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Lowering Credit Risk: The Case for ACE


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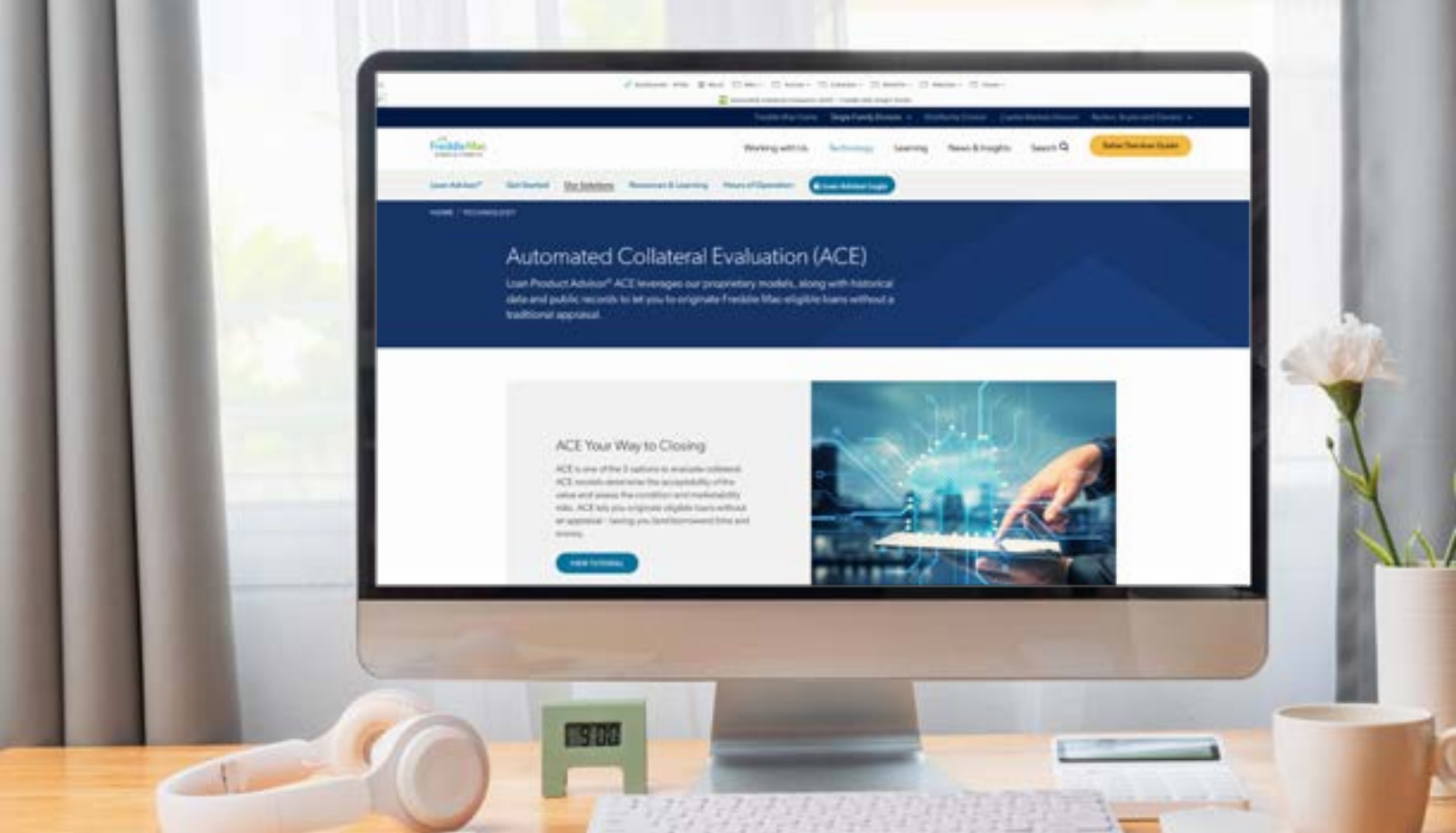
Introduction

This Research Note explores the credit risk impact of an alternative method for assessing home values in the mortgage origination that waives the traditional appraisal process. It is important to understand the credit risk impacts of using alternatives to traditional appraisals as their use has been on the rise, particularly during the COVID-19 pandemic. The paper specifically focuses on the credit risk impacts of Freddie Mac's Automated Collateral Evaluation (ACE) program, which waives the appraisal requirement for eligible mortgages. The study finds that loans originated through the ACE program have a lower default rate compared to similar loans originated with an appraisal. Other benefits of the ACE program include cost savings on appraisals for borrowers and reduced credit losses for Freddie Mac, investors, and mortgage insurers. The results of this study are specific to the ACE decision logic for granting collateral waivers.

To finance a home purchase or refinance an existing mortgage in the U.S. housing market, a certified licensed appraiser typically performs an assessment of the home's value. Alternative methods of certifying value have grown in importance in recent years due to the high volume of loans originated using them, and their significance has been further amplified by the COVID-19 pandemic. During the pandemic, appraisal alternatives based on Automated Valuation Models (AVMs) have helped overcome obstacles such as hesitancy to allow in-person home appraisals and appraisal delays resulting from the large mortgage refinance volume due to historically low mortgage interest rates. This Research Note analyzes the credit risk implications of appraisal waivers that leverage AVMs valuations in the mortgage origination process for home loans funded by Freddie Mac. It also performs the analysis separately for loans originated before and after the COVID-19 pandemic.

