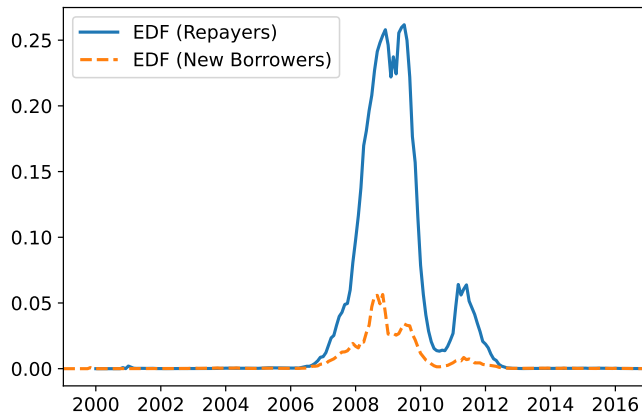
- ▶ Some quantitative differences (unsurprisingly) but matches overall pattern.
- ▶ Focus on EDF (Repayers) which drives most of the variation



Source: Fannie Mae

Decomposing Credit Dispersion

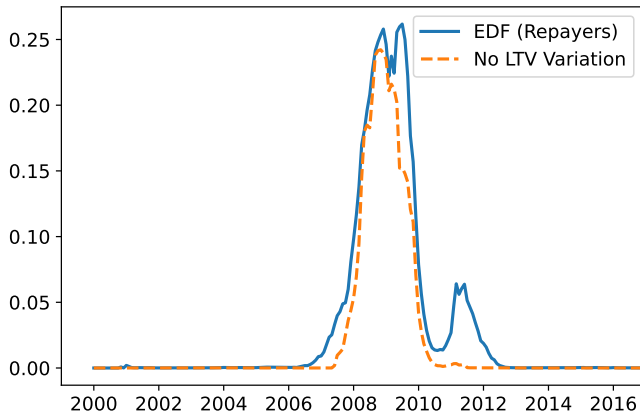
- ▶ Question: what drives variation in EDF (Repayers)?
- ▶ Three candidates: (1) Initial LTV ($B_{i,t}/V_{i,t}$), (2) $\sigma_{i,t}$, (3) $\mu_{i,t}$



Source: Fannie Mae

Decomposing Credit Dispersion

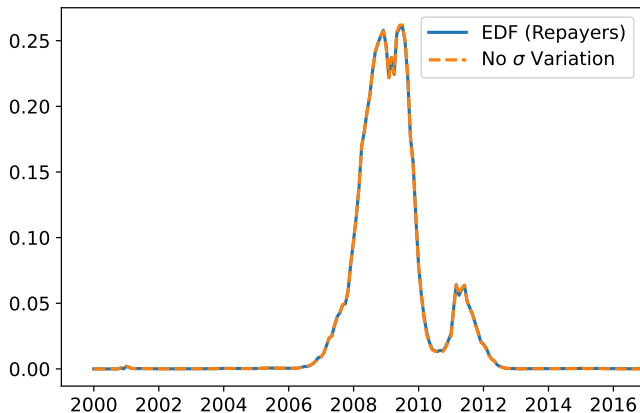
- ▶ Break down sources of variation in EDF: (1) Initial LTV ($B_{i,t}/V_{i,t}$), (2) $\sigma_{i,t}$, (3) $\mu_{i,t}$.
- ▶ Giving all borrowers median LTV (71%) makes little difference.



Source: Fannie Mae

Decomposing Credit Dispersion

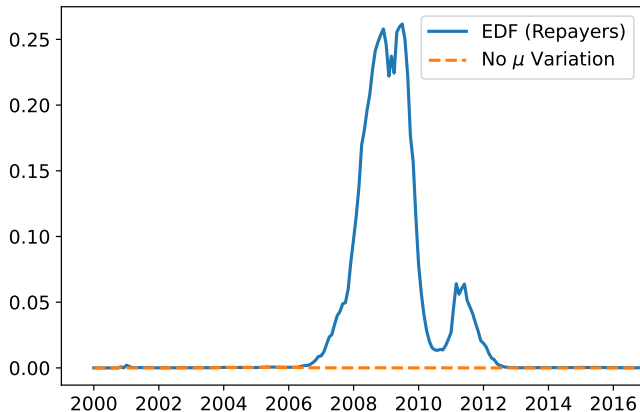
- ▶ Break down sources of variation in EDF: (1) Initial LTV ($B_{i,t}/V_{i,t}$), (2) $\sigma_{i,t}$, (3) $\mu_{i,t}$.
- ▶ Neither does replacing $\sigma_{i,t}$ with its average over entire sample.



