SURF Spotlight: Collateral Valuation and Mortgage Default Risk[1]
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Over the past decade, public policy and business practices in residential collateral valuation have changed significantly. To address concerns that overvaluations may have contributed to the foreclosure crisis of 2007 through 2011, policymakers prioritized increasing appraiser independence to lessen the influence mortgage originators may exercise to pressure appraisers to report upwardly biased valuations. For example, the 2009 Home Valuation Code of Conduct and 2010 Interagency Appraisal and Evaluation Guidelines established expectations for appraisals that are independent from the mortgage underwriting work overseen by a loan officer.

After these policy changes, the use of appraisal management companies (AMCs) has become commonplace (Ding and Nakamura, 2016). AMCs serve as intermediaries that farm out appraisal work to independent appraisers, thus providing a buffer between lenders and appraisers. However, they can also increase the overall cost of appraisals or, at a minimum, cut into the fees that appraisers receive.

More recently, attention has shifted to reducing the burden of current appraisal rules and practices. Appraisals are expensive ($300 to $900 each), with costs generally falling on the mortgage borrowers. The number of licensed appraisers has fallen, and in rural areas, shortages of appraisers are said to be causing challenges for borrowers, including closing delays (Pardo 2018, CSBS 2018).

In November 2018, the Federal Deposit Insurance Corporation (FDIC), the Board of Governors of the Federal Reserve System, and the Office of the Comptroller of the Currency (OCC) jointly issued a notice of proposed rulemaking (NPR) announcing regulators' intentions to increase the threshold for residential mortgages requiring an appraisal from $250,000 to $400,000. The threshold has not been increased since 1994.[2] The NPR included an estimate that an additional 214,000 residential real estate originations in 2017 (3% of Home Mortgage Disclosure Act originations) would have been exempt from appraisal requirements by raising the threshold.[3]

The NPR explicitly acknowledges that appraisals continue to play a fundamental role in mitigating risk to lenders and helping borrowers avoid overpayment. The framework of the NPR reflects the agencies' attempt to balance the benefits of appraisals with the costs.

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[2] Regulators point out in the NPR that, after adjusting the threshold for inflation, its level would be between $424,000 and $641,000 in 2018 (*Federal Register*, 2018, pp. 63116–63117).

[3] The NPR did not apply to loans sold to Fannie Mae, Freddie Mac, or Ginnie Mae.

Regulatory agencies are not the only ones that have been looking to reassess and refine their approach to collateral valuation. Technological advances in data collection and modeling have made automated valuation models and other appraisal alternatives more attractive to lenders and the government-sponsored enterprises (GSEs), Fannie Mae and Freddie Mac. Beginning in December 2016, Fannie Mae began offering appraisal waivers for some mortgages, broadening its program over time. Freddie Mac has since started a similar program, with both of the GSEs programs having been approved by the Federal Housing Finance Agency (FHFA).[4]

The future evolution of policy and practice in the area of collateral valuation depends on understanding the effectiveness of current practices and their impact on measurement and pricing of default risk. Of particular interest is the extent to which bias or inefficiencies in appraisals entail less accurate measurement and less efficient pricing of mortgage default risk. In this SURF Spotlight, we highlight two recently released working papers that advance our understanding of these issues.

"House Price Markups and Mortgage Defaults" by Paul Carrillo, William Doerner, and William Larson

In the latest version of a working paper released in January 2019, researchers at the FHFA and George Washington University (GWU) identify residential properties priced or appraised at a markup. They evaluate how these markups, including those associated with appraisal bias, affect the probability of default of the associated mortgage and the loss to the lender in the event of default.

The authors use a nationwide data set containing mortgage performance data for 40 million conventional, conforming loans originated in 2001 through 2012 and sold to Fannie Mae or Freddie Mac. The loans are matched to property-level sale transactions and zip code-level house price indices. The majority of the analysis focuses on home purchase transactions, for which markups are measured in two ways. The first method calculates the markup as the difference between the sale price at time $t+1$ and a forecast value, which is the price at time t adjusted forward using a zip code-level house price index. The second method calculates the markup as the difference between the forecast value and an appraisal at time $t+1$ (appraisal-based markup).[5]

The study documents that positive markups in the sale price relative to the forecast value are associated with higher probability of default of the mortgage, highlighting the relevance of accurate collateral valuation. The authors estimate that default rates were 3.4% for properties sold at a +20% markup compared with 1.9% for properties sold at a -20% markup.

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[4] For a thorough description of these programs, see FHFA Office of the Inspector General (2018).

[5] The critical assumption of both methods is that the house price growth trajectory between t and $t+1$ in the zip code is good approximation for change in the subject property's own value. The authors acknowledge that their markup measures are inherently noisy, but they argue that the measures should be unbiased estimates of overpayment.