Key Findings

- This analysis shows that loans originated through Freddie Mac's ACE program have about an 8.9% lower delinquency rate relative to otherwise similar loans originated with appraisals when no adjustment is made for COVID-19 forbearances.
 - When COVID-19 forbearance delinquencies are excluded, ACE loans have a 13.9% lower delinquency rates relative to otherwise similar loans originated with appraisals.
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Freddie Mac introduced the ACE program in June 2017, allowing mortgage originators to waive the appraisal requirement for eligible mortgages. Under this program, the originator submits a loan with a specified value estimate (in the case of refinances) or the sales contract price (for purchase transactions), which ACE evaluates using proprietary models that consider data from Multiple Listing Services (MLS), public records, and historical data among other factors. If the loan application meets the criteria for an appraisal waiver and the originator chooses to accept it, the borrower does not need to obtain an appraisal. Moreover, when a mortgage is originated with an ACE appraisal waiver, the originator is no longer responsible for representations and warranties related to the property's value, condition, and marketability. In Q3 2020, nearly 40% of all mortgages funded by Freddie Mac were originated with appraisal waivers through the ACE program, underscoring the importance of evaluating the relative risk of these loans. In the most recent quarter in our data, 2023Q2, this share has dropped to 8.4%.

We utilized internal Freddie Mac data on mortgages for 1-unit single family properties to create a logistic model that compares the default probability of an ACE loan to that of a loan originated with an appraisal, while controlling for loan and borrower characteristics. Our findings indicate that if delinquencies related to COVID-19 forbearance are ignored, all else being equal, ACE loans have a 13.9% lower default rate compared to similar loans that require an appraisal. If no adjustment for COVID forbearance delinquencies is made, ACE loans have about an 8.9% lower delinquency rate.¹

The purpose of this Research Note is to provide a clearer understanding of how appraisal waivers based on estimated home values can be effectively utilized in the loan origination process to reduce default rates. The benefits of lower default rates include credit savings for Freddie Mac, investors in credit risk transfer vehicles, and mortgage insurers. Beyond the benefits of credit savings, the Freddie Mac's ACE program has also resulted in about \$1.63 billion in borrower savings from waived appraisal fees. Furthermore, lenders benefit from faster loan closure, while realtor and broker originators can enjoy a more efficient loan origination process. It should be noted that these findings are specific to Freddie Mac's ACE program's decision-making process regarding appraisal waivers.

¹ There is a potential for selection bias in this analysis as loans that meet the ACE's credit eligibility requirements are evaluated and selected into the program based on additional unpublished criteria. To control for selection an instrumental variable (IV) estimation using the existence of a property forecast at origination as the instrument was implemented and the resulting estimate of the ACE effect is lower by 63% (57% when COVID forbearance delinquencies are removed) than the ordinary least squares (OLS) estimate. However, the imprecision of the IV estimates is such that it is not statistically different from zero or the OLS estimate.



RELATED LITERATURE

There is a significant body of research that highlights shortcomings in traditional home appraisals. One strand of this research has shown that appraisals tend to be biased upward. Cho and Megbolugbe's (1996) study, for example, argues that a home's sales price is a reasonable benchmark for valuation, and they find that over 65% of appraised values for home purchases were higher than the purchase prices. Further research during the housing boom has confirmed this appraisal bias.² Griffin and Maturana (2016) found that 44.9% of nonagency securitized mortgages had appraisals that were over 5% higher than a model-based estimate, and that these loans were 34% more likely to become delinquent than loans without apparent appraisal overvaluation. Agarwal, Ben-David, and Yao (2015) used repeat sales to identify appraisal bias in conforming mortgages, and they found that appraisal overvaluation was predictive of subsequent default. Additionally, LaCour-Little and Malpezzi (2003) found that decreasing appraisal quality is associated with an increase in the hazard rate of mortgage default.

Numerous studies have investigated moral hazard in the appraisal valuation process, in which appraisers may have a vested interest in confirming contract prices or inflating valuations to support refinances. Agarwal, Song, and Yao (2017) report a negative correlation between below-contract appraisals and the appraiser's future business volume from the same lender. Conklin et al. (2020) found that appraisal targeting increases with appraiser competition. Eriksen et al. (2020) also found evidence of appraisal targeting and anchoring, with appraisers who were aware of the contract price being more likely to reach an appraised value at least equal to that price. Additionally, Conklin et al. (2020) found that appraisals of purchases of homes originated by New Century Financial Corporation clustered at or above purchase prices, while Cho and Megbolugbe (1996) and Calem et al. (2020) found similar evidence of purchase price appraisal targeting in other samples. Finally, Ding and Nakamura (2016) and Agarwal, Ambrose, and Yao (2020) show that the Home Valuation Code of Conduct (HVCC) introduced in 2009 has led to some improvements in appraisal quality, specifically reducing overvaluation bias.