Source: Fannie Mae

Decomposing Credit Dispersion

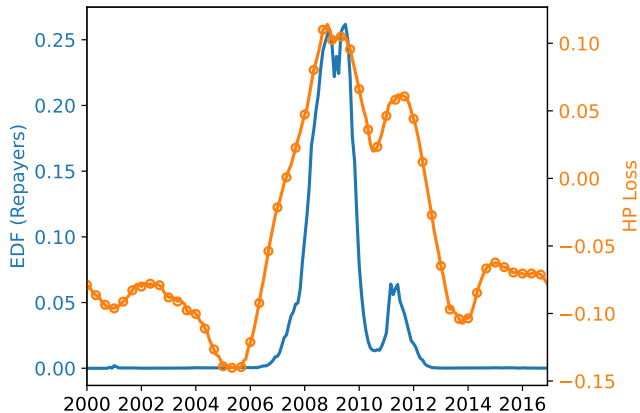
- ▶ Break down sources of variation in EDF: (1) Initial LTV ($B_{i,t}/V_{i,t}$), (2) $\sigma_{i,t}$, (3) $\mu_{i,t}$.
- ▶ Instead, completely driven by changes in 12-month HP growth $\mu_{i,t}$.



Source: Fannie Mae

Decomposing Credit Dispersion

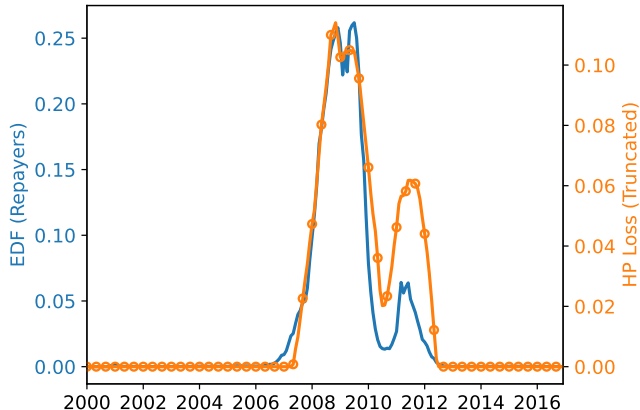
- ▶ EDF somewhat but not completely correlated with raw HP growth (signed as loss below).
- ▶ Due to nonlinear transformation imposed (i.e., normal CDF).



Source: Fannie Mae

Decomposing Credit Dispersion

- ▶ But very well explained by house price losses truncated at zero.



