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Abstract

We identify occupancy fraud — borrowers who misrepresented their occupancy status as owner-occupants rather than investors — in residential mortgage originations during the housing bubble. Unlike previous work, we show fraud was broadly based and appeared in the GSE market and bank portfolio loans, not just private securitization; accounting for that fraud increases the effective investor share by more than one-third. Occupancy fraud allowed riskier borrowers to obtain lower interest rates, and we show that fraudulent borrowers performed substantially worse than similar owner-occupants and declared investors, constituting nearly one-sixth of the share of loans in default by the end of 2008. Their defaults were also much likelier to be "strategic."

Keywords: mortgage default, consumer credit, household finance, misreporting, fraud
JEL Codes: D12, R3

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I. Introduction

Policymakers and the popular press have cited anecdotal evidence to suggest that one of the contributing causes of the housing bubble was pervasive mortgage fraud.[2] Recent academic work has also verified the existence of mortgage fraud along several dimensions. Ben-David (2011) finds evidence of inflated prices. Griffin and Maturana (2016) examine three dimensions of fraud among private securitized loans: unreported second liens, owner-occupancy misreporting, and appraisal overstatements. Piskorski et al. (2015) study second-lien misreporting and occupancy fraud in the private securitized market. Mian and Sufi (2015) argue that borrowers misstated their incomes on mortgage applications.

In this paper, we use a matched credit bureau and mortgage data set to identify occupancy fraud in loans originated between 2005 and 2007. In our paper, fraud occurs when mortgage borrowers claim on a new purchase mortgage application that they will be the owner-occupants of the property[3] but do not move from their old address (as measured in the credit bureau data). In contrast to previous work, our data allow us to confirm that occupancy fraud was pervasive and did not affect just private securitized loans: It appeared in government-sponsored enterprise (GSE)–guaranteed, private securitized, and portfolio-held loans.[4] We argue that the fraudulent purchasers that we identify are very likely to be investors and that accounting for fraud increases the size of the effective investor population by more than one-third.

We show that an important benefit from investor fraud was obtaining lower interest rates: 20–40 basis points lower, on average, than otherwise similar declared investors. For riskier borrowers, such as those with low origination FICO scores,[5] high loan-to-value ratios, or low documentation loans, this discount was even larger.

After we have identified these investors from the matched credit bureau and mortgage data, we compare the performance of honest homeowners, fraudulent investors, and honest declared investors. We find that the fraudulent investors, after controlling for available characteristics, performed substantially worse than otherwise similar honest homeowners, declared investors, and second homeowners, defaulting at a nearly 40 percent higher rate. Despite making up only 5 percent of the borrower population, frauds constitute one-sixth of the dollar share of defaulted loans for originations during this time period. Although we show that they were somewhat more likely to be subprime than declared investors, overall, frauds were part of the prime sector, and so our results are consistent with Adelino et al. (2016) and Foote et al. (2016), who have argued that much of

[2] See, for instance, the Financial Crisis Inquiry Commission's 2011 *Financial Crisis Inquiry Report*.
[3] This entails not renting out the property and not intending to sell the property quickly.
[4] By contrast, Federal Housing Administration (FHA) and loans guaranteed by the Veterans Administration (VA) exhibited markedly lower fraud rates. We group these two types of government guaranteed loans together and term them FHA/VA.
[5] All FICO scores referred to in our work are FICO scores at origination, obtained from the Black Knight McDash data set (described in Section III).

the increase in net borrowing during the housing boom (and defaults during the bust) can be attributed to prime borrowers. We also show that the fraudulent investors are more "strategic" in their default decisions, further highlighting their role in the housing bust. First, their decision to default is more sensitive to negative equity than the default decisions of other borrowers. Using the credit bureau data, we also obtain borrowers' other consumer liabilities, in particular bankcards. We find that, conditional on mortgage default, fraudulent investors had significantly lower bankcard utilization rates than both honest homeowners and declared investors.

The remainder of the paper is organized as follows. Section II describes the related literature. Section III describes the data we use. Section IV documents our definition of mortgage occupancy fraud. Section V provides descriptive statistics for our sample. Section VI studies the determinants of fraud. Section VII presents the results from estimating the impact of fraud on mortgage default. In Section VIII, we consider an alternative hypothesis: that those borrowers whom we identify as fraudulent did not set out to intentionally commit fraud but instead were unable to sell their previous home. We show that this hypothesis is unlikely to explain our results. Section IX concludes.

II. Related Literature

This paper is not the first to examine the role of owner-occupancy fraud and its impact on loan performance. Although they do not focus on fraud per se, Haughwout et al. (2011) were among the first to use credit bureau data to explore the role of real estate investors during the mortgage boom and to show that the self-reported occupancy status may paint a misleading picture. They document significant increases in the share of purchase mortgages attributed to borrowers with multiple first-lien mortgages in their credit files, with as many as half of all purchase mortgages attributable to investors in states that experienced the largest housing booms and busts. They also show that such investors account for a substantial share of defaults.

Several different types of mortgage misrepresentation have been studied in the literature. Garmaise (2015) explores the role of borrower misreporting of personal assets just above round number thresholds. He finds that borrowers who reported above-threshold assets were 25 percentage points more likely to default. Mian and Sufi (2015) explore the role of fraudulent income overstatement on mortgage applications. They compare the growth in income as implied by mortgage applications with the average IRS-reported income growth at the ZIP code level, and they find substantial divergence between these two series. Income overstatement was higher in ZIP codes with low credit scores and low incomes; Mian and Sufi show that borrowers in these ZIP codes experienced some of the most significant increases in mortgage credit during the boom.

Piskorski et al. (2015) analyze private securitized loans and find that second-lien misrepresentation was widespread and occurred late in the intermediation process (e.g., by the underwriters of the residential mortgage-backed securities). More relevant to our paper, in their internet appendix, they detail additional analysis on the role of owner-occupancy misrepresentation in their sample of private securitized loans. They infer owner-occupancy misrepresentation by comparing the property ZIP code reported by the residential mortgage-backed securities (RMBS) trustee with 12 months of credit bureau–reported ZIP codes for the matched borrower. If none of these ZIP codes match, then the authors conclude that this loan was characterized by owner-occupancy fraud.

Griffin and Maturana (2016) also examine three types of fraud (unreported second liens, owner-occupancy misreporting, and appraisal overstatements) in private securitized loans by matching to deeds data. They find that nearly half of the loans examined had at least one form of fraud and that these loans had 50 percent higher delinquency rates than otherwise comparable loans. They argue that investors appeared to be unaware of the incidence of fraud. Finally, they explore the extent to which mortgage fraud and misrepresentation were responsible for the recent house price boom-bust cycle (2015).

Our paper adds to the literature by showing that fraud was widespread, including, importantly, in the large GSE market. We also study the determinants of fraud and quantify the interest-rate savings from misrepresentation. Finally, we examine default outcomes, show that these fraudulent investors default at higher rates (not just because they have multiple liens), and demonstrate that these fraudulent investors' default decisions were more "strategic" than those of other homeowners. Our work contributes to a more complete picture of the role of fraud in the housing boom and bust.

III. Data Description

We obtain our loan information from a data set known as CRISM: Equifax Credit Risks Insight Servicing and Black Knight McDash Data (henceforth CRISM).[6] It is a match between loan-level mortgage data from Black Knight McDash (henceforth McDash) and credit bureau data from Equifax. Personally identifiable information is not included in these anonymized data sets. We restrict our sample to borrowers who:

(1) are listed as the "primary" borrower in CRISM;
(2) are available and listed as primary borrowers in the Federal Reserve Bank of New York Consumer Credit Panel/Equifax Data (henceforth CCP); and

[6] See Beraja et al. (2015) for more detail on the CRISM data set.

(3) originated a first-lien *purchase* mortgage loan for a single-family unit in the McDash data set between January 2005 and December 2007.

We discuss our definition of occupancy fraud in detail in Section IV.

We focus on borrowers with self-reported McDash occupancy type as owner-occupant, declared investor, or second homebuyer.[7] We also restrict to borrowers who have scrambled address, ZIP code, and state data from the CCP one quarter before and four quarters after their matched McDash mortgages originated, as our identification of fraud relies on this. After we impose the additional restrictions described below, our final data set consists of 148,702 loans.

Our house price index (HPI) data come from CoreLogic Solutions (henceforth CoreLogic), and we use ZIP code-level house price indices for single-family detached homes (including distressed sales). Our county-level unemployment rates come from the Bureau of Labor Statistics (BLS).

IV. Defining Occupancy Fraud

A key aspect of our experimental design is the identification of fraudulent investors. We discuss our definition and compare it with others in the literature. Importantly, the CRISM data enable us to compare the self-reported occupancy type from the McDash loan-level data with information from the borrowers' CCP matched credit bureau file. Our goal is to identify and classify borrowers who self-report as owner-occupants on their purchase mortgage applications (reported in the McDash data) but who appear to be investors judging by their credit history information. In our owner-occupancy fraud classification algorithm, we focus on four pieces of information:

- The self-reported occupancy type
- The count of first-lien mortgages four quarters after their matched McDash mortgage is originated
- The borrowers' CCP scrambled address from one quarter before and four quarters after the McDash mortgage origination date
- The distance between the CCP ZIP code and the McDash property ZIP code

We first note that, intuitively, a reported homeowner is likely to actually be either an investor or a second homeowner if: (i) they have multiple first liens, and (ii) they did not move following the origination of their new

[7] We also drop the small number of loans with origination loan-to-value (LTV) ratios either under 25 percent or exceeding 120 percent; loans whose matched borrowers' bankcard utilization at first mortgage default was greater than 150 percent; loans with a McDash investor type six months after origination indicating Ginnie Mae buyout loan, local housing authority, Federal Home Loan Bank, or unknown; and mortgages with origination amounts exceeding $1 million.

purchase mortgage. We say a borrower did not move if they have a CCP scrambled address that is the same one quarter before and four quarters after their matched McDash mortgage originated. We define multiple liens as having more than one first-lien mortgage when observed four quarters after the matched first-lien purchase mortgage was originated.

Our intuition is borne out in the data (Table 2c): 85 percent of all declared owner-occupants move around their mortgage origination, whereas this is the case for only 41 percent of reported second homeowners and 54 percent of investor mortgages. Furthermore, 22 percent of reported owner-occupants have multiple first liens in their credit bureau files four quarters following mortgage origination, compared with 52 percent of second homeowners and 48 percent of investors. Furthermore, 36 percent of second homeowners and 32 percent of investors meet both of these criteria; the 6 percent share of declared homeowners that also does is likely to be, in truth, a composition of second homeowners and investors.

To distinguish between second homeowners and investors, we add a final criterion, which is that the distance between the CCP ZIP code and the McDash property ZIP code is no more than 75 miles. The intuition is that second homes are likelier to be located further from the borrower's residence. Based on Table 2c, we see that this is indeed the case: Considering just borrowers who did not move and have multiple liens, over three-quarters of investors have a CCP ZIP code that is within 75 miles of their McDash ZIP code, compared with just one-quarter of second homeowners. This final restriction only has a small impact on the size of the relevant homeowner population: We are left with 5,765 "fraudulent investors."

Note that we have taken a conservative definition of fraud, in that we used several criteria to narrow the set of homeowners under consideration; this way, we can be more certain that those who meet these criteria are indeed fraudulent investors. As we show below, each restriction is independently associated with elevated default risk; therefore, one could expand the set of frauds by considering the restrictions individually, as in the previous literature.

Formally, we define four types of borrowers:

Honest owner-occupants: These are reported in the McDash data set as having originated an owner-occupied home purchase loan and whose CCP scrambled addresses one quarter before and four quarters after their matched McDash mortgage origination are different.

Fraudulent investors: These are reported in the McDash data set as having originated an owner-occupied home purchase loan and whose CCP scrambled addresses is the same one quarter before and four quarters after their matched McDash mortgage originated. The borrower's credit bureau file also reports more than one first-

lien mortgage four quarters after the matched first lien was originated. Finally, the distance between the CCP and McDash ZIP codes is no more than 75 miles.

Declared investors: These are borrowers who are reported in the McDash data set as taking out a mortgage for the purchase of an investment property.

Second homebuyers: These are borrowers who are reported in the McDash data set as taking out a mortgage for the purchase of a second home.

Note that we drop mortgages that do not fit one of these four criteria. We further restrict our attention to loans in the McDash data with single-family property types to avoid the possibility that our fraud classifier does not pick up an address change because of borrowers moving within large multifamily units. In addition, we also drop borrowers who reported themselves as homeowners with post office box addresses, as this would make it difficult to determine whether a borrower moved following their home purchase and thus to distinguish between honest homeowners and fraudulent investors. Any concerns about the accuracy of the fraud classification should bias downward the likelihood of finding that these borrowers behave differently.

We now discuss how our methodology of identifying owner-occupancy misrepresentation relates to that of other papers that have addressed the phenomenon.

Haughwout et al. (2011) also use multiple first liens to identify investors in credit bureau data, although they cannot explicitly tie this to fraud, as they do not have mortgage data to identify the reported occupancy type. Griffin and Maturana (2016) identify fraudulent borrowers as those for whom the tax mailing address differs from that of the property. Similarly, Piskorski et al. (2015) identify fraudulent borrowers as those for whom the credit bureau ZIP code (interpreted as representing the borrower's true mailing address) is not the same as the property ZIP code.

Our approach combines these two types of information: the number of first liens and the CCP address (from the Federal Reserve Bank of New York/Equifax Consumer Credit Panel). We do not have access to the property tax mailing address in our data set, so we cannot take the same approach as Griffin and Maturana (2016); however, our "no move" restriction captures a similar intuition. Unlike Piskorski et al. (2015), we use not just ZIP codes but more precise information on the (scrambled) CCP address; this also allows us to identify fraud that takes place within a ZIP code. Another advantage of our approach over that of Griffin and Maturana (2016) and Piskorski et al. (2015) is that we can distinguish between reported homeowners who are likely to be second homebuyers and those who are likely to be investors.

Finally, both Griffin and Maturana (2016) and Piskorski et al. (2015) confine their analysis to private securitized loans (primarily subprime and jumbo mortgages). By contrast, by using our credit bureau data on additional liens and addresses, we are able to study the extent of fraud across the entire universe of mortgage and loan types. As we show below, this substantially increases the total amount of fraud. In particular, we find significant incidence of fraud among prime GSE-guaranteed loans and also those held on bank portfolios.