There have been recent papers that have documented the increased usage of appraisal waivers during the COVID-19 pandemic. Bosshardt, Doerner, and Xu (2022) find that appraisal waivers are more prevalent for refinance loans and are associated with higher conditional prepayment rates during 2020 but to a lesser extent in 2021 as refinancing activity slowed down. Karamon and McManus (2022) examine the Freddie Mac's ACE program and find that loans originated with appraisal waivers have a lower default risk in comparison to otherwise similar loans originated with appraisals.

In addition, several studies have investigated whether model-based property value estimates outperform appraisal valuations in predicting credit risk. LaCour-Little and Malpezzi (2003) demonstrate that a residual measure derived from a hedonic model of appraisal values on property characteristics is positively and significantly associated with mortgage default risk. Agarwal, Ben-David, and Yao (2015) use model-generated valuation estimates to calculate an appraisal bias-corrected loan-to-value ratio that provides additional information on default likelihood. Kelly (2007) finds that model-based estimates predict both claims and delinquencies, while appraisal ratios only predict claims.³ In a more recent study, Calem et al. (2020) suggest that appraisals are less informative than model-based valuations for measuring default risk. Bogin and Shui (2020) propose an alternative measure of LTV based on AVM estimates that explains an additional 0.30% of future delinquencies.

2 See Calem, Lambie-Hanson, and Nakamura (2015); Piskorski, Seru, and Witkin (2015); Shi and Zhang (2015); Ding and Nakamura (2016); Eriksen et al. (2019); Conklin et al. (2020); and Kruger and Maturana (2021).

3 "Claims" refers to mortgage claims that lenders file with FHA for loans that terminate in losses. HUD pays a claim to the lender equal to the difference between the fair market sales price and the outstanding indebtedness, approved costs, and debenture interest.



DATA

This study utilizes internal Freddie Mac data on loans originated between May 2017 and June 2023. The estimation sample ends in June 2023 to ensure at least six months of performance for the most recent originations. To maintain consistency, ACE-ineligible properties such as investor properties, 2- to 4-unit properties, manufactured homes, and leasehold estates are excluded. The dependent variable in this analysis is an indicator variable that captures whether a loan becomes 90 days delinquent or worse (D90+), including loans that are more than 90 days delinquent and enter foreclosure or are resolved through third-party or short sale from origination through December 2023. To address the large volume of mortgages that became D90+ through Freddie Mac's COVID-19 forbearance offering, a D90+ variable that treats a loan that enters D90+ status while in forbearance as non-delinquent is also calculated.

The independent variable of interest is an ACE indicator that takes on a value of 1 if a loan is originated with an ACE waiver. Other control variables used in the analysis include loan-to-value ratio (LTV) at origination, borrower(s)' FICO score(s) at origination, unpaid principal balance (UPB) at origination, debt-to-income ratio (DTI) at origination, loan purpose, loan product, occupancy status, number of borrowers, property type, third-party origination (TPO). Fixed effects for the loan origination quarter and the state are also included.

To account for their potential non-linear relationship with the dependent variable, we categorized the following continuous variables: LTV, FICO, UPB, and DTI, with reference categories specified as LTV (75-80), FICO score (740-780), UPB (\$175,000-\$225,000), DTI (30-35). The analysis also includes fixed effects for the loan origination quarter and the state.

We divide loans into two subgroups: "ACE," which represents loans that were originated without an appraisal due to receiving ACE waivers and "Eligible Non-ACE," which comprises those loans that met the ACE program eligibility requirements but were not offered waivers by the ACE decision logic or were offered waivers but originated with an appraisal.⁴

The ACE eligibility criteria changed over the sample period. From the second quarter of 2017 through July 15, 2018, loans that met the following requirements were eligible for an ACE waiver evaluation: Total loan-to-value (TLTV) less than or equal to 80%, loans that are purchase or non-cash-out refinance, and are backed by 1-unit, owner-occupied or second homes, and single-family and planned unit development (PUD) properties. The eligibility criteria for ACE further expanded over time: Condominium properties were added to the eligibility criteria from July 16, 2018, through March 28, 2020, while cash-out refinances with specific TLTV \leq 70% for owner-occupied and TLTV \leq 60% for second homes, and non-cash-out refinances with TLTV \leq 90% became eligible starting on March 29, 2020. In this analysis, the ACE loans without appraisals are the "treated" group, and the eligible non-ACE loans are used as the "control" population.

4 This classification sharpens the categorization in Karamon and McManus (2022) by using internal Freddie Mac data. To be eligible for ACE, loans must also be submitted through Freddie Mac's Loan Product Advisor® (LPA) and delivered to Loan Selling Advisor® (LSA). Furthermore, they must be in an LPA "accept" risk class. Some loans classified as "Eligible Non-ACE" in this earlier analysis may be ineligible for the program because the public Single-Family Loan-Level Data used in that analysis do not identify whether loans are in an LPA "accept" class and delivered through LSA. A summary of eligibility criteria can be found at <https://sf.freddiemac.com/tools-learning/loan-advisor/our-solutions/ace-eligibility-table>. For a complete list of eligibility requirements, see Freddie Mac's Seller Servicer guide: <https://sf.freddiemac.com/tools-learning/sellerservicer-guide/overview>.