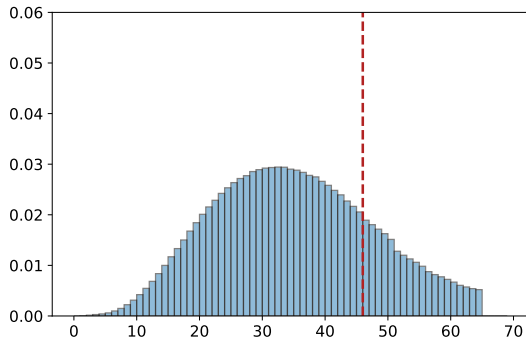
Source: Fannie Mae

Evaluation

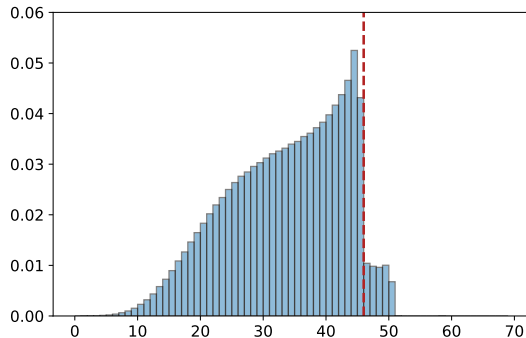
- ▶ Given previous, I reinterpret empirical results as:
 - Higher credit dispersion **house price losses** \implies lower economic activity.
 - Makes sense, especially given existing research (e.g., Mian, Rao, Sufi 2013).
 - But how does it connect to three hypotheses/push the literature forward?
- ▶ Author argues that this pushes against “subprime” view, since these were prime borrowers.
 - Again, this seems right, prime borrowers also at high risk (Adelino, Schoar, Severino, 2016).
 - But the strict “subprime” story is a subset of a broader “credit” story.
 - Greenwald (2018): major expansion of PTI limits (including to prime) key credit change.

Credit Standards

- ▶ Example: PTI distribution for purchase or cash-out mortgages **without PMI** for boom period (2000 - 2007) and post-bust period (2014 - 2016).



(a) PTI Ratios: Boom (2000 - 2007)

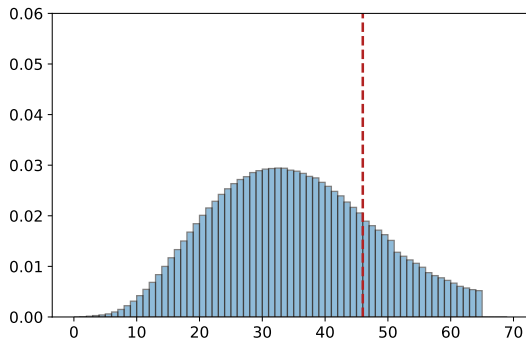


(b) PTI Ratios: Post-Bust (2014 - 2016)

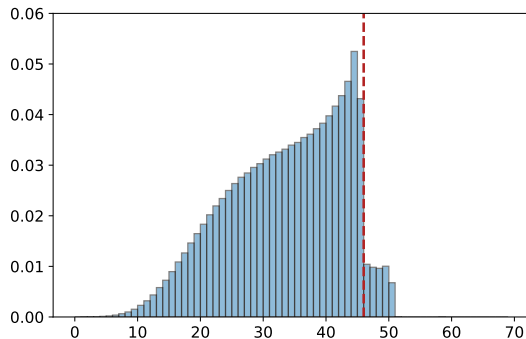
Source: Fannie Mae

Credit Standards

- ▶ Boom-period loans may have been very risky in a broader sense (affordability) even though LTVs were not very high.



(a) PTI Ratios: Boom (2000 - 2007)



(b) PTI Ratios: Post-Bust (2014 - 2016)

Source: Fannie Mae

Evaluation

- ▶ Similarly, would be good to create more daylight between author's results and "expectations" story.
 - Author's model is able to generate a lot of action rationally using TV disaster risk.
 - But very difficult to distinguish risk preferences/exposures and changes in expectations from prices alone, since they affect risk-neutral probs the same way. Needs more discipline.
 - Not clear whether credit dispersion measure, essentially based on an extrapolative model of house price growth, is an example of rational or irrational expectation generation.
- ▶ My recommendation: link expected default rates more rigorously to the data.
 - Ad-hoc HP growth forecast, 1-year default horizon could be improved.
 - Need to take non-strategic default more seriously (Ganong and Noel 2020, Low 2022).
 - Better to tie into actual performance of loans (available in GSE data, e.g., Hurst et al 2016).

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Conclusion

- ▶ Building blocks for a great paper:
 - Looking carefully at default probabilities as a key state variable.
 - Distinguishing competing hypotheses: credit vs. overoptimism vs. rational risk management.
- ▶ My suggestion for next steps: sharpen results to distinguish hypotheses.
 - Credit dispersion mostly picks up house price losses, seemingly could act through any channel.
 - Would be good to consider/control for broader versions of credit story.
 - Some tricky issues with “rationality” when forecasting default rates (extrapolative expectations).