V. Descriptive Statistics

In this section, we compare descriptive characteristics by borrower type: honest owner-occupants, fraudulent investors, declared investors, and second homebuyers. A broad set of summary statistics is given in Table 2a.[8] For many of our comparisons, we will focus on borrowers with multiple first liens, as these are more comparable with fraudulent investors (who have multiple first liens by construction); summary statistics for these are found in Table 2b.

We observe from Table 2a that while there is indeed high representation of private securitization among fraudulent mortgages, were we to restrict attention to private securitized mortgages alone, as in the previous literature, we would have accounted for less than half of all fraudulent loans. Overall, our estimate of the share of borrowers misrepresenting their occupancy status peaks in the first half of 2006 at 4.4 percent (Table 3). We also show in Figure 1 that the fraud share continued to drop further after 2007, falling below 2 percent by 2018. In Table 3, we find a drop in the share of owner-occupancy misrepresentation among private securitized loans from the first half of 2007 to the second half 2007, consistent with the tighter standards that were reported in this market.[9] This was also documented by Piskorski et al. (2015). As this share is declining, we also find an increase in the share of occupancy misrepresentation among other types of loans, particularly GSE-guaranteed mortgages and loans held on bank portfolios. This is consistent with the increase in GSE risk-taking that has been noted in the literature.[10] Finally, note that both fraudulent and declared investors were much less likely to have FHA/VA-guaranteed loans. This is not surprising because of the stricter enforcement of FHA/VA owner-occupancy requirements. As a result, for some of our analysis, we drop these loans.

Figure 2 gives a heat map with the state-level mortgage occupancy fraud rates for purchase mortgages originated between 2005 and 2007. The areas with the highest fraud rates were California and Washington, D.C., with fraud rates in excess of 13 percent (and exceeding the number of declared investors). Other states with high fraud rates include Hawaii, Nevada, Florida, and Arizona. Many of these correspond with the "bubble states," and we also see in Table 2a that fraudulent investors originated loans in areas that had experienced

[8] See Table 1 for variable descriptions.
[9] Similarly, there is a sharp drop in the share of private securitized subprime loans in the McDash data set for the second half of 2007.
[10] See, for example, Elul et al. (2019).

greater-than-average house price growth; however, these areas would also see major house price declines in 2008.

Next, we show that fraudulent investors were riskier, in a number of dimensions observable *ex-ante*, than declared investors. Indeed, in our multivariate analysis below, we show that one key benefit of fraud was to obtain better terms than declared investors would receive for risky loans. In order to sharpen our comparison, we focus most of this discussion on borrowers with multiple first liens.

Gao and Li (2012) find that most *declared* residential real estate investors are prime. While this is still the case for fraudulent investors, we do see that they are considerably more likely to be subprime than other borrowers, particularly those with multiple first liens (Table 2b). Indeed, 19 percent have FICO scores at origination below 660, compared with only 9 percent for declared investors with multiple firsts. As we next discuss, the origination characteristics also suggest that fraudulent investors took on substantially riskier mortgages than declared investors and honest homeowners.

Fraudulent investors are also more likely to have high (first-lien) loan-to-value (LTV) ratios than declared investors or honest homeowners with multiple liens. Fourteen percent have LTV ratios at origination of 90 percent or higher, compared with roughly 10 percent for declared investors or honest homeowners. Combined with the more severe house price declines in the areas where fraud was prevalent, this led to higher updated LTV ratios in December 2008 and also, as we show below, higher default risk.[11]

Turning now to other risk characteristics, we see from Table 2b that fraudulent investors were substantially more likely to have low documentation loans, interest-only mortgages, option ARMs, and brokered mortgages than declared investors with multiple first liens. They also are more likely to have 2/28 and 3/27 ARMs, which the literature has shown to be riskier.

Fraudulent investors also have much larger mortgages than declared investors: 18 percent have jumbo loans with origination amounts above $417,000, compared with only 4 percent for declared investors with multiple liens. This reflects, first of all, the fact that potential investors with a larger loan will find fraud more compelling, as the interest-rate savings will be bigger. In addition, we see below that lenders appear to have tighter underwriting for those who they can identify as investors, limiting the loan size made available to them. As we show below, these larger loan sizes imply that high default risk translates into a high dollar share of defaults for fraudulent investors.

[11] Our credit bureau data also allow us to identify other mortgages held by the borrower. Half of all fraudulent investors also had accompanying second liens, which further lowered their equity position, and, as we show in our multivariate analysis, contributed to higher default risk.

From Table 2b, when we compare interest rates paid by borrowers with multiple first liens, we see that those paid by fraudulent investors are, unconditionally, about 15 basis points lower than those for declared investors and 25 basis points higher than those for honest homeowners. However, we have shown that fraudulent investors are riskier than other borrowers: When we control for these risk characteristics in our multivariate analysis below, we will see that this discount relative to the declared investors grows, highlighting the motivation to undertake fraud. We will also see that the risk-adjusted premium relative to honest homeowners is small, particularly for GSE and private securitized loans, suggesting that these lenders either did not identify fraud or chose to ignore it.

In addition to being observably riskier at origination, fraudulent investors are also riskier ex-post. As of December 2008, 24 percent of all fraudulent investors were seriously delinquent (60 or more days past due) or in default on this mortgage. This compares with 8 percent of declared investors and 9 percent of honest homeowners (Table 2a). In Table 4, we break out default rates by two key origination characteristics: origination vintage and origination FICO score. Across these categories, fraudulent investors are uniformly more risky. Furthermore, in our multivariate analysis, we will show that this elevated risk persists even when we control for a full set of observable risk characteristics. Owing to both higher risk and larger loan sizes (above), fraudulent investors make up nearly one-sixth of the balances in our sample that are in default as of December 2008, despite representing only four percent of all purchased mortgages. Compared with the much larger pool of declared investors, the contribution of frauds to default is actually twice as large.

Finally, we will show in our analysis below that fraudulent investors' elevated default risk is driven by strategic motives, namely greater sensitivity to house price declines. The full analysis will consider several indicators of strategic behaviors. However, from the summary statistics in Table 2b, we can compare borrowers' bankcard utilization rates, which can be viewed as an indicator of (il)liquidity (see Elul et al., 2010).[12] Outside of default, fraudulent investors have a similar rate of high utilization (i.e., utilization greater than or equal to 80 percent) as honest homeowners but a greater rate than declared investors (likely reflecting the fact that they are more likely to be subprime than the latter). However, for those in default at the end of 2008, the difference is striking: fraudulent investors' utilization rates are significantly *lower* than those of both declared investors and, especially, honest homeowners. This suggests that their default decisions were less likely to be driven by an inability to pay and, indeed, we show below that house price declines played a greater role in this decision for frauds.

[12] We focus here on those with multiple liens in order to make a more uniform comparison across borrower types.

VI. Estimations and Results – Determinants of Fraud

We now examine the determinants of investor fraud. We begin by showing that fraudulent investors pay lower interest rates than similar declared investors, particularly for riskier mortgages.

From the summary statistics, we have seen that fraudulent investors have interest rates that are lower than those obtained by declared investors with multiple liens. So, one natural motivation for fraud seems to be to obtain lower interest rates. Although the average difference is relatively small, we note that there are also differences in observable risk characteristics between fraudulent investors and declared investors. Therefore, we estimate multivariate models of the interest rate at origination, where we control for various borrower, mortgage, and property characteristics. For loan *i,* receiving interest rate Y_i at origination (in percentage points), we estimate models of the form:

$$Y_i = \alpha + \beta X_i + \gamma Borrower\ Type_i + \epsilon_i \qquad (1)$$

where X_i is a set of mortgage and borrower characteristics at the time of origination, and $Borrower\ Type_i$ is one of: honest homeowner, fraudulent investor, declared investor, or second homeowner, as described above. In some of the regressions we also interact the borrower type with mortgage characteristics from X_i. This allows us to determine how the premium paid by different borrower types varies with risk characteristics; in addition, by interacting the borrower type with the investor type (GSE, portfolio, private securitization) we are also able to assess the degree to which different types of lenders identified the additional risk of fraud. The results from these estimations are reported in Table 5a.

We begin with a model for all borrowers in column (1).[13] The control variables have the expected signs: Higher origination FICO scores are associated with lower rates; higher LTV ratios at origination are also associated with higher rates. We also see that shorter-maturity mortgages have lower rates, as do larger loans; low-documentation loans and interest-only mortgages also have higher rates. 2/28 and 3/27 ARMs, known to be associated with riskier borrowers, have higher rates, whereas other ARMs have lower rates relative to the omitted category, fixed-rate mortgages. Loans in private MBS have higher rates relative to the omitted category, GSE loans.

Turning now to the primary coefficients of interest, we see that declared investors have interest rates that are 21 basis points higher than fraudulent investors (the baseline category), which helps explain the motivation for

[13] We drop FHA/VA loans from this regression, as there is a trivial incidence of fraud for these, and they are effectively off limits for non-owner-occupants.

fraud. We also see that fraudulent investors pay slightly higher rates than both honest homeowners and second homeowners, but this difference will disappear once we control for additional risk factors, next.

In column (2), we add controls for the criteria used to identify fraud: moving around the time of loan origination, having multiple first liens, and the distance between the CCP and McDash ZIP codes. We see that having multiple first liens and not moving are associated with higher rates, as is having a CCP ZIP code that is more than 75 miles from the McDash property ZIP code. This may be due to lenders using these to identify some undeclared investors and second homeowners. Importantly, however, they do not seem to be able to identify all occupancy fraud: Having controlled for these factors, fraudulent investors now pay nearly 30 basis points less than fraudulent investors, and their rates are no longer significantly different from those paid by honest homeowners or second homeowners. This is equivalent to the difference in rates between those with origination FICO scores below 660 (the baseline category) and those with scores between 660 and 700.

Columns (3) and (4) repeat the analysis in column (2), first restricting the sample first to borrowers with multiple liens and then those who also did not move and have a ZIP distance of 75 miles or less. The results do not change.

In Table 5b, we report the marginal effects from estimating a model like that of column (2) of 5a, but now also interacting key risk characteristics with borrower types. Each cell represents the premium paid (or discount, if negative) by the borrower type in that column, for the risk characteristic in that row, relative to that paid by a fraudulent investor with the same risk characteristic. The first model is estimated across all borrower types, and the second restricts attention to a more uniform sample: borrowers with multiple first liens, who did not move, and whose ZIP distance is 75 miles or less (these restrictions drop honest homeowners).

We begin with column (2), which allows us to compare the rates paid by declared investors with those paid by fraudulent investors with similar risk characteristics. We know from Table 5a that fraudulent investors pay lower rates: We see in 5b that the discount they receive is larger for riskier loans — those with the lowest FICO scores (less than 660), high origination LTV (above 80 percent and, particularly, above 90 percent), low or no documentation, and interest-only payments. Restricting attention to the smaller (but more uniform) sample of nonmovers with multiple first liens and a ZIP distance of 75 miles or less yields similar — indeed stronger — results.

Column (1) shows the rates paid by honest homeowners with different risk characteristics, relative to those paid by fraudulent investors. On average, as we know from Table 5a, honest homeowners pay modestly lower rates. These differences are somewhat larger in the loans with the riskiest characteristics: This suggests that lenders may have had some ability to identify and price the risk of fraud. One striking outlier is loans held in bank

portfolios. Here we see that honest homeowners pay rates that are a full 45 basis points lower than fraudulent investors (and the premium paid by declared investors over the fraudulent is also smaller than average here). This suggests that these lenders were better able to identify, and price, the risk of fraud.

The Extensive Margin

In order to further identify the determinants of fraud, we also estimate probit models of fraud versus declared investor, restricting attention to just these two borrower types and just to those with multiple first liens. More formally, the probability that loan *i* is identified as fraudulent is modeled as $\Pr(fraud) = \Pr(y \leq Y_i)$, where y is normally distributed with mean 0 and variance 1, and

$$Y_i = \beta X_i \qquad (2)$$

Table 6 reports the marginal effects from these regressions. These results are generally consistent with the interest rate regressions discussed immediately above. Column (1) includes the basic risk characteristics. Low origination FICO scores, high LTV, and low documentation status are all associated with higher likelihood of fraud. For example, relative to the overall sample average of fraud in this sample of 44 percent, having an LTV of 90 percent or above raises the likelihood of being fraudulent by 15 percentage points; furthermore, having a FICO score above 660 is associated with a rate of fraud that is 11 to 19 percentage points lower. Column (2) includes controls for additional loan characteristics. Fraudulent investors have much larger loan sizes than declared investors: For example, having a loan size above $700,000 is a near-guarantee of fraud. Other covariates are likely correlated with this: fraudulent investors more often have portfolio loans (as these are likelier to be jumbo) and longer loan terms. These larger loan sizes likely reflect a desire by lenders to lend less to investors, whom they perceive as riskier. However it is also consistent with the interest rate motivation: For a larger loan, the benefit of a lower rate is correspondingly larger. We also see that fraud is about 5 percentage points likelier for broker-originated loans, providing support for the hypothesis that brokers facilitated fraudulent behavior. Conversely, correspondent lenders are less likely to be associated with fraud: These are smaller lenders who may have had closer contact with borrowers.

In specification (3) we replace the state fixed effects with an indicator for "bubble states" (Arizona, California, Florida, and Nevada). Consistent with the descriptive statistics, fraud is modestly more common in these states, which were associated with the housing boom-bust cycle. Another possible motivation for fraud is to lower local property taxes. In specification (4), we replace the state fixed effects with an indicator variable for whether

the state has statutes in place that reduce property taxes for owner-occupants relative to investors (often termed "homestead exemptions").[14] We find a statistically significant, but economically small, impact.

Taking advantage of other laws that favor homeowners may also be a motivation for occupancy fraud. In particular, for an investor, protecting other assets in case of mortgage default may be important. As Pence (2006) and others point out, however, most states that prohibit deficiency judgments restrict these protections to owner-occupants. In column (5), we consider a specification in which we replace state fixed effects with an indicator variable for states that prohibit deficiency judgments.[15] While fraud is indeed more likely in these states, the effect is again economically small.