Appraisals that match the sale price are remarkably frequent; in nearly half of the observations in the data set, the sale price is within 0.5% of the appraisal, consistent with the findings from several previous studies comparing appraised values with sale prices (Ding and Nakamura 2016; Eriksen, Fout, Palim, and Rosenblatt, 2018; and Calem, Lambie-Hanson, Nakamura, and Kenney, 2018). For observations in which the appraisal is nearly identical to the transaction price, appraisal-based, positive markups are associated with an increased likelihood of default, conditional on the recorded loan-to-value (LTV) ratio. For observations in which the appraisal and sale price diverge, appraisal-based markups exhibit little relationship to the conditional likelihood of default. Altogether, this evidence indicates that appraisals tend to be upward biased, with consequences for default risk measurement.

The authors also provide interesting results for refinances, although those are based solely on the appraisal-based markup measure. The authors find that markups for refinance mortgages tend to be larger and that these markups are even more strongly correlated with increased default risk.

The paper also touches on how markups are related to ultimate dollar losses. Focusing on mortgages originated in 2006–2007 that subsequently experienced foreclosure liquidation, they find that about one-sixth of the amount of the markup is ultimately borne as credit loss for loans that had no mortgage insurance.[6] The authors do not opine on why such a small share of the markup is ultimately transmitted to the lender, but such information would give readers a better understanding of the implications for loss given default, an area that has received much less academic attention than the probability of default.

Sorting into markup values (e.g., overpaying for a house) may be endogenous with default risk, as the authors acknowledge. As a result, it is not appropriate to interpret the authors' results causally. Although the authors are agnostic about the causes of the markups, the data may provide some clues. In particular, understanding the characteristics of the subject and anchor transactions, such as the financing type used or the amount of time the property spent on the market, could help reduce noise in the markup estimates, mitigate endogeneity issues, and help readers assess what policy actions, if any, ought to be taken to address markups in residential real estate valuations.

<u>"Appraising Home Purchase Appraisals" by Paul S. Calem, Lauren Lambie-Hanson, Leonard I. Nakamura, and Jeanna H. Kenney</u>

The second work we feature is a recent working paper from authors at the Federal Reserve Bank of Philadelphia. This paper explores the tendency of appraised values to confirm home purchase contract prices and discusses the consequences of the resulting "information loss" for default risk measurement. The study includes a theoretical model of appraiser behavior along with a detailed empirical investigation.

The theoretical model represents the appraiser as internalizing a key trade-off that the lender faces when a property's value appears less than the price agreed upon by the buyer and

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[6] Mortgages with MI naturally have lower transmission of markups to lenders in the form of losses conditional on default. See Table 5 of this paper. Transmission is closer to one-seventh to one-eighth of the markup amount.

seller. If the appraisal is reported below the contract price, the transaction may fail, and the lender would lose the opportunity to originate the loan. However, a biased appraisal (upward-adjusted toward the contract price) results in lost information about the appraiser's true opinion of the value of the home, and it implies that the collateral risk is greater than indicated by the calculated LTV ratio.

Specifically, an appraised value below the contract price may threaten the transaction because the denominator of the LTV ratio for a mortgage is calculated as the lesser of the appraised value and the transaction price. Thus, an appraisal that is below the contract price requires that the buyer would need to provide a greater down payment or renegotiate with the seller to secure a lower price to restore the LTV associated with the original mortgage application.

The authors explain that when borrowers locate at LTV "notches" (most importantly, 80%, 85%, 90%, and 95%) when applying for a mortgage, a negative appraisal is particularly threatening to the transaction. This is because mortgage insurance costs increase in a step function above each of these notches, as shown in Figure 1.

Although the theoretical model in the paper is useful for showing how appraisers may respond differently at notch and nonnotch LTVs, the authors point out that the minimum value rule for calculating LTV is likely not the only driver of appraisal bias. Additional institutional and regulatory requirements around appraisals are outside the scope of the model.