Summary Statistics

Exhibit 1 presents summary statistics for a sample of 5,540,307 loans, consisting of 3,261,955 ACE-originated loans and 2,278,352 loans that met ACE program eligibility requirements but were originated with an appraisal. Loans originated with an ACE waiver exhibit better credit profiles than the “Eligible Non-ACE” population, with lower average LTVs (64.2 vs. 64.9), higher average FICO scores (756 vs. 751), lower average note rates (3.1% vs. 3.6%), and lower average DTI ratios (33.1 vs. 34.4). The average origination UPB for ACE loans is \$287,436, which is higher than the average UPB of the eligible group at \$274,056. It is noteworthy that 87% of ACE loans are refinances, while only 55% of the eligible non-ACE loans are refinances. In addition, ACE loans are almost twice as likely to be originated through a broker (16%) as “Eligible Non-ACE” loans (9%). ACE loans have lower cumulative average empirical default rates (1.09% for D90+ and 0.55% for D90+ with COVID-19 forbearance related delinquencies removed) compared to the control population (1.66% and 0.86%, respectively).

EXHIBIT 1:

Summary Statistics

Variable	ACE		Eligible Non-ACE	
	Mean	Standard Deviation	Mean	Standard Deviation
LTV	64.2	14	64.9	17
FICO	756	45	751	48
UPB (\$)	287,436	130,682	274,056	157,536
Note Rate	3.1%	0.7%	3.6%	1.1%
DTI	33.1	10.0	34.4	10.3
Refinance	87%	33%	55%	50%
Single Family	64%	48%	64%	48%
Condos	7%	25%	9%	28%
30-Fixed Mortgages	70%	46%	75%	43%
Second Homes	3%	16%	7%	25%
One Borrower	52%	50%	51%	50%
Broker	16%	37%	9%	29%
Correspondent	23%	42%	23%	42%
Ever D90+	1.09%	10%	1.66%	13%
Ever D90+ (w/ Covid FB DQs Removed)	0.55%	7%	0.86%	9%
Loan Count	3,261,955		2,278,352	

Note: ACE = Automated Collateral Evaluation; D90+ = ever 90 days delinquent or worse; D120+ = ever 120 days delinquent or worse; DTI = debt-to-income ratio; FICO = a type of consumer credit risk score; LTV = loan-to-value ratio; UPB = unpaid principal balance. “Correspondent” refers to loans sold through a correspondent lender. FB=Forbearance. DQ=delinquency

Exhibit 2 presents the frequency of ACE-originated loans within our sample of all loans eligible for ACE (5,540,307) and all originations by quarter from Q2 2017 through Q3 2023 (13,851,353). The utilization of ACE increased considerably over this time period. Until 2018, ACE-originated loans accounted for less than 5% of all originations, but at their peak in Q3 2020, they constituted nearly 40% of all originations. In our sample, 3,261,955 loans were originated through ACE until the end of Q2 2023. Assuming an average appraisal cost of \$500, the ACE program saved borrowers approximately \$1.63 billion in appraisal fees.⁵

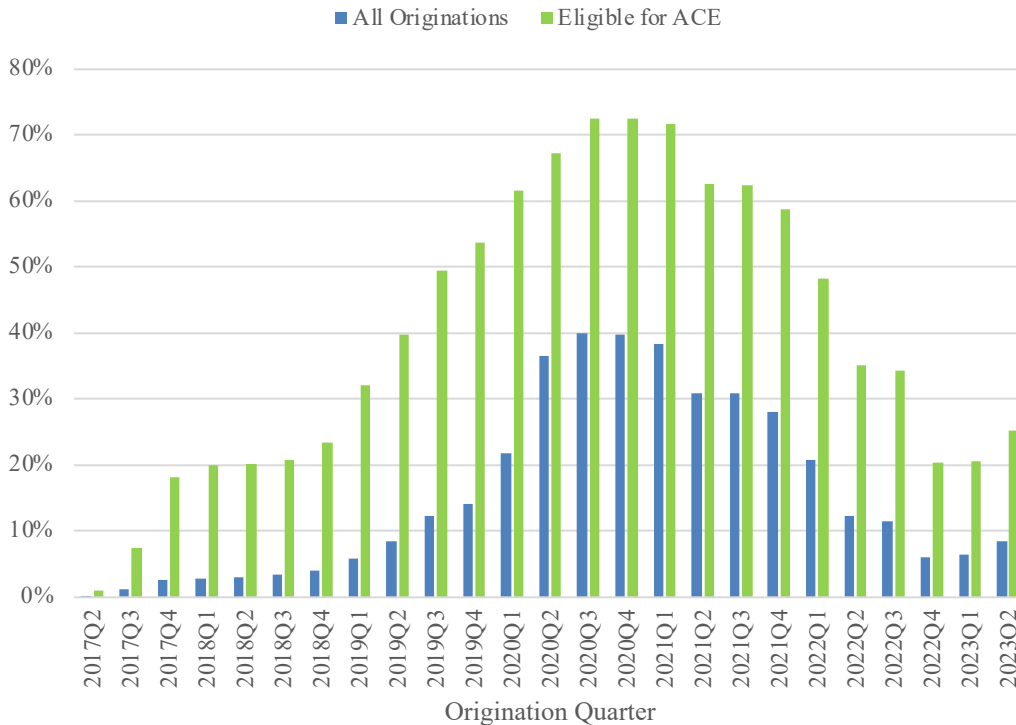
⁵ The typical price for a single-family home appraisal is \$500, according to a 2023 survey by National Association of Realtors. See https://cdn.nar.realtor/sites/default/files/documents/2023-appraisal-survey-09-05-2023.pdf?_gl=1%2A2w3a8i%2A_gcl_au%2ANzE5NDMzNTUwLjE3MDIwNDgyNTY.