Finally, in column (6), we restrict attention to an even more uniform sample: borrowers who did not move around the mortgage origination and with a ZIP distance of 75 miles or less. Many of the differences reported above become smaller, but the following risk factors are still important (and quantitatively remain relatively unchanged): low origination FICO scores, high origination LTV, large loan sizes, long-maturity mortgages, and interest-only mortgages.

VII. Estimation and Results — Fraud and Default Behavior

Our previous analyses show that fraudulent investors were observably riskier at origination; from the summary statistics, we have also seen that they defaulted at higher rates. In order to identify the precise contribution of fraud to default risk, we estimate multivariate probit models of default where we control for risk characteristics. That is, the probability that loan *i* is in default[16] is modeled as $\Pr(Default) = \Pr(y \leq Y_i)$, where *y* is normally distributed with mean 0 and variance 1,

$$Y_i = \beta X_i + \delta Z_i + \gamma Borrower\ Type_i \qquad (3)$$

and *Borrower Type*$_i$ is as described following equation (1) above. We include a variety of mortgage and borrower characteristics at origination in X_i, and Z_i includes dynamic variables as of December 2008: the change in the local unemployment rate from origination through December 2008 and an estimate of what the LTV would be in December 2008 when the house price at origination is updated using the local house price index. We cannot control for lender-specific fixed effects in this data set, but Griffin and Maturana (2016) show that, for loans in private mortgage-backed securities, there is very little variation in owner-occupancy misreporting

[14] We obtain these from the National Conference of State Legislatures (2002).
[15] We use the state law classification in Ghent and Kudlyak (2011)
[16] Recall that a loan is deemed to be in "default" if it is seriously delinquent (60 or more days past due) or defaults as of December 2008.

across lenders, suggesting that these decisions were made by the borrowers (possibly in conjunction with brokers, as suggested above).

In the first specification of Table 7a, we report the marginal effects from regressions of the likelihood of default as of December 2008 on a variety of characteristics known to affect default. This table reports only the key covariates — the full set can be found in the appendix. Coefficients have the expected signs: Higher origination FICO scores are associated with lower default risk; higher LTV ratios, both at origination and also market-to-market (as of December 2008), are associated with higher risk. Low-documentation, brokered, and interest-only loans are riskier, as are FHA/VA and private securitized mortgages. Increases in unemployment are also associated with higher default risk. Turning to the coefficients of interest, we see that relative to fraudulent investors (the base category), all of the other borrower types have a substantially lower risk of default: a difference of 5–6 percentage points (relative to the sample average rate of roughly 10 percentage points).

In model (2), we add an indicator variable for having multiple first liens. Recall that Haughwout et al. (2011) identify investors as those with multiple liens and show that they default at higher rates. We see that about one-third of the additional risk of fraudulent loans (relative to declared investors) can be explained by the presence of these other liens. However, fraudulent investors are still substantially riskier: Their propensity to default is 3.3 percentage points higher than otherwise similar declared investors. By way of comparison, this is roughly equivalent to moving from the 700–750 origination FICO score bin to the 660–700 origination FICO score bin.

In the next specification, (3), we add a dummy variable for moving across the mortgage origination. Recall that this was a criterion for distinguishing fraudulent investors from honest homeowners. Moving is actually associated with a very modest *increase* in default risk, and so the marginal effect of the honest homeowner borrower type becomes slightly more negative as a result (since honest homeowners move by construction). As some declared investors also move (Table 2b), their marginal effect also becomes more negative, so that a fraudulent homeowner is now 4.7 percentage points more likely to default than a similar declared investor.

The final criterion defining fraud was that the distance between the property (McDash) ZIP code be no more than 75 miles from the CCP ZIP code; this helped distinguish fraudulent investors from second homeowners. In column (5) we add an indicator for a ZIP distance of more than 75 miles. This is associated with higher default risk, which is in line with the findings of Chinco and Mayer (2016) that out-of-town buyers acted as uninformed speculators. Since most second homeowners have this property (Table 2b), the marginal default contribution of the second homeowner borrower type also becomes more negative; the effect on investors is smaller.

After including all of these covariates, we find that fraudulent investors are now over 6 percentage points more likely to default than similar investors. They are also much riskier than the other borrower types (honest

homeowners and second homeowners). In column (5), we confirm that our results are robust to fitting a linear probability model instead, and in (6), we show that they continue to hold when we restrict to a more uniform sample: those with multiple first liens, who did not move, and with a ZIP distance of 75 miles or less.

Strategic Default

We have seen that fraudulent investors are significantly more likely to default than other borrowers. We now show that these default decisions are particularly sensitive to house prices, i.e., these borrowers are more "strategic." We approach this in two ways.

First, we add interactions of several key risk characteristics (coded as categorical variables) with the borrower type to the model in column (4) of Table 7a. These covariates are: origination FICO score, updated LTV (as of December 2008), and the change in unemployment from origination to December 2008. That is, to Equation (3), we add interactions of the borrower type with these selected covariates from X_i and Z_i.

The marginal effects for these variables, by borrower type (relative to fraudulent investors), are reported in Table 7b. All of the coefficients are negative, reflecting the fact that fraudulent investors have higher default risk than other borrower types (as shown in Table 7a). In most cases, there is only modest variation across the categories, suggesting that the extra risk of fraud is not significantly impacted, for instance, by the change in local unemployment rates. Updated LTV is an exception, however. We find that fraudulent investors are significantly more likely to default when their updated LTV is high than are other borrower types. For instance, for the lowest category (updated LTV<80 percent), fraudulent investors are only 2–4 percentage points more likely to default, whereas for the highest category (updated LTV ≥120 percent), the difference ranges from 11–13 percentage points across the borrower types. This supports the idea that these borrowers are more strategic than others. More broadly, it demonstrates their greater sensitivity to house price declines and confirms the role that they played in the housing bust.

The other way we approach this question is to compare the likelihood of having high bankcard utilization across borrower type and default status; intuitively, high utilization rates are associated with illiquidity (see Elul et al., 2010). We obtain bankcard utilization from the borrower's matched credit bureau record, as of December 2008. Strategic behavior would be evident in a borrower having relatively lower utilization in case of default, which captures default in the face of smaller liquidity shocks or, equivalently, drawing down less of their liquidity buffer in order to avoid default. We estimate probit regressions where the probability that borrower *i* has high utilization (i.e., a ratio of aggregate bankcard balances to credit limit of 80 percent or higher as of December

2008) is modeled as $\Pr(High\ Utilization) = \Pr(y \leq Y_i)$, where y is normally distributed with mean 0 and variance 1, and

$$Y_i = \beta X_i + \delta D_i + \gamma Borrower\ Type_i + \alpha D_i \times BorrowerType_i \qquad (4)$$

Now X_i includes mortgage and borrower characteristics both at origination and as of December 2008; D_i is an indicator variable denoting whether or not the loan is in default as of December 2008.[17] As fraudulent investors are the base borrower type, we conjecture that $\alpha>0$ for the other borrower types. That is, the other borrower types are likelier to have high utilization in case of default. In addition, we expect that $\delta>0$, that is, that borrowers who default have higher utilization, *ceteris paribus*. (This is consistent with the summary statistics in Table 2a and will be discussed below).

In column (1) of Table 8a, we see that borrower and loan characteristics that reflect ex-ante liquidity constraints (higher LTV at origination, lower origination FICO score, a longer mortgage term) are associated with a greater likelihood of high utilization. Similarly, borrowers with FHA loans are significantly likelier to have high utilization, as are borrowers paying higher interest rates. Changes in the economic environment since origination also play a role: larger changes in unemployment rates (from loan origination through December 2008) and higher updated LTV ratios are also associated with high utilization. The full set of marginal effects can be found in the Appendix.

Turning next to the covariates of interest, borrowers who default on their mortgage are 19 percentage points more likely to have high utilization (relative to a sample average of around 27 percent). This coefficient may be interpreted as capturing unobserved liquidity shocks that the borrower has been subject to, both ex-ante as well as following loan origination.

Next, we consider the interaction of borrower type and default. These marginal effects are reported in Table 8b. This table reports the marginal effect on utilization of moving from fraudulent investors (the base borrower type) to one of the other borrower types, separately for borrowers who do and do not default. In addition, we also report a Chi Square statistic that tests whether the marginal effects are equal across defaulters and nondefaulters.

We see that, generally, nondefaulting fraudulent investors have utilization rates that are either the same as or higher than the other borrower types; this is consistent with our summary statistics. For declared investors, the difference is statistically significant (1.3 percentage points in column (1)), likely reflecting the tighter

[17] We drop 2,556 loans where the default was resolved with a loan termination before December 2008.

underwriting that the latter face, and the fact that those who commit fraud may do so because they expected not to be approved for this mortgage had they declared themselves as investors.

The situation is reversed in default, however. In particular, fraudulent investors who default are 3 percentage points *less* likely to have high utilization than similar declared investors. And the Chi-square statistic confirms that the relative difference for these two borrower types between the likelihood of high utilization in and out of default is statistically significant. This difference is even more striking for honest homeowners, as the latter would be expected to try harder to avoid default (i.e., they behave less strategically). Finally, we do not find as large a difference between fraudulent investors and second homeowners; we conjecture that second homeowners are similarly less attached to their properties.

VIII. An Alternative Hypothesis – *Accidental Fraud*

We have classified borrowers who identify as owner occupants, have multiple first liens, did not move following the origination of their new mortgage, and had a ZIP distance of 75 miles or less as fraudulent; we showed that these frauds default at higher rates (even accounting for the fact that they have multiple liens) and that these defaults were more "strategic." An alternative hypothesis is that this fraud was "accidental," in that these borrowers did not set out to commit occupancy fraud but were unable to sell their original home, for example, because of a real estate market that was worse than anticipated when the transaction commenced. This could explain the presence of multiple liens and would also be consistent with higher default rates because these borrowers would have an ex-post debt burden that is higher than originally anticipated. We do note, however, that it is hard to see how this would affect the other criteria used to define fraud, in line with our results below.

To address this alternative hypothesis, we construct measures of housing market strength and examine how well they predict our measure of fraud. First, using the Multiple Listings Service data from CoreLogic Solutions (henceforth MLS), we construct a semiannual measure of the average days on market (DOM) for single-family properties offered for sale in the county associated with the consumer address in the CCP data (prior to the new purchase mortgage origination date).[18] The available MLS data enables us to construct this measure for 1,911 counties, covering roughly 85 percent of our sample. We create buckets for this measure to allow for a nonlinear effect. Our summary statistics, in Table 2a, show that fraudulent investors indeed have a somewhat longer DOM than do honest homeowners (or declared investors). In Table 2b, we see that once we condition on

[18] We drop properties listed for rental, apartments, commercial/industrial/business properties, condos, farms, land/plots, mobile homes, multifamily units, duplexes, triplexes, fourplexes, timeshares, townhouses, listings with a negative DOM, and those with a DOM greater than 540.

the borrower having multiple liens, this difference shrinks. This will be explored further in our multivariate regressions.

We now use this DOM measure as a regressor in a linear probability model for each of the criteria defining occupancy fraud: having multiple liens four quarters following the CRISM loan origination, not moving following loan origination, and a ZIP distance of 75 miles or less. We restrict attention to borrowers who are declared owner-occupants in the McDash mortgage data since we are interested in distinguishing between frauds and "accidental" frauds.

The results are reported in Table 9a (the full set of coefficients can be found in the appendix). In each case, we first estimate a baseline linear probability model for the criterion (without the days measure) and then add the days measure in a separate column. Column (1), in particular, reports the results for a model of multiple liens. The key determinants have intuitive signs. Lagged house price appreciation is positively associated with multiple liens, either because by raising the value of the borrowers' other properties it relaxes credit constraints, or alternatively because it attracts speculative buyers (see Chinco and Mayer, 2016). Interest-only loans are associated with a significantly higher likelihood of multiple first liens, as such loans lower the required monthly payments; similarly, adjustable rate mortgages with short fixed periods are also associated with multiple liens. Borrowers with lower FICO scores at origination are generally less likely to have multiple liens (likely because of tighter underwriting criteria) Those with either very low or very high LTV ratios at origination are less likely to have other liens: the former likely because they have other liquid wealth, and the latter because of stricter lender underwriting for borrowers with multiple liens.

In column (2) we add the DOM measure. Longer days on market is indeed associated with a higher likelihood of multiple liens, as we hypothesized. However, the effect of DOM is rather modest and its inclusion in our model does not affect any of the other coefficients. In column (3) we replace DOM with the year-ahead change in house prices as our measure of market strength. Contrary to the "accidental fraud" hypothesis, *increases* in future house prices are associated with multiple first liens. We conjecture that this may reflect either a causal effect from property speculation to house prices (Chico and Mayer, 2016), or, similarly, that speculators anticipate these future increases in prices. In any case, we do not find strong support for the alternative hypothesis of "accidental fraud."

In columns (4)–(12) we repeat this analysis for the other criteria (not moving and ZIP distance of less than 75 miles) and finally for fraud itself (which incorporates all three criteria). In each case, very few of the covariates are economically significant, and the days measure is usually statistically (but always economically) insignificant.

In Table 9b we examine the effect of DOM on our probit models of mortgage default from Table 7a. Column (1) estimates the baseline model for the subsample of borrowers for whom we can compute DOM; the coefficients are close to those in column (1) of Table 7a.[19] In column (2), we add the DOM measure and see that while increased DOM is indeed associated with a modestly higher incidence of default, the fraud coefficient is unchanged. We interpret the positive relationship between DOM and default as indicating that in a slower market it is more difficult for borrowers to sell their house instead of defaulting. Finally, in column (3), we control for the criteria defining fraud: multiple liens, not moving, and a ZIP distance of 75 miles or less. Doing so does not significantly change the DOM coefficients. As already seen in column (4) of Table 7a, adding these covariates does sharpen the relative impact of fraud on default, as expected.

For robustness, we also estimated the models described here with (i) ZIP-code level measures of DOM (ii) half-year lag and lead DOM measures, and (iii) the change in DOM over the past year (to capture unanticipated deterioration); overall, we obtained similar, or weaker, impacts of DOM. These results are not reported here.