Figure 1. Monthly Mortgage Insurance Premium Costs by LTV for a Borrower Purchasing a $200,000 Home
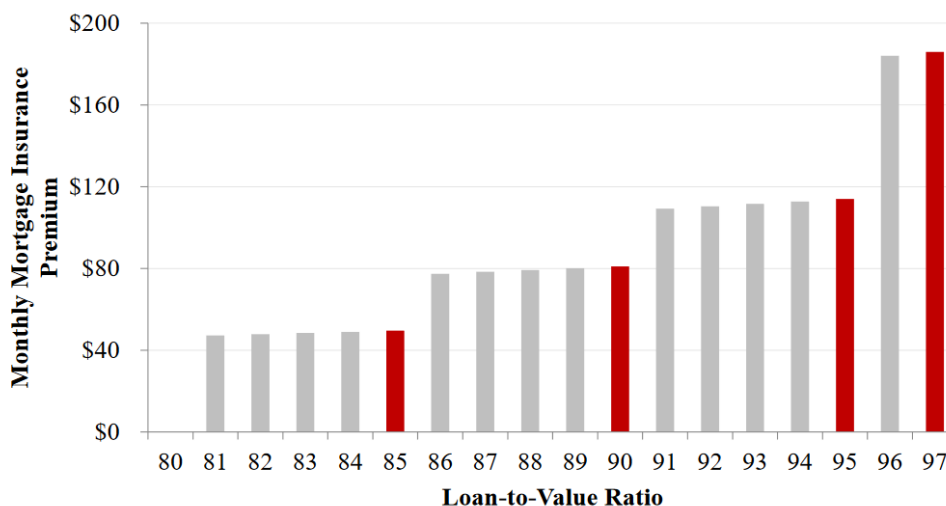
Source: Authors' tabulations of data from Goodmortgage.com's PMI Calculator for mortgage insurance payments required if the purchase price is $200,000. Calculations assume the borrower has a FICO score of 720 or higher. Data retrieved on December 18, 2016.

Source of Figure: Calem, Lambie-Hanson, Nakamura, and Kenney (2018)

In the empirical analysis, the authors analyze data on home purchase mortgages from one of the two GSEs. There are four main findings.

First, in a sample of 1.3 million mortgage applications made in 2013–2015, 30% of appraisals were reported at values *precisely identical* to the contract price, as shown in Figure 2.

Although this finding is consistent with prior literature, this paper innovates by pointing out that these "identical appraisal" instances are more common at LTV notches than just above or below notches. Second, in a sample of 900,000 mortgages originated 2003–2009, defaults are more common at LTV notches, which the authors argue is mostly driven by borrowers at LTV notches being more financially constrained.

Third, conditional on the recorded LTV, loans were much more likely to have defaulted if the appraisal was reported identical to the contract price. This is consistent with findings by Carrillo, Doerner, and Larson (2019) that loans with upward-biased appraisals are more likely to default. Finally, ratios of automated valuation model (AVM) estimates to contract prices are more predictive of mortgage default than ratios of appraisals to contract prices, implying that AVMs appear to provide more accurate measurement of collateral risk for this sample of mortgages.

Figure 2. Distribution of Appraised Values Relative to Contract Price, 2013–2015 First-Lien Mortgage Applications
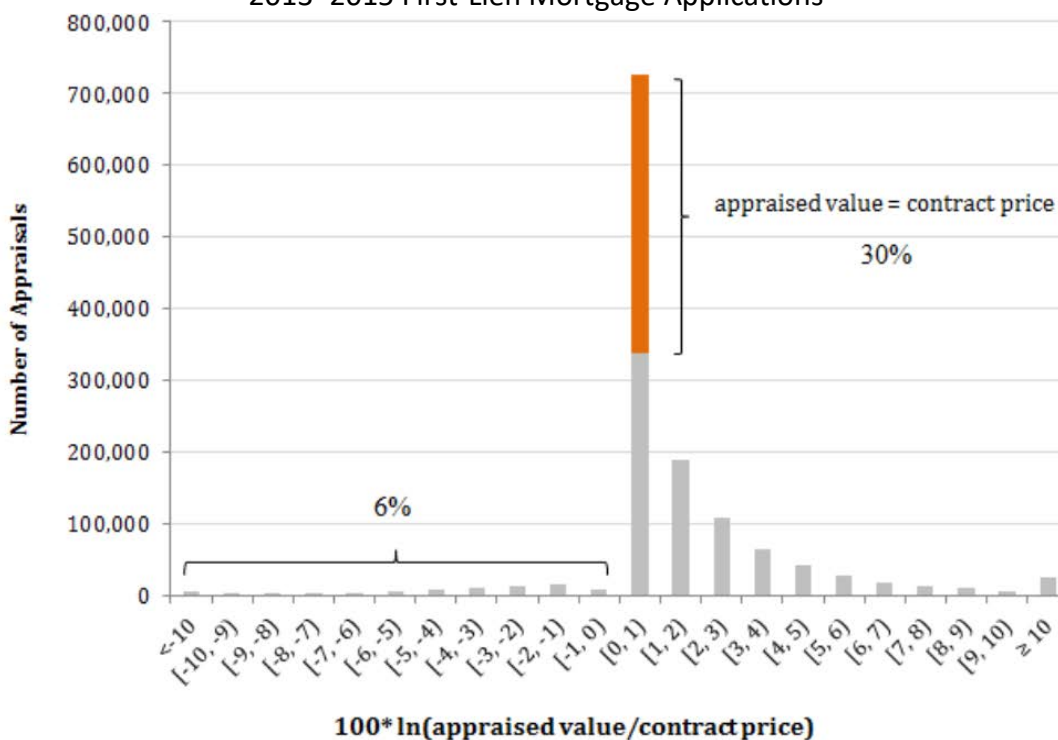
Source of Figure: Calem, Lambie-Hanson, Nakamura, and Kenney (2018)