Exhibit 1 revealed that ACE program loans have a lower cumulative average empirical delinquency rate compared to the Eligible Non-ACE loan population. However, exhibit 1 also showed that ACE loans have a better credit profile on average, and as a result, they will be expected to exhibit better default performance. To make a fairer comparison between ACE and Eligible Non-ACE loans, we would need to control for differences in credit quality across the two populations. We tackle this in the next section.

EXHIBIT 2:

Share of ACE Loans by Origination Quarter



EMPIRICAL METHODOLOGY AND ESTIMATION

The study design involves comparing two loan populations to determine the difference in default rates. The “treated” group comprises loans that received an ACE appraisal waiver. The control group consists of loans meeting ACE program eligibility requirements but were originated using a traditional appraisal. The study initially examines the cumulative conditional ever D90+ rates over time for the ACE and non-ACE populations. The control group is weighted to match the risk characteristics of the ACE group using a propensity score modelling approach (explained in the appendix) to control for observable differences between the two groups highlighted in Exhibit 1. A logistic model is then used to assess the impact of receiving an ACE waiver on ever D90+ rates, controlling for loan and borrower characteristics. This model is used to estimate an overall ACE effect, specifically the average default reduction achieved through screening loans with the ACE program.

Unconditional Default Rates by Loan Age

Exhibit 1 provided summary statistics for our sample of loans and indicated that ACE loans had a better credit profile and lower default rates than the control group. However, it is possible that the observed difference in default rates is due to the credit characteristics of the two groups rather than the ACE program itself. To address this concern, we weighted the control group to match the risk profile of the ACE loans, controlling for variables such as LTV, FICO score, UPB, DTI, loan purpose, product type, occupancy status, number of borrowers, property type, TPO, geography (state).



EXHIBIT 3A:

Cumulative Ever D90+ Rates with Covid FB Adjustment (Pre-2020Q2 Cohort)

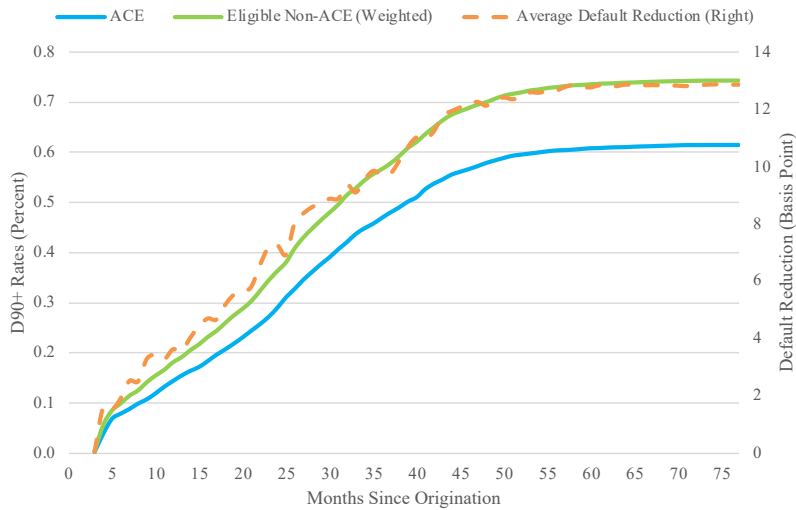
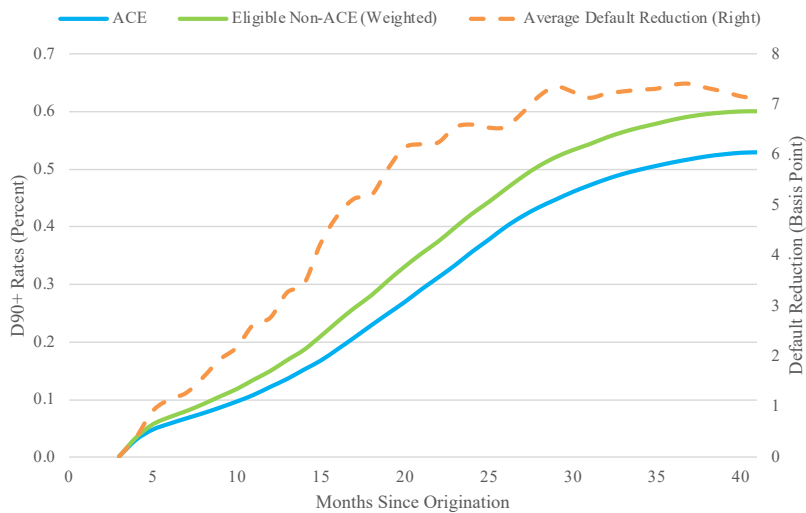


EXHIBIT 3B:

Cumulative Ever D90+ Rates with Covid FB Adjustment (Post 2020Q2 Cohort)



Note: ACE = Automated Collateral Evaluation; D90+ = ever 90 days delinquent or worse.