In short, while a slower housing market is modestly associated with a higher incidence of multiple liens and higher default rates, we conclude that these effects are largely independent of fraud.

IX. Conclusion

Using a matched credit bureau and mortgage data set, we identify widespread occupancy fraud in residential mortgages originated between 2005 and 2007. In contrast to previous studies, our data set allows us to show that occupancy fraud was common in the GSE market and in loans held in portfolio, not just in the private label market. We find that mortgage borrowers who misrepresented their occupancy status performed worse than otherwise similar owner-occupants and declared investors. Fraudulent investors' bankcard utilization rates while in default indicate that their mortgage default decisions were more strategic than those of honest owner-occupants and declared investors. Our results are economically significant and demonstrate the important role that occupancy fraud played during the U.S. housing boom and bust. Our approach, which brings together a broad set of data on borrowers, may also be useful in understanding future cases in which fraud is suspected as contributing to consumer lending booms.

[19] The differences are due to the restriction here to counties for which we can compute DOM.

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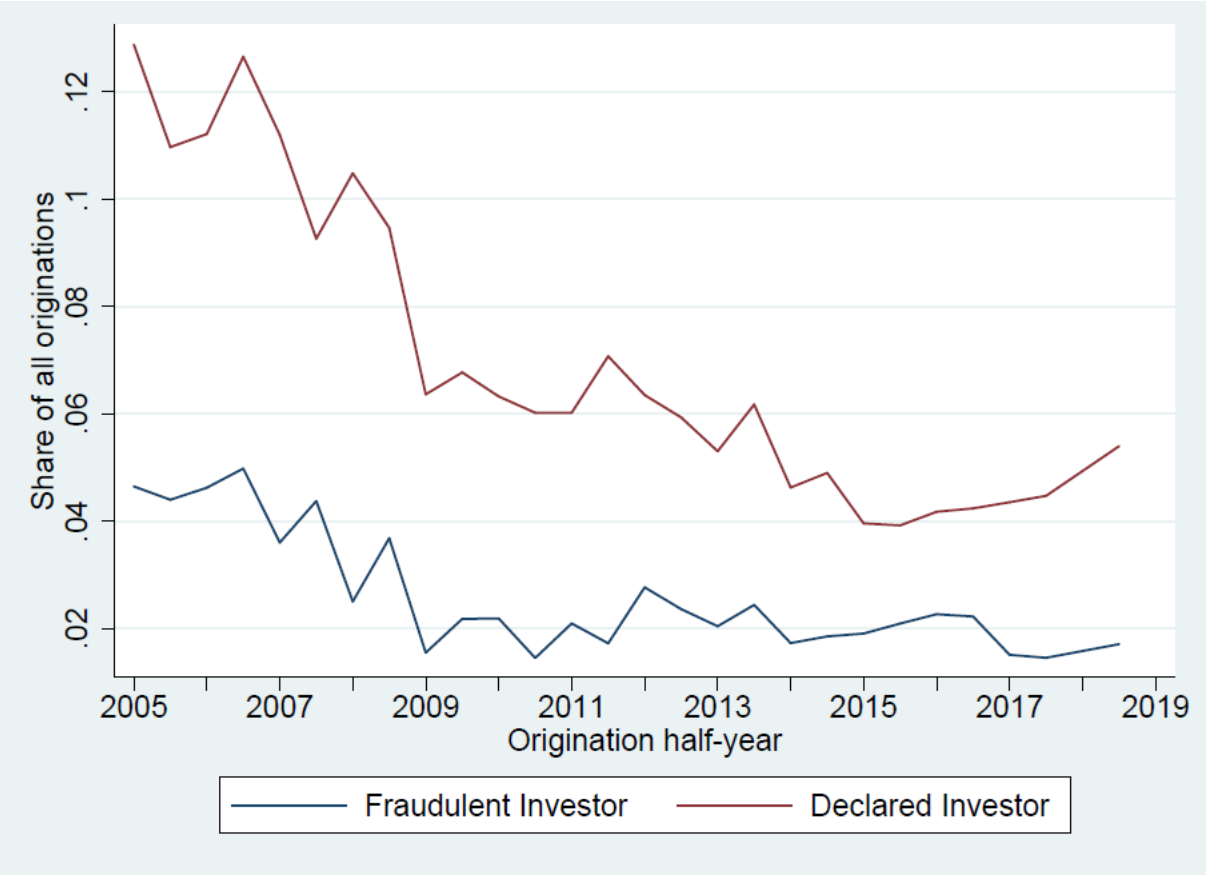
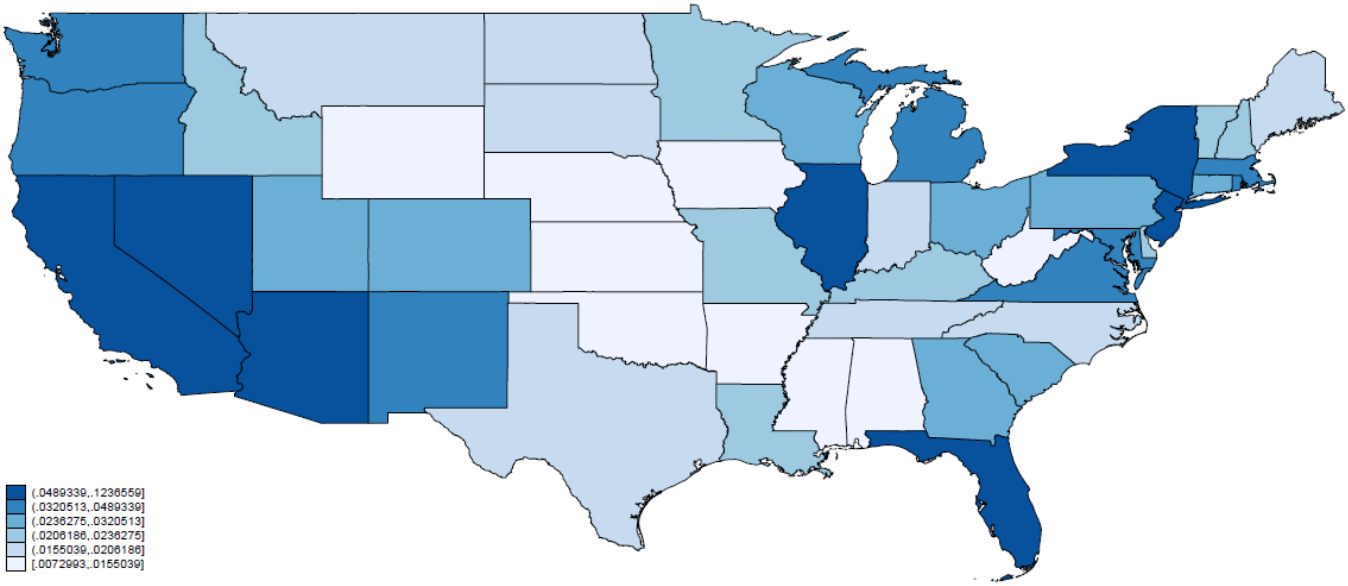
Figure 1: Incidence of Mortgage Fraud and Investor Activity by Origination Vintage



Note: Borrower types are as defined in Section IV.
Source: Authors' calculations of McDash, CCP, and CRISM data.

Figure 2: The Geography of Occupancy Fraud
State-level mortgage occupancy fraud rate as a share of purchase mortgages originated between 2005 and 2007.



Source: Authors' calculations of McDash, CCP, and CRISM data.

Table 1: Variable Descriptions

Variable	Description
Borrower Type	Honest homeowner, fraudulent investor, declared investor, or second home
Default	60+ days delinquent as of December 2008 or bad termination by December 2008, in McDash data
Bubble State	McDash property address in California, Nevada, Arizona, or Florida
FICO (Origination)	McDash origination FICO score
LTV Ratio (Origination)	LTV ratio of CRISM mortgage at origination
% Change HPI: Origination to Dec. 2008	Percentage change in the property's ZIP code–level CoreLogic house price index from origination to December 2008; if ZIP code level is not available, the county level is used, and if this is also unavailable, the state level is used
% Change 2-Year Lagged HPI	Percentage change in the property's ZIP code–level CoreLogic house price index two years before the McDash loan origination date; if ZIP code level is not available, county level is used, and if this is also unavailable, the state level is used
Second Lien	Borrowers have a second lien (HELOC or closed-end home equity loan) in bureau data four quarters after CRISM mortgage origination
Interest Rate (Origination)	Interest rate observed when mortgage first enters the McDash data
Investor Type	McDash–reported investor type six months following origination: FHA/VA, GSE (FNMA/FHLMC), Private Securitized, or Portfolio.
Interest Rate Type	Fixed Rate vs. ARM; for ARMs, loans have either 1-year, 2-year, 3-year, 5-year, 7-year, or 10-year introductory fixed periods
Bankcard Utilization ≥80%	1 if bankcard utilization is greater than or equal to 0.80 as of December 2008
Bankcard Utilization (No Default)	Total bankcard balance/Total bankcard limit (for bankcards with an update in the previous 3 months) as of December 2008; mortgage not in default as of December 2008 (CCP)
Bankcard Utilization (Default)	Bankcard utilization in December 2008 if mortgage in default as of December 2008 (but not terminated)
Updated LTV Ratio (December 2008)	Origination amount/(LTV at origination× [1+ ZIP code–level HPI appreciation from origination to December 2008])
Multiple First Liens	More than one first-lien mortgage in CCP four quarters following the CRISM mortgage origination date
Unemployment Rate at Close Date	Property's ZIP code–level unemployment rate at origination (BLS)
Change Unemployment (Origination) to December 2008	Percentage change in the property's ZIP code–level unemployment rate from origination to December 2008 (BLS)
Deficiency Prohibited	State law prohibits deficiency judgments against borrower in the event of mortgage default (Ghent and Kudlyak, 2011)
Homestead Exemption	State-level dummy variable where 0 indicates no homestead tax exemption or exemption only for seniors and 1 indicates homestead tax exemption for all ages (National Conference of State Legislatures, 2002)
Mortgage Term	Years until mortgage maturity (at origination): 15/20 years, 30 years, or 40 years

Source: Variables based on authors' calculations of McDash, CCP, CRISM, CoreLogic, and BLS data.

Table 2a: Summary Statistics by Borrower Type

Characteristic	Honest Owner-Occup.	Fraudulent Investor	Declared Investor	Second Homeowner
Number Loans	120817	5765	16381	5739
Share (Count)	81.25%	3.88%	11.02%	3.86%
Share by Origination Dollars	82.11%	5.14%	8.63%	4.12%
Share of Delinq/Defaults – Count (as of Dec. 2008)	78.63%	9.82%	9.23%	2.32%
Share of Delinq/Defaults – $ (as of Dec. 2008)	77.08%	13.60%	6.77%	2.55%
Serious Delinquency/Default (60+DPD) by Dec. 2008	9.13%	23.89%	7.90%	5.68%
Moved around Mortgage Origination	100.00%	0.00%	58.40%	42.17%
CCP ZIP ≤ 75 Miles from McDash ZIP	97.82%	100.00%	82.25%	38.00%
Multiple First Liens (4Q after Orig.)	18.49%	100.00%	44.19%	50.90%
Bubble State	17.14%	37.76%	16.24%	29.33%
Deficiency Prohibited in State	24.25%	39.76%	22.74%	25.07%
FICO at Orig. <660	26.19%	20.02%	17.53%	7.28%
FICO at Orig. in [660,700)	17.47%	21.47%	16.32%	13.78%
FICO at Orig. in [700,750)	24.51%	29.18%	26.41%	27.43%
FICO at Orig. in [750,800)	26.96%	25.74%	33.57%	41.51%
FICO at Orig. ≥800	4.88%	3.59%	6.17%	10.00%
FICO Score at Orig. (Avg.)	705.10	709.47	720.32	741.35
LTV at Orig. ≤70	13.72%	13.11%	19.35%	22.90%
LTV at Orig. (70,80]	46.99%	65.29%	48.61%	56.40%
LTV at Orig. (80,90)	6.36%	5.83%	8.02%	9.65%
LTV at Orig. ≥90	32.93%	15.77%	24.02%	11.05%
LTV at Orig. (Avg.)	81.91	78.87	78.94	75.44
Updated LTV Dec. 2008 <80	22.93%	18.44%	30.11%	30.72%
Updated LTV Dec. 2008 [80,90)	20.64%	18.20%	23.73%	24.53%
Updated LTV Dec. 2008 [90,100)	19.00%	16.67%	17.78%	16.10%
Updated LTV Dec. 2008 [100,120)	26.08%	24.27%	19.98%	17.08%
Updated LTV Dec. 2008 ≥120	11.35%	22.43%	8.39%	11.57%
Loan amount at Orig. ≤200k	59.07%	38.27%	72.00%	55.95%
Loan amount at Orig. (200k,359650]	27.51%	34.41%	22.50%	28.86%
Loan amount at Orig. (359650,417k]	4.87%	9.66%	3.16%	5.09%
Loan amount at Orig. (417k,700k]	6.79%	14.14%	1.98%	7.54%
Loan amount at Orig. >700k	1.76%	3.52%	0.35%	2.56%
Loan amount at Orig. (avg, $)	219349	287564	169987	231844
Jumbo Loan (Share)	8.94%	18.35%	2.42%	10.49%
HPI % Chg.: Orig. to Dec. 2008	-11.46%	-19.23%	-10.64%	-13.83%
HPI % Chg.: 2 years prior to Orig.	16.66%	23.23%	18.59%	23.30%
Second Lien (4Q after Orig.)	30.36%	49.97%	39.04%	42.46%
Interest Rate at Orig.	6.40	6.69	6.57	6.28
Brokered	18.19%	26.78%	10.43%	14.10%
FRM	78.58%	56.84%	85.35%	72.10%
ARM: 1-year intro rate	1.18%	1.63%	1.01%	3.35%
ARM: 2-year intro rate	6.25%	15.54%	3.55%	2.23%
ARM: 3-year intro rate	2.13%	4.39%	1.73%	1.97%
ARM: 5-year intro rate	7.60%	16.22%	6.29%	13.52%
ARM: 7-year intro rate	2.08%	2.53%	1.20%	2.93%
ARM: 10-year intro rate	2.17%	2.84%	0.88%	3.90%
Interest-Only Loan	12.69%	29.00%	8.45%	19.69%
Option ARM	3.09%	9.58%	3.27%	0.61%
Low/No Documentation	40.46%	50.89%	24.44%	52.27%
Unknown Documentation	8.89%	10.77%	6.63%	10.30%
FHA/VA	13.51%	2.64%	19.28%	0.00%
GSE	55.65%	45.45%	58.50%	70.71%
Portfolio	9.56%	11.67%	3.87%	10.04%
Private Securitized	21.28%	40.24%	18.34%	19.25%
Bankcard Util. (not in default as of Dec. 2008)	34.90%	33.33%	30.26%	26.23%
Bankcard Util. ≥80% (not in default as of Dec. 2008)	27.67%	24.95%	23.25%	19.86%
Bankcard Utilization (in default as of Dec. 2008)	78.59%	56.60%	69.27%	56.04%
Bankcard Util. ≥80% (in default as of Dec. 2008)	79.37%	58.95%	71.58%	58.04%
Days on Market (County Average)	161.8	183.9	156.5	178.7

Source: Authors' calculations of McDash, CCP, CRISM, CoreLogic and BLS data. FICO score at origination is from McDash.