One limitation of this study is that it is restricted to GSE purchase mortgages. A second limitation is that the sample for the default analysis is limited to mortgages that were successfully originated in 2003–2009, which the authors acknowledge causes a selection issue. Specifically, they only observe applications that result in an origination, and it is conceivable that borrowers who had a negative appraisal and yet still appear in the data may be different from the group that had a negative appraisal and subsequently exited. As a result of these limitations, it is not possible for the paper to determine the overall contribution of appraisals in helping predict defaults.

Conclusion

Lenders and policymakers are grappling with the changing landscape of residential mortgage collateral valuation in light of postcrisis reforms and more recent efforts to relax regulatory burdens. Technological advances offer new possibilities, from AVM-based estimation to property site visits conducted by drones.

The two studies spotlighted here suggest a persistent tendency for upward bias and information loss in appraised values that continues to challenge the accuracy of default risk measurement for residential mortgages. Information loss in appraisals makes it more difficult to quantify and efficiently price mortgage default risk. Consequences may extend beyond the immediately impacted mortgage transaction, to potential, subsequent consumers of appraisal data, who use the data to evaluate lending decisions, property valuations, and default risk.

Both studies find that substantial upward deviations of the transaction price from model-based predictions increase default probabilities. Thus, both studies suggest benefits from the use of statistical models or automated valuation approaches. For example, the FHFA and GWU study notes that "individual borrowers, mortgage underwriters, and others assessing the risks of a loan or portfolio of loans may be able to reduce their risk exposure" by considering the statistically predicted values.

The Philadelphia Fed study suggests that the tendency to report a biased appraised value is not inherent to the appraisal process but reflects incentives arising from the minimum value rule for calculating the LTV. Thus, the analysis suggests looking beyond the appraisal process to the regulatory or institutional policies that govern mortgage origination. For instance, it may be preferable to set property value equal to contract price when calculating the LTV, with the appraisal reported as an additional characteristic of property considered in underwriting. Alternatively, appraisers might be directed to report appraisals as a range of values, with the lender free to select a particular value within that range.

Despite growing demand for automation and efficiency gains, the general consensus in the industry seems to be that having an independent professional visit a property in person and offer an objective assessment is valuable to both borrower and lender. In particular, properties that have unique features or that are located in thinly traded markets may have high variances in AVM-generated estimates, requiring a higher-touch, human assessment of value. Overall, although technological advances could provide faster and less expensive collateral valuations, engaging well-trained human appraisers will be important for these hard-to-value properties for the foreseeable future.

References

CSBS (2018). "Current Appraiser Shortages in Rural Communities," available at https://www.csbs.org/current-appraiser-shortages-rural-communities.

Calem, Paul S., Lauren Lambie-Hanson, Leonard I. Nakamura, and Jeanna H. Kenney (2018). "Appraising Home Purchase Appraisals," Federal Reserve Bank of Philadelphia Working Paper 18-28, available at https://philadelphiafed.org/-/media/research-and-data/publications/working-papers/2018/wp18-28.pdf.

Carrillo, Paul E., William M. Doerner, and William D. Larson (2019). "House Price Markups and Mortgage Default," FHFA Staff Working Paper 18-02 (revised January 2019), available at https://www.fhfa.gov/PolicyProgramsResearch/Research/PaperDocuments/wp1802.pdf.

Ding, Lei and Leonard Nakamura (2016). "The Impact of the Home Valuation Code of Conduct on Appraisal and Mortgage Outcomes," *Real Estate Economics*, 44(3): 658–690.

Eriksen, Michael D., Hamilton B. Fout, Mark Palim, and Eric Rosenblatt (2018). "The Influence of Contract Prices and Relationships on Collateral Valuation," University of Cincinnati Lindner College of Business Research Paper, available at https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3216648.

Federal Housing Finance Agency Office of the Inspector General (2018). "An Overview of Enterprise Appraisal Waivers," White Paper 2018-006, available at https://www.fhfaoig.gov/Content/Files/WPR-2018-006.pdf.

Federal Register (2018). "Proposed Rule: Real Estate Appraisals," 7 December 2018, 83(235): 63110–63127.

Pardo, Sheryl (2017). "Slow and Inefficient Appraisal System Gives Advantage to Cash Buyers," Urban Wire blog, available at https://www.urban.org/urban-wire/slow-and-inefficient-appraisal-system-gives-advantage-cash-buyers.