Exhibits 3a and 3b display the resulting cumulative default rates (removing forbearance delinquencies) for the “treated” and risk weighted “control” groups by loan age (left scale). It also presents the percentage difference in default rates between the two groups over time (right scale). After weighting the control group to match the risk profile of the ACE population, the exhibit shows that the default reduction through ACE is negligible shortly after origination but increases rapidly to over 12 bps after 50 months of seasoning in the pre-2020 sample and about 7 bps for the post-2020 Q2 sample after 27 months of seasoning. This finding indicates that even after accounting for differences in credit characteristics, ACE loans continue to display superior default performance.



Default Model Estimation

We model the incidence of default using a logistic specification that accounts for loan and borrower characteristics, including an indicator for ACE loans. We specify logistic regression that allows us to estimate the overall incremental default improvement associated with the ACE program. We estimate the following equation:

$$\text{Logit}(p_i) = \ln(p_i / (1-p_i)) = \alpha + \beta * \text{ACE}_i + B * X_i + \beta \epsilon_i \quad (1)$$

where β is the parameter that captures ACE's effect on mortgage default, and $p_i = \text{Prob}(\text{Default}_i = 1)$

We estimate a logistic regression model to examine the relationship between loan default and various loan and borrower characteristics, including an indicator variable for ACE loans. The dependent variable is the D90+ indicator adjusted for forbearance, which measures delinquency of 90 days or more from loan origination through December 2023. We use a sample of loans originated from May 2017 to June 2023.

To conclude our analysis, we perform a counterfactual exercise to determine the average default reduction for ACE loans. We use the estimated coefficients from our logistic model to predict the default probabilities for ACE loans. Using these predictions, we calculate the predicted counterfactual default rate for each of the ACE loans assuming they did not receive and utilize an ACE waiver. The average of these counterfactual probabilities represents the "Hypothetical Default Rate," which is the average predicted probability with the ACE indicator variable set to zero.

Results

The following section presents the results of the default model and a counterfactual analysis. Exhibit 4 displays the findings of our logistic regression, where the D90+ indicator adjusted for forbearance is regressed on an ACE flag and a set of control variables. The coefficient on the ACE indicator is -0.076 and is statistically significant, indicating that loans originated with an ACE waiver have an approximately 7.6% lower default rate compared to the average default rate of the entire sample (ACE and Eligible Non-ACE). The coefficients on the control variables demonstrate the expected signs, with loans having lower LTV ratios, higher FICO scores, higher loan balances, and lower DTI ratios being linked with a lower default rate. Shorter-term fixed-rate mortgages, as well as loans with two or more borrowers, are also less likely to default.

EXHIBIT 4

Baseline Regression Coefficients

Variable	Coefficient	Standard Errors	Prob > ChiSq
ACE	-0.076	0.006	<.0001
LTV 0-60	-0.291	0.011	<.0001
LTV 60-70	-0.089	0.011	<.0001
LTV 70-75	0.021	0.014	0.1317
LTV >80	0.272	0.020	<.0001
FICO 0-700	1.428	0.010	<.0001
FICO 700-740	0.426	0.011	<.0001
FICO 780-800	-0.752	0.017	<.0001
FICO >800	-0.868	0.021	<.0001
DTI 0-25	-0.353	0.015	<.0001
DTI 25-30	-0.177	0.015	<.0001
DTI 35-40	0.097	0.011	<.0001
DTI 40-45	0.221	0.010	<.0001
DTI >=45	0.284	0.011	<.0001
UPB 0-125	0.181	0.013	<.0001
UPB 125K-175K	0.004	0.012	0.7585
UPB 225K-300K	-0.090	0.011	<.0001
UPB 300K-400K	-0.050	0.012	<.0001
UPB >400K	0.023	0.013	0.0792
Cashout Refi	0.181	0.011	<.0001
Rate Term Refi	-0.100	0.008	<.0001
ARM	0.214	0.055	<.0001
F10	-0.233	0.062	0.0002
F15	-0.178	0.024	<.0001
F20	-0.104	0.029	0.0004
Second Homes	-0.145	0.017	<.0001
One Borrower	0.417	0.006	<.0001
Condos	-0.031	0.015	0.0322
PUD	-0.052	0.011	<.0001
Broker	0.048	0.011	<.0001
Correspondent	0.027	0.009	0.0024
State & Quarter FE		Yes	
Pseudo R-square		11.08%	
N		5,540,305	

Note: The dependent variable is ever D90+ adjusted for COVID-19 forbearances. ACE = Automated Collateral Evaluation; DTI = debt-to-income ratio; F10, F15, and F20 denote fixed-rate mortgages with repayment terms of 10, 15, and 20 years; FE = fixed effects; FICO = a type of consumer credit risk score; LTV = loan-to-value ratio; PUD = Planned Unit Development Properties; UPB = unpaid principal balance.