Table 2b. Summary Statistics for Borrowers with Multiple First Liens

Characteristic	Honest Owner-Occupant	Fraudulent Investor	Declared Investor	Second Homeowner
Number Loans	21511	5613	7052	2921
Share (Count)	58%	15%	19%	8%
Share by Origination Dollars	64%	16%	12%	7%
Share of Delinq./Defaults – Count (as of Dec. 2008)	58%	26%	13%	4%
Share of Delinq./Defaults – $ (as of Dec. 2008)	61%	27%	8%	4%
Serious Delinquency/Default (60+DPD) by Dec. 2008	14%	24%	10%	8%
Moved around Mortgage Origination	100%	0%	33%	31%
CCP ZIP ≤75 Miles from McDash ZIP	96%	100%	78%	33%
Bubble State	30%	38%	22%	33%
Deficiency Prohibited in State	33%	41%	26%	27%
FICO at Orig. <660	16%	19%	9%	7%
FICO at Orig. in [660,700)	20%	21%	18%	14%
FICO at Orig. in [700,750)	31%	30%	32%	30%
FICO at Orig. in [750,800)	29%	26%	36%	42%
FICO at Orig. ≥800	4%	4%	5%	7%
FICO Score at Orig. (Avg.)	716.60	711.06	730.60	739.61
LTV at Orig. ≤70	12%	13%	21%	20%
LTV at Orig. (70,80]	73%	67%	57%	60%
LTV at Orig. (80,90)	4%	6%	12%	10%
LTV at Orig. ≥90	11%	14%	10%	10%
LTV at Orig. (Avg.)	78.22	78.46	76.13	76.33
Updated LTV Dec. 2008 <80	22%	19%	32%	28%
Updated LTV Dec. 2008 [80,90)	25%	19%	26%	24%
Updated LTV Dec. 2008 [90,100)	18%	16%	17%	17%
Updated LTV Dec. 2008 [100,120)	20%	24%	15%	17%
Updated LTV Dec. 2008 ≥120	16%	23%	10%	14%
Loan amount at Orig. ≤200k	35%	37%	71%	49%
Loan amount at Orig. (200k,359650]	39%	35%	21%	31%
Loan amount at Orig. (359650,417k]	9%	10%	3%	6%
Loan amount at Orig. (417k,700k]	14%	14%	3%	10%
Loan amount at Orig. >700k	4%	4%	1%	3%
Loan amount at Orig. (avg, $)	294417.36	290912.92	170911.07	254494.50
Jumbo Loan (Share)	18%	19%	4%	14%
HPI % Chg: Orig. to Dec. 2008	-16%	-19%	-13%	-15%
HPI % Chg: 2 years prior to Orig.	21%	24%	20%	25%
Second Lien (4Q after Orig.)	36%	51%	57%	54%
Interest Rate at Orig.	6.45	6.70	6.86	6.31
Brokered	22%	27%	17%	14%
FRM	64%	56%	76%	67%
ARM: 1-year intro rate	2%	2%	2%	5%
ARM: 2-year intro rate	10%	16%	6%	2%
ARM: 3-year intro rate	3%	4%	3%	2%
ARM: 5-year intro rate	15%	17%	11%	17%
ARM: 7-year intro rate	3%	3%	2%	3%
ARM: 10-year intro rate	3%	3%	1%	5%
Interest-Only Loan	27%	30%	15%	24%
Option ARM	5%	10%	6%	1%
Low/No Documentation	46%	52%	39%	54%
Unknown Documentation	10%	11%	10%	10%
FHA/VA	0%	0%	0%	0%
GSE	53%	47%	64%	66%
Portfolio	11%	12%	6%	11%
Private Securitized	36%	41%	30%	23%
Bankcard Utilization (in default as of Dec. 2008)	69%	56%	63%	57%
Bankcard Util. ≥80% (in default as of Dec. 2008)	70%	58%	63%	56%
Bankcard Util. (not in default as of Dec. 2008)	34%	33%	28%	26%
Bankcard Util. ≥80% (not in default as of Dec. 2008)	24%	25%	19%	18%
Days on Market (County Average)	174.6	184.2	163.0	178.8

Note: Borrowers with multiple first liens four quarters after loan origination. Borrowers with an FHA or VA loan are excluded.

Source: Authors' calculations of McDash, CCP, CRISM, CoreLogic, and BLS data. FICO score at origination is from McDash.

Table 2c: Borrower Characteristics by Reported Occupancy Type

	Owner-Occupant	Investor	Second - Homeowner
Multiple First Liens	0.22	0.48	0.52
No Move	0.15	0.46	0.59
Multi and No Move	0.06	0.32	0.36
ZIP Distance (Miles)			
25th pct.	0	0	72
50th pct.	7	8	204
75th pct.	30	67	802

Note: Key borrower characteristics by McDash reported occupancy type. ZIP distance is the distance between McDash and CCP ZIP codes, conditional on having multiple first liens and not moving following loan origination.
Source: Authors' calculations of McDash, CRISM, CCP data.

Table 3: Fraud Share (%) by Origination Vintage and Investor Type

	FHA/VA	GSE	Portfolio	Private Securitized	All
2005H1	0.51	2.95	5.31	6.23	3.78
2005H2	0.54	2.76	4.91	6.75	3.95
2006H1	0.68	2.97	5.27	8.34	4.36
2006H2	0.73	3.08	4.44	7.10	3.76
2007H1	1.04	3.44	4.76	8.69	3.87
2007H2	1.10	3.54	5.35	6.68	3.46

Source: Authors' calculations of McDash, CCP, and CRISM data.

Table 4: Share (%) Seriously Delinquent or in Default as of December 2008, by Borrower Type

	Honest Owner-Occupant	Fraudulent Investor	Declared Investor	Second Homeowner
2005 at Origination	8.82	22.03	8.14	5.66
2006 at Origination	11.82	31.95	9.76	7.92
2007 at Origination	6.65	16.33	4.96	2.89
FICO at Orig. <660	21.74	42.98	20.90	17.70
FICO at Orig. [660,700)	9.79	31.50	12.19	10.87
FICO at Orig. [700,750)	5.13	20.57	5.80	7.05
FICO at Orig. [750,800)	1.62	9.16	1.91	2.23
FICO at Orig. ≥800	0.58	4.35	1.19	0.35

Source: Authors' calculations of McDash, CCP, and CRISM data. FICO score at origination is from McDash.

Table 5a: Fraud and Interest Rates*

	(1)	(2)	(3)	(4)
Honest Homeowner	-0.165***	0.015	-0.101***	
	(0.009)	(0.013)	(0.016)	
Declared Investor	0.214***	0.296***	0.333***	0.387***
	(0.010)	(0.011)	(0.013)	(0.016)
Second Home	-0.085***	-0.022	-0.077***	-0.052*
	(0.012)	(0.014)	(0.017)	(0.032)
FICO at Orig in [660,700)	-0.349***	-0.354***	-0.316***	-0.336***
	(0.006)	(0.006)	(0.012)	(0.025)
FICO at Orig. in [700,750)	-0.444***	-0.448***	-0.446***	-0.495***
	(0.006)	(0.006)	(0.011)	(0.024)
FICO at Orig. in [750,800)	-0.521***	-0.523***	-0.547***	-0.620***
	(0.006)	(0.006)	(0.012)	(0.025)
FICO at Orig ≥800	-0.526***	-0.525***	-0.557***	-0.625***
	(0.009)	(0.009)	(0.019)	(0.039)
LTV at Orig. in (70,80]	0.055***	0.050***	0.070***	0.096***
	(0.005)	(0.005)	(0.010)	(0.019)
LTV at Orig. (80,90)	0.345***	0.337***	0.420***	0.450***
	(0.008)	(0.008)	(0.016)	(0.029)
LTV at Orig. ≥90	0.364***	0.362***	0.513***	0.592***
	(0.006)	(0.006)	(0.013)	(0.027)
Orig. Amt. in (200k,359650]	-0.172***	-0.176***	-0.159***	-0.158***
	(0.004)	(0.004)	(0.008)	(0.017)
Orig. Amt. (359650,417k]	-0.234***	-0.240***	-0.243***	-0.210***
	(0.008)	(0.008)	(0.013)	(0.029)
Orig. Amt. (417k,700k]	-0.329***	-0.334***	-0.349***	-0.317***
	(0.008)	(0.008)	(0.012)	(0.027)
Orig. Amt. >700k	-0.335***	-0.341***	-0.348***	-0.274***
	(0.013)	(0.013)	(0.021)	(0.048)
Moved		-0.131***	-0.032**	
		(0.009)	(0.013)	
ZIP Distance >75 miles		0.036***	0.006	
		(0.008)	(0.012)	
Single First Lien		-0.072***		
		(0;004)		
R^2	0.52	0.52	0.53	0.53
Observations	129069	129069	37097	9789

Note: OLS regression models for the interest rate at the time of origination (or when first available). FHA/VA loans are excluded. Column (3) restricts attention to borrowers with multiple first liens. Column (4) further restricts attention to borrowers who do not move across loan origination and have a ZIP distance of 75 miles or less. All specifications include origination half-year and state fixed effects. FICO at origination is from McDash. Standard errors (clustered at the county level) are in parentheses; *** p<0.01, ** p<0.05, * p<0.1.

Source: Authors' calculations of McDash, CCP, CRISM, CoreLogic, and BLS data.

Table 5b: Marginal Effects on Interest Rates

	(1) Honest Homeowner	(2) Decl. Investor	(3) Second Homeowner	(4) Decl. Investor; Multiple Firsts	(5) Second Homeowner; Multiple Firsts
FICO Orig. <660	-0.016	0.417***	-0.032	0.545***	-0.156
	(0.023)	(0.029)	(0.038)	(0.046)	(0.130)
FICO Orig. in [660,700)	-0.143***	0.317***	-0.100***	0.392***	-0.311**
	(0.022)	(0.024)	(0.030)	(0.035)	(0.137)
FICO Orig. in [700,750)	-0.074***	0.355***	-0.064***	0.661***	-0.361***
	(0.019)	(0.020)	(0.024)	(0.146)	(0.137)
FICO Orig. in [750,800)	-0.045**	0.350***	-0.051**	0.612***	-0.368**
	(0.020)	(0.020)	(0.023)	(0.146)	(0.150)
FICO Orig. ≥800	-0.042	0.346***	-0.061	0.632***	-0.183**
	(0.046)	(0.049)	(0.052)	(0.185)	(0.085)
LTV Orig. ≤70	0.006	0.316***	0.036	0.532***	-0.234
	(0.026)	(0.026)	(0.030)	(0.101)	(0.147)
LTV Orig. in (70,80]	-0.023	0.289***	0.006	0.548***	-0.260*
	(0.016)	(0.016)	(0.019)	(0.096)	(0.133)
LTV Orig. in (80,90)	-0.115***	0.460***	-0.174***	0.612***	-0.417**
	(0.037)	(0.040)	(0.045)	(0.106)	(0.165)
LTV Orig. ≥90	-0.211***	0.542***	-0.275***	0.740***	-0.626***
	(0.025)	(0.031)	(0.034)	(0.102)	(0.151)
Orig. Amt. <=200K	-0.052***	0.370***	-0.065***	0.582***	-0.303**
	(0.017)	(0.017)	(0.020)	(0.096)	(0.132)
Orig Amt (200K,359650]	-0.070***	0.358***	-0.019	0.554***	-0.270**
	(0.018)	(0.020)	(0.024)	(0.099)	(0.135)
Orig. Amt. (359650,417K]	-0.079***	0.286***	-0.082*	0.583***	-0.332*
	(0.030)	(0.040)	(0.046)	(0.120)	(0.174)
Orig. Amt. (417k,700K]	-0.093***	0.377***	-0.132***	0.651***	-0.477***
	(0.029)	(0.045)	(0.043)	(0.115)	(0.175)
Orig Amt. >700K	-0.183***	0.149	-0.185***	0.338*	-0.372
	(0.049)	(0.094)	(0.071)	(0.178)	(0.233)
GSE	-0.025	0.348***	-0.069***	0.616***	-0.354**
	(0.016)	(0.017)	(0.019)	(0.097)	(0.139)
Portfolio	-0.421***	0.295***	-0.192***	0.447***	-0.258
	(0.029)	(0.037)	(0.039)	(0.107)	(0.162)
Private Securitized	-0.016	0.412***	0.018	0.550***	-0.273**
	(0.020)	(0.021)	(0.028)	(0.097)	(0.135)
Not Interest-Only	-0.071***	0.338***	-0.060***	0.537***	-0.305**
	(0.015)	(0.014)	(0.017)	(0.095)	(0.130)
Interest-Only Loan	-0.023	0.470***	-0.062**	0.700***	-0.349**
	(0.022)	(0.027)	(0.029)	(0.101)	(0.147)
Not Low Doc.	-0.001	0.316***	-0.015	0.575***	-0.260*
	(0.017)	(0.016)	(0.020)	(0.096)	(0.133)
Low Doc.	-0.152***	0.416***	-0.122***	0.576***	-0.375***
	(0.017)	(0.018)	(0.020)	(0.097)	(0.134)
Not Unknown Doc.	-0.050***	0.349***	-0.053***	0.576***	-0.321**
	(0.014)	(0.014)	(0.017)	(0.095)	(0.130)
Unknown Doc.	-0.199***	0.448***	-0.129***	0.566***	-0.270*
	(0.030)	(0.034)	(0.039)	(0.105)	(0.157)
Not Option ARM	-0.066***	0.359***	-0.044***	0.573***	-0.279**
	(0.014)	(0.013)	(0.016)	(0.095)	(0.127)
Option ARM	-0.018	0.328***	-0.473***	0.601***	-0.760**
	(0.032)	(0.040)	(0.111)	(0.111)	(0.339)
No Second Lien	-0.072***	0.343***	-0.053***	0.585***	-0.331**
	(0.016)	(0.016)	(0.019)	(0.096)	(0.135)
Has Second Lien	-0.051***	0.385***	-0.071***	0.567***	-0.303**
	(0.017)	(0.016)	(0.020)	(0.096)	(0.130)
Observations	129069	129069	129069	9789	9789

Note: This table reports the marginal effect on origination interest rate of changing risk characteristics, by borrower type, relative to the base borrower type (fraudulent investor). Columns (1)–(3) interact borrower type in model (2) in Table 5a; columns (4)–(5) interact borrower type in model (4) of Table 5a. FICO at origination is from McDash. Standard errors are in parentheses (clustered at the county level); *** p<0.01, ** p<0.05, * p<0.1.

Source: Authors' calculations of McDash, CCP, CRISM, CoreLogic, and BLS data.

Table 6: Determinants of Fraud

	(1)	(2)	(3)	(4)	(5)	(6)
FICO at Orig. in [660,700)	-0.107***	-0.124***	-0.125***	-0.125***	-0.125***	-0.102***
	(0.015)	(0.015)	(0.015)	(0.015)	(0.015)	(0.015)
[700,750)	-0.154***	-0.172***	-0.177***	-0.176***	-0.177***	-0.160***
	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)	(0.015)
[750,800)	-0.190***	-0.200***	-0.208***	-0.208***	-0.209***	-0.198***
	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)	(0.015)
≥800	-0.174***	-0.178***	-0.189***	-0.187***	-0.189***	-0.204***
	(0.023)	(0.022)	(0.023)	(0.023)	(0.023)	(0.025)
Orig. LTV in (70,80]	0.128***	0.093***	0.085***	0.084***	0.085***	0.090***
	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)	(0.013)
(80,90)	-0.057***	-0.040**	-0.047***	-0.050***	-0.047***	-0.070***
	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)	(0.020)
≥90	0.154***	0.153***	0.144***	0.142***	0.144***	0.128***
	(0.016)	(0.015)	(0.015)	(0.015)	(0.015)	(0.017)
Orig. Amt (200K,359650]		0.202***	0.234***	0.237***	0.234***	0.261***
		(0.011)	(0.010)	(0.010)	(0.010)	(0.013)
(359650,417K]		0.320***	0.365***	0.369***	0.365***	0.364***
		(0.019)	(0.017)	(0.017)	(0.017)	(0.018)
(417K,700K]		0.381***	0.423***	0.427***	0.424***	0.373***
		(0.018)	(0.016)	(0.016)	(0.016)	(0.017)
>700K		0.468***	0.511***	0.515***	0.513***	0.439***
		(0.027)	(0.024)	(0.024)	(0.024)	(0.021)
Lagged 2-Yr. HPI Change	-0.042	-0.033	-0.062**	-0.038	-0.043*	0.007
	(0.033)	(0.032)	(0.028)	(0.025)	(0.025)	(0.037)
Unemployment Rate at Orig.	-0.020***	0.002	0.010***	0.011***	0.009***	0.005
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.004)
Interest-Only Loan		0.127***	0.125***	0.129***	0.127***	0.127***
		(0.014)	(0.014)	(0.014)	(0.014)	(0.015)
Low Documentation		0.086***	0.094***	0.094***	0.094***	0.060***
		(0.009)	(0.009)	(0.009)	(0.009)	(0.010)
Unknown Documentation		0.005	0.012	0.012	0.012	-0.003
		(0.014)	(0.014)	(0.014)	(0.014)	(0.015)
Correspondent Lender	-0.062***	-0.076***	-0.077***	-0.078***	-0.079***	-0.014
	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.012)
Broker	0.055***	0.045***	0.053***	0.052***	0.052***	0.026**
	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)	(0.012)
Has Second Lien	-0.068***	-0.060***	-0.062***	-0.061***	-0.061***	-0.108***
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.009)
Portfolio	0.122***	0.056***	0.053***	0.053***	0.054***	0.038**
	(0.015)	(0.016)	(0.016)	(0.016)	(0.016)	(0.017)
Private Securitized	0.023**	-0.071***	-0.069***	-0.069***	-0.069***	-0.068***
	(0.010)	(0.010)	(0.011)	(0.011)	(0.011)	(0.012)
Term: 15/20 years	-0.087***	-0.063***	-0.072***	-0.074***	-0.072***	-0.106***
	(0.020)	(0.019)	(0.019)	(0.019)	(0.019)	(0.022)
40 years	0.138***	0.133***	0.139***	0.140***	0.139***	0.114***
	(0.027)	(0.027)	(0.027)	(0.027)	(0.027)	(0.028)
ARM: 1-year	-0.074**	-0.075**	-0.074**	-0.075**	-0.103***	-0.074**
	(0.030)	(0.030)	(0.031)	(0.030)	(0.036)	(0.030)
2-year	0.107***	0.119***	0.120***	0.120***	0.079***	0.107***
	(0.018)	(0.018)	(0.018)	(0.018)	(0.019)	(0.018)
3-year	0.002	0.010	0.010	0.010	-0.003	0.002
	(0.023)	(0.024)	(0.024)	(0.024)	(0.026)	(0.023)
5-year	-0.042***	-0.038**	-0.037**	-0.038**	-0.043**	-0.042***
	(0.015)	(0.016)	(0.016)	(0.016)	(0.018)	(0.015)
7-year	-0.097***	-0.091***	-0.090***	-0.092***	-0.051	-0.097***
	(0.027)	(0.027)	(0.027)	(0.027)	(0.035)	(0.027)
10-year	-0.050*	-0.046	-0.046	-0.047	-0.042	-0.050*
	(0.029)	(0.029)	(0.029)	(0.029)	(0.035)	(0.029)
Option ARM		-0.088***	-0.087***	-0.087***	-0.087***	-0.019
		(0.016)	(0.016)	(0.016)	(0.016)	(0.021)
Bubble State			0.026**			
			(0.011)			
Owner-Occup. Prop. Tax Exemption				0.021**		
				(0.009)		
Deficiency Judgment Prohibited					0.018*	
					(0.010)	
Observations	12665	12665	12665	12665	12665	9261

Note: Probit models for the probability that a declared investor or fraudulent investor is fraudulent. All specifications are restricted to borrowers who have multiple first-lien mortgages in CCP four quarters after origination and exclude FHA/VA loans. Column (2) gives the marginal effects for model (1). All specifications include origination half-year fixed effects, and columns (1), (2), and (6) include state fixed effects. FICO at origination is from McDash. Standard errors are in parentheses (clustered at the county level); *** p<0.01, ** p<0.05, * p<0.1.
Source: Authors' calculations of McDash, CCP, CRISM, CoreLogic, and BLS data.

Table 7a: Fraud and Mortgage Default

	(1)	(2)	(3)	(4)	(5)	(6)
Honest Homeowner	-0.058***	-0.033***	-0.054***	-0.066***	-0.096***	
	(0.004)	(0.004)	(0.007)	(0.007)	(0.008)	
Declared Investor	-0.049***	-0.033***	-0.047***	-0.064***	-0.091***	-0.067***
	(0.005)	(0.005)	(0.007)	(0.007)	(0.008)	(0.009)
Second Homeowner	-0.056***	-0.039***	-0.051***	-0.084***	-0.117***	-0.062***
	(0.006)	(0.006)	(0.007)	(0.008)	(0.009)	(0.016)
Single First Lien		-0.031***	-0.032***	-0.031***	-0.029***	
		(0.002)	(0.002)	(0.002)	(0.003)	
Moved			0.017***	0.022***	0.037***	
			(0.004)	(0.004)	(0.004)	
ZIP Distance >75 miles				0.049***	0.050***	
				(0.005)	(0.005)	
Has Second Lien	0.019***	0.020***	0.021***	0.021***	0.013***	0.001
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.006)
Orig. Int. Rate	0.032***	0.031***	0.031***	0.031***	0.053***	0.056***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.003)	(0.005)
FICO Orig. in [660,700)	-0.068***	-0.071***	-0.070***	-0.071***	-0.075***	-0.032***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.012)
FICO Orig. in [700,750)	-0.100***	-0.102***	-0.102***	-0.102***	-0.104***	-0.068***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.012)
FICO Orig. in [750,800)	-0.130***	-0.131***	-0.131***	-0.131***	-0.118***	-0.129***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.013)
FICO Orig. ≥800	-0.142***	-0.142***	-0.142***	-0.142***	-0.112***	-0.140***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.003)	(0.021)
Orig. Amt. in (200k,359650]	0.008***	0.004*	0.004*	0.005**	0.011***	0.052***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.009)
Orig. Amt. in (359650,417k]	0.020***	0.015***	0.015***	0.016***	0.021***	0.078***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.014)
Orig. Amt. in (417k,700k]	0.002	-0.003	-0.003	-0.002	-0.001	0.059***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.013)
Orig. Amt. >700k	-0.018***	-0.021***	-0.022***	-0.020***	-0.026***	-0.000
	(0.007)	(0.006)	(0.006)	(0.006)	(0.007)	(0.020)
LTV Orig. in (70,80]	0.021***	0.020***	0.020***	0.020***	0.004	0.039***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.012)
LTV Orig. in (80,90)	0.010**	0.012***	0.012***	0.012***	-0.015***	0.005
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.016)
LTV Orig. ≥90	0.021***	0.024***	0.024***	0.025***	-0.007	0.027
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.016)
Updated LTV in [80, 90)	0.014***	0.013***	0.013***	0.013***	0.002	0.021**
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.010)
Updated LTV in [90,100)	0.031***	0.030***	0.030***	0.030***	0.018***	0.049***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)	(0.011)
Updated LTV in [100,120)	0.054***	0.053***	0.053***	0.053***	0.045***	0.106***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.004)	(0.014)
Updated LTV ≥120	0.113***	0.110***	0.110***	0.109***	0.144***	0.186***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.006)	(0.019)
1.4≤Chg Unemp.<2.2	-0.001	-0.001	-0.001	-0.001	-0.001	-0.002
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.012)
2.2≤Chg Unemp.<3.4	0.000	0.001	0.001	0.001	-0.002	-0.026*
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.015)
3.4≤Chg Unemp.<20	0.011***	0.011***	0.011***	0.011***	0.009***	-0.011
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.017)
FHA/VA	0.023***	0.025***	0.025***	0.025***	0.023***	
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	
Portfolio	0.015***	0.015***	0.015***	0.015***	0.008**	0.013
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.013)
Private Securitized	0.022***	0.020***	0.020***	0.020***	0.020***	0.030***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)	(0.011)
Constant					-0.174***	
					(0.016)	
Observations	148702	148702	148702	148702	148702	9690

Notes: Models of mortgage default as of December 2008. All columns except for (5) report marginal effects from probit regressions; column (5) is a linear probability model. Column (6) drops FHA/VA loans and restricts attention to borrowers with multiple first liens, who did not move, and with a ZIP distance of 75 miles or less. All models include origination half-year and state fixed effects. FICO at origination is from the McDash data set. Standard errors are in parentheses (clustered at the county level); *** p<0.01, ** p<0.05, * p<0.1.
Source: Authors' calculations of McDash, CCP, CRISM, CoreLogic, and BLS.

Table 7b. Marginal Effects on Default: Updated LTV, Origination FICO Score, and Unemployment Change

	(1) Updated LTV <80	(2) Updated LTV [80, 90)	(3) Updated LTV [90, 100)	(4) Updated LTV [100, 120)	(5) Updated LTV ≥120
Honest Homeowner	-0.018**	-0.039***	-0.048***	-0.083***	-0.114***
	(0.009)	(0.010)	(0.010)	(0.014)	(0.017)
Declared Investor	-0.023***	-0.039***	-0.035***	-0.076***	-0.128***
	(0.009)	(0.010)	(0.011)	(0.015)	(0.018)
Second Homeowner	-0.040***	-0.056***	-0.075***	-0.112***	-0.136***
	(0.009)	(0.011)	(0.013)	(0.016)	(0.022)
Observations	34902	31524	28230	38563	16580

	(1) FICO <660	(2) FICO in [660, 700)	(3) FICO in [700, 750)	(4) FICO in [750, 800)	(5) FICO ≥800
Honest Homeowner	-0.047***	-0.081***	-0.072***	-0.046***	-0.031**
	(0.013)	(0.010)	(0.009)	(0.007)	(0.013)
Declared Investor	-0.045***	-0.078***	-0.073***	-0.047***	-0.017
	(0.014)	(0.010)	(0.009)	(0.007)	(0.017)
Second Homeowner	-0.108***	-0.099***	-0.078***	-0.052***	-0.043***
	(0.018)	(0.012)	(0.009)	(0.007)	(0.014)
Observations	36303	26032	37502	42237	7725

	(1) Chg. Unemp. [-17.2, 1.4)	(2) Chg. Unemp. [1.4, 2.2)	(3) Chg. Unemp. [2.2, 3.4)	(4) Chg. Unemp. [3.4, 20)
Honest Homeowner	-0.065***	-0.067***	-0.053***	-0.049***
	(0.012)	(0.012)	(0.011)	(0.009)
Declared Investor	-0.062***	-0.055***	-0.056***	-0.053***
	(0.012)	(0.013)	(0.011)	(0.010)
Second Homeowner	-0.080***	-0.097***	-0.077***	-0.079***
	(0.015)	(0.015)	(0.012)	(0.010)
Observations	148702	148702	148702	148702

Note: This table estimates a probit model of default, like that of model (4) of Table 7a, where we interact borrower type with updated LTV, FICO at origination, and unemployment. This table reports the marginal effects of changing the borrower type variable category (from the baseline category of fraudulent investor), for the interacted variables: updated LTV in December 2008, FICO score at origination, and change in unemployment from origination to December 2008. FICO is at origination and is from McDash. Standard errors are in parentheses (clustered at the county level); * p<0.10, ** p<0.05, *** p<0.010.
Source: Authors' calculations of McDash, CCP, CRISM, CoreLogic, and BLS.