Exhibit 5 shows robustness of these results to fitting the model to different sample periods and to making the forbearance adjustment to the D90+ event. Using a D90+ event with no forbearance adjustment for the ‘pooled’ 2017Q1 – 2023Q2 sample the ACE coefficient is -0.048 and statistically significant. This shows that ACE loans have a lower predicted D90+ rate even when forbearance delinquencies are included. Since the interest rate and house price growth environment has recently changed, ACE performance is also reported separately for recently originated loans (2020Q3-2023Q2) and for loans originated prior to that period (2017Q1- 2020Q2). In each case, the estimated ACE coefficient is negative and statistically significant, indicating that the model predicts lower default rates for ACE loans.

EXHIBIT 5

Robustness Check

Estimation Sample	Ever D90+	ACE Coeff Estimate	Standard Errors	Prob > ChiSq
Pooled (2017Q1-2023Q2)	No Adjustment	-0.048	0.004	<.0001
	Covid FB DQs Removed	-0.076	0.006	<.0001
2017Q1-2020Q2	No Adjustment	-0.069	0.007	<.0001
	Covid FB DQs Removed	-0.108	0.012	<.0001
2020Q3-2023Q2	No Adjustment	-0.032	0.006	<.0001
	Covid FB DQs Removed	-0.065	0.007	<.0001

Taking the sample of 3,261,955 ACE loans, we compute the “Hypothetical Default Rate” (representing the average predicted default probability if the ACE loans had not been screened through the program) and the “Actual Default Rate” (representing the ACE loans’ average predicted default probability implied by the model).

EXHIBIT 6

Average Default Reduction for Loans Screened through ACE

Estimation Sample	Ever D90+	ACE Loans Count	Predicted D90+ Rate if Not ACE	Predicted D90+ Rate if ACE	Default Reduction	
					Percentage	Basis Points
Pooled (2017Q1-2023Q2)	No Adjustment	3,261,955	1.20%	1.09%	-8.9%	-10.7
	Covid FB DQs Removed	3,261,955	0.64%	0.55%	-13.9%	-8.8
2017Q1-2020Q2	No Adjustment	700,672	2.31%	2.03%	-12.2%	-28.2
	Covid FB DQs Removed	700,672	0.76%	0.62%	-19.2%	-14.6
2020Q3-2023Q2	No Adjustment	2,561,283	0.89%	0.84%	-6.0%	-5.3
	Covid FB DQs Removed	2,561,283	0.60%	0.53%	-12.0%	-7.2

Exhibit 6 reports the results of the average default reduction for loans selected into the ACE program (that is, the ACE sample). Focusing on the ‘pooled’ 2017Q1 – 2023Q2 sample, if the sample did not receive an ACE waiver, the model with forbearance adjustment predicts that the counterfactual default rate would be higher, at 0.64%. Meanwhile the predicted default rate stands at 0.55%, resulting in a default improvement of 13.9%. With no forbearance adjustment, the default improvement is 8.9%.⁶ The sub-periods examined also show material default reductions. Note that three reasons help explain the reduced default improvement for mortgages originated between 2020Q3 and 2023Q2 compared to those originated between 2017Q1 and 2020Q2.

6 COVID-19 forbearance delinquencies are driven more by household cash-flow events than by the collateral, and thus should be largely unrelated to the appraisal waiver status. Removing forbearance delinquencies lower the relative risk of ACE loans with respect to the eligible non-ACE loans. Specifically, exhibit 3a. shows that after 40 months, the forbearance adjusted D90+ rate is 0.50% for ACE loans and 0.63% for weighted Eligible Non-ACE loans. Without adjustment, these rates would have been 1.94% and 2.16%, respectively, and this represents an increase of about 1.50% for both samples. Removing forbearance delinquencies lowers the D90+ rates for both the ACE and eligible non-ACE populations by nearly the same amount while keeping the difference between the two relatively constant.



First, the default 'benefit' increases with loan age, and the more recent originations have less time to realize these benefits. Second, ACE loans are more likely to refinance relative to the eligible non-ACE population (Exhibit 1), which confers a default advantage to ACE loans. In the pre-2020Q2 sample ACE loans were twice as likely to prepay as the control group, but only 40% more likely to do so post-2020Q2, which narrows the prepayment advantage for these ACE loans. Third, the post-2020Q2 period has coincided with robust house price growth, which has lowered the incentive to default in both the treated and control groups.

Conclusion

Evaluating collateral value is central to the management of credit risk in mortgage origination. This research note examined the credit risk impact of appraisal waivers based on AVM valuations instead of traditional appraisals in assessing collateral value in mortgage origination. Specifically, it evaluates the default risk differences between loans originated under Freddie Mac's ACE program that received an ACE appraisal waiver and loans with similar risk characteristics that underwent traditional appraisal valuations. The study finds that loans with ACE appraisal waivers have an 8.9% lower probability of defaulting (13.9% when forbearance delinquencies are excluded).