Table 8a: Default, Fraud and Bankcard Utilization

	(1)	(2)	(3)	(4)
Mortgage Default (Dec. 2008)	0.189***	0.187***	0.165***	0.150***
	(0.007)	(0.007)	(0.012)	(0.020)
Term Is 15/20 years	-0.059***	-0.060***	-0.053***	-0.056***
	(0.006)	(0.006)	(0.011)	(0.017)
Term Is 40 years	0.028***	0.028***	0.037***	0.035
	(0.007)	(0.007)	(0.013)	(0.023)
Orig. Int. Rate	0.031***	0.031***	0.030***	0.029***
	(0.002)	(0.002)	(0.003)	(0.005)
FICO Orig. in [660,700)	-0.141***	-0.142***	-0.095***	-0.109***
	(0.004)	(0.004)	(0.010)	(0.021)
FICO Orig. in [700,750)	-0.234***	-0.235***	-0.189***	-0.191***
	(0.004)	(0.004)	(0.011)	(0.021)
FICO Orig. in [750,800)	-0.310***	-0.311***	-0.262***	-0.252***
	(0.004)	(0.004)	(0.011)	(0.021)
FICO Orig. ≥800	-0.334***	-0.335***	-0.286***	-0.280***
	(0.005)	(0.005)	(0.013)	(0.022)
LTV Orig. in (70,80]	0.019***	0.018***	0.014**	0.005
	(0.004)	(0.004)	(0.006)	(0.013)
LTV Orig. in (80,90)	0.037***	0.037***	0.036***	0.019
	(0.006)	(0.006)	(0.012)	(0.020)
LTV Orig. ≥90	0.051***	0.052***	0.038***	-0.014
	(0.005)	(0.005)	(0.011)	(0.017)
Updated LTV in [80, 90)	0.004	0.004	0.009	0.017
	(0.004)	(0.004)	(0.007)	(0.013)
Updated LTV in [90,100)	0.011**	0.011**	0.014*	0.024
	(0.004)	(0.004)	(0.008)	(0.016)
Updated LTV in [100,120)	0.013***	0.012***	0.003	0.011
	(0.005)	(0.005)	(0.008)	(0.017)
Updated LTV ≥120	0.021***	0.021***	0.010	0.003
	(0.006)	(0.006)	(0.011)	(0.021)
1.4≤Chg. Unemp.<2.2	0.006*	0.006*	0.003	-0.025**
	(0.003)	(0.003)	(0.007)	(0.012)
2.2≤Chg. Unemp.<3.4	0.007**	0.007**	-0.001	-0.030**
	(0.003)	(0.003)	(0.007)	(0.014)
3.4≤Chg. Unemp.<20	0.018***	0.018***	0.010	-0.021
	(0.004)	(0.004)	(0.009)	(0.017)
FHA	0.046***	0.047***		
	(0.004)	(0.004)		
Portfolio	0.014***	0.014***	0.004	0.019
	(0.004)	(0.004)	(0.008)	(0.014)
Private Securitized	0.017***	0.016***	0.012**	0.010
	(0.003)	(0.003)	(0.005)	(0.010)
Single First Lien		-0.006**		
		(0.003)		
Moved		0.002	0.019**	
		(0.006)	(0.009)	
ZIP Distance >75 miles		0.033***	0.020**	
		(0.006)	(0.008)	
Observations	123874	123874	31315	8163

Note: Probit models for the probability of a borrower having bankcard utilization greater than or equal to 80 percent as of December 2008. The models also include an interaction term between borrower type and mortgage default (reported in Table 8b). Column (3) drops FHA/VA loans and restricts attention to borrowers with multiple first liens. Column (4) further restricts to borrowers who moved and with ZIP distances of 75 miles or less. All models include origination half-year and state fixed effects. FICO at origination is from McDash. Standard errors are in parentheses (clustered at county level); *** p<0.01,
** p<0.05, * p<0.1.
Source: Authors' calculations of McDash, CCP, CRISM, CoreLogic, and BLS data.

Table 8b: Default, Fraud, and Bankcard Utilization (Interactions)

	(1)	(2)	(3)	(4)
Honest Homeowner				
Mortgage not in Default	-0.000	0.002	-0.012	
	(0.006)	(0.008)	(0.010)	
Mortgage in Default	0.106***	0.105***	0.068***	
	(0.014)	(0.017)	(0.019)	
χ^2	44.34***	40.53***	21.71***	
Declared Investor				
Mortgage not in Default	-0.013*	-0.017**	-0.031***	-0.027***
	(0.007)	(0.008)	(0.008)	(0.009)
Mortgage in Default	0.051**	0.038	0.032	0.050
	(0.023)	(0.024)	(0.027)	(0.041)
χ^2	7.27**	5.33**	5.22**	3.36*
Second Homeowner				
Mortgage not in Default	0.009	-0.008	-0.033***	-0.027*
	(0.008)	(0.009)	(0.011)	(0.015)
Mortgage in Default	0.071*	0.043	0.045	0.117
	(0.038)	(0.037)	(0.045)	(0.103)
χ^2	2.55	1.84*	2.80*	1.88
Observations	123874	123874	31315	8163

Note: The marginal effects on the probability of high bankcard utilization of changing borrower type (relative to the baseline type of fraudulent investor), interacted with whether or not the borrower's mortgage was in default (60+ DPD) in December 2008, for the probit models of high utilization from Table 8a. The chi-squared statistic is from a test of equality of the marginal across default status. Standard errors are in parentheses (clustered at county level); *** p<0.01,
** p<0.05, * p<0.1.
Source: Authors' calculations of McDash, CCP, CRISM, CoreLogic, and BLS data.

Table 9a: Alternative Hypothesis: "Accidental Fraud" – Determinants of Multiple Liens and Fraud

Outcome	(1) Multi	(2) Multi	(3) Multi	(4) No Move	(5) No Move	(6) No Move	(7) ZIP dist. ≤75 mi.	(8) ZIP dist. ≤75 mi.	(9) ZIP dist. ≤75 mi.	(10) Fraud	(11) Fraud	(12) Fraud
DOM [60,120)		0.011**			0.001			-0.005***	-0.005***		0.001	
		(0.005)			(0.004)			(0.002)	(0.002)		(0.004)	
DOM [120,180)		0.015**			0.003			-0.004**	-0.004**		0.003	
		(0.006)			(0.004)			(0.002)	(0.002)		(0.004)	
DOM [180,365)		0.019**			0.008**			-0.007***	-0.007***		0.008**	
		(0.009)			(0.004)			(0.002)	(0.002)		(0.004)	
DOM ≥365		0.027**			0.007			-0.008**	-0.008**		0.007	
		(0.012)			(0.007)			(0.003)	(0.003)		(0.007)	
HPI % chg: 1 yr. post-orig.			0.296***			0.101***						0.101***
			(0.028)			(0.014)						(0.014)
HPI % chg: 2 yr. pre-orig. lag	0.078***	0.076***	0.131***	0.044***	0.043***	0.062***	-0.015*	-0.015*	-0.015*	0.044***	0.043***	0.062***
	(0.015)	(0.015)	(0.015)	(0.009)	(0.009)	(0.010)	(0.008)	(0.008)	(0.008)	(0.009)	(0.009)	(0.010)
Second Lien (+4Q)	-0.042***	-0.042***	-0.043***	0.026***	0.026***	0.026***	-0.002*	-0.002*	-0.002*	0.026***	0.026***	0.026***
	(0.006)	(0.006)	(0.006)	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)
Orig. FICO [660,700)	0.061***	0.061***	0.061***	0.016***	0.016***	0.016***	0.002	0.002	0.002	0.016***	0.016***	0.016***
	(0.005)	(0.005)	(0.005)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Orig. FICO [700,750)	0.061***	0.061***	0.062***	0.014***	0.014***	0.015***	0.003	0.003	0.003	0.014***	0.014***	0.015***
	(0.004)	(0.004)	(0.004)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Orig. FICO [750,800)	0.011**	0.011**	0.012**	0.006**	0.006**	0.007***	0.006***	0.006***	0.006***	0.006**	0.006**	0.007***
	(0.005)	(0.005)	(0.005)	(0.003)	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)	(0.003)
Orig. FICO ≥800	-0.040***	-0.040***	-0.039***	0.001	0.001	0.001	0.007***	0.007***	0.007***	0.001	0.001	0.001
	(0.006)	(0.006)	(0.006)	(0.003)	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)	(0.003)
Orig. LTV (70,80]	0.095***	0.095***	0.096***	0.005**	0.005**	0.005**	0.001	0.001	0.001	0.005**	0.005**	0.005**
	(0.005)	(0.005)	(0.005)	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)
Orig. LTV (80,90)	-0.017***	-0.017***	-0.017***	0.009***	0.009***	0.009***	0.002	0.002	0.002	0.009***	0.009***	0.009***
	(0.006)	(0.006)	(0.006)	(0.003)	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)	(0.003)
Orig. LTV ≥90	-0.059***	-0.058***	-0.058***	0.004*	0.004*	0.005*	0.002	0.002	0.002	0.004*	0.004*	0.005*
	(0.005)	(0.005)	(0.005)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Orig. Amt. (200K,359650]	0.104***	0.104***	0.100***	0.008***	0.009***	0.007***	0.004***	0.004***	0.004***	0.008***	0.009***	0.007***
	(0.004)	(0.004)	(0.004)	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)
Orig. Amt. (359650,417K]	0.156***	0.156***	0.152***	0.025***	0.025***	0.024***	0.005**	0.006**	0.006**	0.025***	0.025***	0.024***
	(0.008)	(0.008)	(0.007)	(0.005)	(0.005)	(0.005)	(0.002)	(0.002)	(0.002)	(0.005)	(0.005)	(0.005)
Orig. Amt. (417K,700K]	0.117***	0.117***	0.116***	0.012*	0.012*	0.012*	0.014***	0.014***	0.014***	0.012*	0.012*	0.012*
	(0.008)	(0.008)	(0.008)	(0.006)	(0.006)	(0.006)	(0.003)	(0.003)	(0.003)	(0.006)	(0.006)	(0.006)
Orig. Amt. >700K	0.135***	0.136***	0.136***	0.012*	0.012*	0.013*	0.017***	0.016***	0.016***	0.012*	0.012*	0.013*
	(0.013)	(0.013)	(0.012)	(0.007)	(0.007)	(0.007)	(0.004)	(0.004)	(0.004)	(0.007)	(0.007)	(0.007)
Interest-Only Loan	0.099***	0.099***	0.097***	0.021***	0.021***	0.020***	-0.003	-0.003	-0.003	0.021***	0.021***	0.020***
	(0.006)	(0.006)	(0.006)	(0.003)	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)	(0.003)
Portfolio	-0.004	-0.004	-0.005	0.003	0.003	0.003	-0.002	-0.002	-0.002	0.003	0.003	0.003
	(0.005)	(0.005)	(0.005)	(0.003)	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)	(0.003)
Private Securitized	0.059***	0.059***	0.059***	0.011***	0.011***	0.011***	-0.004**	-0.004**	-0.004**	0.011***	0.011***	0.011***
Observations	95317	95317	95317	95317	95317	95317	95317	95317	95317	95317	95317	95317
R^2	0.112	0.113	0.114	0.030	0.030	0.031	0.008	0.008	0.008	0.030	0.030	0.031

Note: Linear probability models for the likelihood of a borrower having one or more characteristics used to define fraud. Sample restricted to loans that report being owner-occupied in CRISM. All specifications include constant, and origination half-year and state fixed effects. FICO at origination is from McDash. Standard errors (clustered by pre-origination CCP county) are in parentheses; *** p<0.01, ** p<0.05, * p<0.1.

Source: Authors' calculations of McDash, CCP, CRISM, CoreLogic, and BLS data.

Table 9b: Alternative Hypothesis: "Accidental Fraud" – Mortgage Default

	(1) Default	(2) Default	(3) Default	(4) Default
Honest Homeowner	-0.056***	-0.055***	-0.055***	-0.055***
	(0.004)	(0.004)	(0.008)	(0.007)
Declared Investor	-0.051***	-0.050***	-0.064***	-0.063***
	(0.005)	(0.005)	(0.007)	(0.007)
Second Home	-0.052***	-0.052***	-0.075***	-0.075***
	(0.006)	(0.006)	(0.007)	(0.007)
DOM [60,120)		0.007**		0.007**
		(0.003)		(0.003)
DOM [120,180)		0.010***		0.010***
		(0.004)		(0.004)
DOM [180,365)		0.014***		0.014***
		(0.004)		(0.004)
DOM ≥365		0.013**		0.012**
		(0.005)		(0.005)
Single First Lien			-0.033***	-0.033***
			(0.002)	(0.002)
Moved			0.017***	0.018***
			(0.004)	(0.004)
ZIP Distance >75 miles			0.049***	0.049***
			(0.005)	(0.005)
Observations	111594	111594	111594	111594

Note: Probit models (like those of Table 7a) for the probability of a borrower being 60+ DPD as of December 2008. This table reports marginal effects. All models include origination half-year and state fixed effects. FICO at Origination is from McDash. Standard errors are in parentheses (clustered at county level); *** p<0.01, ** p<0.05, * p<0.1.
Source: Authors' calculations of McDash, CCP, CRISM, CoreLogic, and BLS data.