It is important to note some limitations of these findings. Our analysis focuses on the performance of loans through December 2023 and may not necessarily be applicable to future periods. Improvements in traditional appraisal methods could narrow the performance differences between ACE loans and traditional appraisals over time. For instance, increasing the level of scrutiny on appraisals through tools like Freddie Mac's Loan Collateral Advisor® could improve appraisal precision. However, future enhancements to the ACE program and other analytic tools, such as HVE, could increase the benefits of utilizing ACE. Additionally, changes in economic and housing conditions, such as rising mortgage rates, a decrease in house prices, or a different post-COVID housing environment, could affect the magnitude of our results.

The benefits of using ACE for collateral risk assessment go beyond improved credit risk. Borrowers can enjoy savings on appraisal fees. For instance, the 3,261,955 ACE loans in the sample saved borrowers around \$1.63 billion in appraisal fees assuming an average appraisal cost of \$500. Lenders can also benefit from an expedited and streamlined origination process, faster loan closure, and collateral representation and warranty relief, thereby improving their efficiency, and reducing costs. Similarly, real estate agents and mortgage originators are likely to experience a more efficient loan origination process. Ultimately, the judicious use of appraisal waivers to lower risk benefits consumers and the U.S. housing finance system.



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Appendix. The Propensity Score Model Used in Weighting

Exhibit 3 presents a comparison of the cumulative D90+ rates between the ACE and non-ACE populations, with the latter weighted to account for differences in risk characteristics between the two groups. To create the propensity weights, a logistic regression model was used to estimate the probability of a loan being in the ACE sample. The model included several independent variables, such as LTV, FICO score, UPB, DTI, loan purpose, product type, occupancy status, number of borrowers, property type, TPO, state and quarter of origination fixed effects. Continuous variables were categorized to be discrete to account for possible non-linear relationships with the dependent variable. The dependent variable equals one if the loan is an ACE loan and is zero otherwise.

Exhibit 7 displays the coefficients from the propensity model estimation. As indicated by the summary statistics, the results show that ACE loans have superior credit characteristics compared to the eligible non-ACE sample. For instance, the coefficient for the LTV category > 80 is -0.612, suggesting that loans with LTV greater than 80 are less probable to be ACE loans relative to those with LTV 75-80. Similarly, lower FICO scores, lower UPBs, higher DTIs, cash-out refinances, 10-year and 15-year fixed-rate mortgages, and condominium properties have lower probabilities of being ACE loans relative to their respective reference categories. The propensity weights (w) for the control population are determined by denoting the estimated predicted probability of being an ACE loan as \hat{p} , the propensity weights (w) for the control population are given by:

$$w = \hat{p} / (1 - \hat{p})$$

When $\hat{p} < 1/2$, then $w < 1$. Loans that are less likely to be an ACE loan are down weighted.



EXHIBIT 7

Estimated Coefficients of the Propensity Score Model

Variable	Coefficient	Standard Errors	Prob > ChiSq
LTV 0-60	0.090	0.002	<.0001
LTV 60-70	0.306	0.002	<.0001
LTV 70-75	0.382	0.003	<.0001
LTV >80	-0.612	0.004	<.0001
FICO 0-700	-0.135	0.002	<.0001
FICO 700-740	0.004	0.002	0.0356
FICO 780-800	0.035	0.002	<.0001
FICO >800	0.090	0.002	<.0001
UPB 0-125K	-0.566	0.003	<.0001
UPB 125K-175K	0.010	0.002	<.0001
UPB 225K-300K	0.260	0.002	<.0001
UPB 300K-400K	0.242	0.002	<.0001
UPB >400K	-0.153	0.002	<.0001
DTI 0-25	0.032	0.002	<.0001
DTI 25-30	0.065	0.002	<.0001
DTI 35-40	0.022	0.002	<.0001
DTI 40-45	-0.036	0.002	<.0001
DTI >=45	-0.137	0.002	<.0001
Cash-out Refi	-0.735	0.002	<.0001
Rate Term Refi	-0.017	0.002	<.0001
ARM	-0.065	0.010	<.0001
F10	0.029	0.008	0.0002
F15	-0.060	0.004	<.0001
F20	0.090	0.004	<.0001
Second Homes	0.351	0.003	<.0001
One Borrower	0.055	0.001	<.0001
Condos	-0.207	0.003	<.0001
PUD	0.203	0.002	<.0001
Broker	0.370	0.002	<.0001
Correspondent	-0.124	0.002	<.0001
State & Quarter FE		Yes	
Pseudo R-square		30.1%	
N		5,540,305	

Note: DTI = debt-to-income ratio; F10 and 15 are fixed-rate mortgages with repayment terms of 10 and 15 years; FE = fixed effects; FICO = a type of consumer credit risk score; LTV = loan-to-value ratio; PUD = Planned Unit Development properties; UPB = unpaid principal balance.

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