Appendix: Full Set of Covariates for Selected Regressions

Table 7a: Fraud and Mortgage Default

	(1)	(2)	(3)	(4)	(5)	(6)
Honest Homeowner	-0.058***	-0.033***	-0.054***	-0.066***	-0.096***	
	(0.004)	(0.004)	(0.007)	(0.007)	(0.008)	
Investor	-0.049***	-0.033***	-0.047***	-0.064***	-0.091***	-0.067***
	(0.005)	(0.005)	(0.007)	(0.007)	(0.008)	(0.009)
Second Home	-0.056***	-0.039***	-0.051***	-0.084***	-0.117***	-0.062***
	(0.006)	(0.006)	(0.007)	(0.008)	(0.009)	(0.016)
Single First Lien		-0.031***	-0.032***	-0.031***	-0.029***	
		(0.002)	(0.002)	(0.002)	(0.003)	
Moved			0.017***	0.022***	0.037***	
			(0.004)	(0.004)	(0.004)	
ZIP Distance >75 miles				0.049***	0.050***	
				(0.005)	(0.005)	
Has Second Lien	0.019***	0.020***	0.021***	0.021***	0.013***	0.001
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.006)
Term is 15/20 years	-0.024***	-0.025***	-0.024***	-0.024***	0.020***	-0.050*
	(0.005)	(0.005)	(0.005)	(0.005)	(0.002)	(0.026)
Term is 40 years	0.032***	0.032***	0.032***	0.032***	0.081***	0.032*
	(0.005)	(0.005)	(0.005)	(0.005)	(0.010)	(0.018)
ARM: 1-year fixed	-0.002	-0.003	-0.003	-0.004	0.004	-0.031
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.025)
ARM: 2-year fixed	0.040***	0.039***	0.038***	0.038***	0.142***	0.073***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.007)	(0.013)
ARM: 3-year fixed	0.034***	0.033***	0.033***	0.033***	0.079***	0.052**
	(0.005)	(0.005)	(0.005)	(0.005)	(0.008)	(0.022)
ARM: 5-year fixed	0.014***	0.013***	0.014***	0.012***	0.022***	0.027**
	(0.003)	(0.003)	(0.003)	(0.003)	(0.005)	(0.012)
ARM: 7-year fixed	-0.013***	-0.012***	-0.012***	-0.013***	-0.013***	0.009
	(0.004)	(0.004)	(0.004)	(0.004)	(0.005)	(0.022)
ARM: 10-year fixed	-0.023***	-0.022***	-0.022***	-0.022***	-0.030***	-0.016
	(0.004)	(0.004)	(0.004)	(0.004)	(0.005)	(0.016)
Orig. Int. Rate	0.032***	0.031***	0.031***	0.031***	0.053***	0.056***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.003)	(0.005)
FICO Orig. in [660,700)	-0.068***	-0.071***	-0.070***	-0.071***	-0.075***	-0.032***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.012)
FICO Orig. in [700,750)	-0.100***	-0.102***	-0.102***	-0.102***	-0.104***	-0.068***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.012)
FICO Orig. in [750,800)	-0.130***	-0.131***	-0.131***	-0.131***	-0.118***	-0.129***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.013)
FICO Orig. ≥800	-0.142***	-0.142***	-0.142***	-0.142***	-0.112***	-0.140***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.003)	(0.021)
Orig. Amt. in (200K,359650]	0.008***	0.004*	0.004*	0.005**	0.011***	0.052***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.009)
Orig. Amt. in (359650,417K]	0.020***	0.015***	0.015***	0.016***	0.021***	0.078***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.014)
Orig. Amt. in (417K,700K]	0.002	-0.003	-0.003	-0.002	-0.001	0.059***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.013)
Orig. Amt. >700K	-0.018***	-0.021***	-0.022***	-0.020***	-0.026***	-0.000
	(0.007)	(0.006)	(0.006)	(0.006)	(0.007)	(0.020)
LTV Orig. in (70,80]	0.021***	0.020***	0.020***	0.020***	0.004	0.039***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.012)
LTV Orig. in (80,90)	0.010**	0.012***	0.012***	0.012***	-0.015***	0.005
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.016)
LTV Orig. ≥90	0.021***	0.024***	0.024***	0.025***	-0.007	0.027
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.016)
Interest-Only Loan	0.044***	0.042***	0.042***	0.041***	0.041***	0.051***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.005)	(0.011)
Low Doc.	0.021***	0.020***	0.021***	0.020***	0.024***	0.036***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.008)
Unknown Doc. Status	-0.023***	-0.023***	-0.023***	-0.023***	-0.029***	-0.027**
	(0.003)	(0.003)	(0.003)	(0.003)	(0.004)	(0.012)
Correspondent Lender	0.001	0.002	0.001	0.002	0.003*	-0.017*
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.010)
Brokered	0.015***	0.014***	0.014***	0.014***	0.017***	0.019**
	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)	(0.009)
Updated LTV in [80, 90)	0.014***	0.013***	0.013***	0.013***	0.002	0.021**
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.010)
Updated LTV in [90,100)	0.031***	0.030***	0.030***	0.030***	0.018***	0.049***

	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)	(0.011)
Updated LTV in [100,120)	0.054***	0.053***	0.053***	0.053***	0.045***	0.106***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.004)	(0.014)
Updated LTV ≥120	0.113***	0.110***	0.110***	0.109***	0.144***	0.186***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.006)	(0.019)
1.4≤Chg. Unemp.<2.2	-0.001	-0.001	-0.001	-0.001	-0.001	-0.002
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.012)
2.2≤Chg. Unemp.<3.4	0.000	0.001	0.001	0.001	-0.002	-0.026*
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.015)
3.4≤Chg. Unemp.<20	0.011***	0.011***	0.011***	0.011***	0.009***	-0.011
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.017)
FHA/VA	0.023***	0.025***	0.025***	0.025***	0.023***	
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	
Portfolio	0.015***	0.015***	0.015***	0.015***	0.008**	0.013
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.013)
Private Securitized	0.022***	0.020***	0.020***	0.020***	0.020***	0.030***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)	(0.011)
Constant					-0.174***	
					(0.016)	
Observations	148702	148702	148702	148702	148702	9690

Note: Models of mortgage default are as of December 2008. All columns except for (5) report marginal effects from probit regressions; column (5) is a linear probability model. Column (6) drops FHA/VA loans and restricts attention to borrowers with multiple first liens, who did not move, and with a ZIP distance of 75 miles or less. All models include origination half-year and state fixed effects. FICO at origination is from the McDash data set.
Source: Authors' calculations of McDash, CCP, CRISM, CoreLogic, and BLS data. Standard errors are in parentheses (clustered at county level);
*** p<0.01, ** p<0.05, * p<0.1.

Table 8a: Default, Fraud, and Bankcard Utilization

	(1)	(2)	(3)	(4)
Mortgage Default (Dec. 2008)	0.189***	0.187***	0.165***	0.150***
	(0.007)	(0.007)	(0.012)	(0.020)
Term Is 15/20 years	-0.059***	-0.060***	-0.053***	-0.056***
	(0.006)	(0.006)	(0.011)	(0.017)
Term Is 40 years	0.028***	0.028***	0.037***	0.035
	(0.007)	(0.007)	(0.013)	(0.023)
Has Second Lien	0.021***	0.021***	0.012***	0.011
	(0.002)	(0.002)	(0.004)	(0.008)
ARM	0.009***	0.009**	0.003	-0.003
	(0.004)	(0.004)	(0.005)	(0.012)
Orig. Int. Rate	0.031***	0.031***	0.030***	0.029***
	(0.002)	(0.002)	(0.003)	(0.005)
FICO Orig. in [660,700)	-0.141***	-0.142***	-0.095***	-0.109***
	(0.004)	(0.004)	(0.010)	(0.021)
FICO Orig. in [700,750)	-0.234***	-0.235***	-0.189***	-0.191***
	(0.004)	(0.004)	(0.011)	(0.021)
FICO Orig. in [750,800)	-0.310***	-0.311***	-0.262***	-0.252***
	(0.004)	(0.004)	(0.011)	(0.021)
FICO Orig. ≥800	-0.334***	-0.335***	-0.286***	-0.280***
	(0.005)	(0.005)	(0.013)	(0.022)
Orig. Amt. in (200000,359650]	-0.003	-0.003	0.015***	0.015
	(0.003)	(0.003)	(0.005)	(0.010)
Orig. Amt. in (359650,417000]	-0.010**	-0.010**	0.008	0.000
	(0.005)	(0.005)	(0.008)	(0.014)
Orig. Amt. in (417000,700000]	-0.016***	-0.016***	0.010	0.007
	(0.005)	(0.005)	(0.008)	(0.015)
Orig. Amt. >700000	-0.012	-0.012	0.003	0.025
	(0.008)	(0.008)	(0.011)	(0.025)
LTV Orig. in (70,80]	0.019***	0.018***	0.014**	0.005
	(0.004)	(0.004)	(0.006)	(0.013)
LTV Orig. in (80,90)	0.037***	0.037***	0.036***	0.019
	(0.006)	(0.006)	(0.012)	(0.020)
LTV Orig. ≥90	0.051***	0.052***	0.038***	-0.014
	(0.005)	(0.005)	(0.011)	(0.017)
Interest-Only Loan	0.025***	0.024***	0.030***	0.028**
	(0.004)	(0.004)	(0.007)	(0.012)
Option ARM	-0.013*	-0.013**	-0.020**	-0.002
	(0.007)	(0.007)	(0.009)	(0.018)
Low Doc.	-0.002	-0.002	-0.001	-0.004
	(0.002)	(0.002)	(0.004)	(0.008)
Unknown Documentation Status	0.008**	0.007*	0.016**	0.041**
	(0.004)	(0.004)	(0.008)	(0.016)
Correspondent Lender	0.003	0.004	-0.001	-0.002
	(0.002)	(0.002)	(0.005)	(0.009)
Brokered	0.005*	0.005*	0.008	-0.001
	(0.003)	(0.003)	(0.005)	(0.009)
Updated LTV in [80, 90)	0.004	0.004	0.009	0.017
	(0.004)	(0.004)	(0.007)	(0.013)
Updated LTV in [90,100)	0.011**	0.011**	0.014*	0.024
	(0.004)	(0.004)	(0.008)	(0.016)
Updated LTV in [100,120)	0.013***	0.012***	0.003	0.011
	(0.005)	(0.005)	(0.008)	(0.017)
Updated LTV ≥120	0.021***	0.021***	0.010	0.003
	(0.006)	(0.006)	(0.011)	(0.021)
1.4≤Chg. Unemp.<2.2	0.006*	0.006*	0.003	-0.025**
	(0.003)	(0.003)	(0.007)	(0.012)
2.2≤Chg. Unemp.<3.4	0.007**	0.007**	-0.001	-0.030**
	(0.003)	(0.003)	(0.007)	(0.014)
3.4≤Chg. Unemp.<20	0.018***	0.018***	0.010	-0.021
	(0.004)	(0.004)	(0.009)	(0.017)
FHA/VA	0.046***	0.047***		
	(0.004)	(0.004)		
Portfolio	0.014***	0.014***	0.004	0.019
	(0.004)	(0.004)	(0.008)	(0.014)
Private Securitized	0.017***	0.016***	0.012**	0.010
	(0.003)	(0.003)	(0.005)	(0.010)
Single First Lien		-0.006**		
		(0.003)		
Moved		0.002	0.019**	
		(0.006)	(0.009)	

ZIP Distance >75 mi.		0.033***	0.020**	
		(0.006)	(0.008)	
Observations	123874	123874	31315	8163

Note: Probit models for the probability of a borrower having bankcard utilization greater than or equal to 80 percent as of December 2008. The models also include an interaction term between borrower type and mortgage default (reported in Table 8b). Column (3) drops FHA/VA loans and restricts attention to borrowers with multiple first liens. Column (4) further restricts to borrowers who moved and with ZIP distances of 75 miles or less. All models include origination half-year and state fixed effects. FICO at origination is from McDash. Standard errors are in parentheses (clustered at county level); *** p<0.01,** p<0.05, * p<0.1

Source: Authors' calculations of McDash, CCP, CRISM, CoreLogic, and BLS data.

Table 9a: Alternative Hypothesis: "Accidental Fraud" – Determinants of Multiple Liens and Fraud

Outcome	(1) Multi	(2) Multi	(3) Multi	(4) No Move	(5) No Move	(6) No Move	(7) ZIP Dist≤75 Mi.	(8) ZIP Dist≤75 Mi.	(9) ZIP Dist≤75 Mi.	(10) Fraud	(11) Fraud	(12) Fraud
DOM [60,120)		0.011**			0.001			-0.005***			0.001	
		(0.005)			(0.004)			(0.002)			(0.004)	
DOM [120,180)		0.015**			0.003			-0.004**			0.003	
		(0.006)			(0.004)			(0.002)			(0.004)	
DOM [180,365)		0.019**			0.008**			-0.007***			0.008**	
		(0.009)			(0.004)			(0.002)			(0.004)	
DOM ≥365		0.027**			0.007			-0.008**			0.007	
		(0.012)			(0.007)			(0.003)			(0.007)	
HP % Chg: 1 Yr. Post-Orig.			0.296***			0.101***			-0.031***			0.101***
			(0.028)			(0.014)			(0.008)			(0.014)
HP % Chg.: 2-Year Lag	0.078***	0.076***	0.131***	0.044***	0.043***	0.062***	-0.015*	-0.015*	-0.021**	0.044***	0.043***	0.062***
	(0.015)	(0.015)	(0.015)	(0.009)	(0.009)	(0.010)	(0.008)	(0.008)	(0.009)	(0.009)	(0.009)	(0.010)
Has Second Lien	-0.042***	-0.042***	-0.043***	0.026***	0.026***	0.026***	-0.002*	-0.002*	-0.002*	0.026***	0.026***	0.026***
	(0.006)	(0.006)	(0.006)	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)
Orig. FICO [660,700)	0.061***	0.061***	0.061***	0.016***	0.016***	0.016***	0.002	0.002	0.002	0.016***	0.016***	0.016***
	(0.005)	(0.005)	(0.005)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Orig. FICO [700,750)	0.061***	0.061***	0.062***	0.014***	0.014***	0.015***	0.003	0.003	0.002	0.014***	0.014***	0.015***
	(0.004)	(0.004)	(0.004)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Orig. FICO [750,800)	0.011**	0.011**	0.012**	0.006**	0.006**	0.007***	0.006***	0.006***	0.006***	0.006**	0.006**	0.007***
	(0.005)	(0.005)	(0.005)	(0.003)	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)	(0.003)
Orig. FICO ≥800	-0.040***	-0.040***	-0.039***	0.001	0.001	0.001	0.007***	0.007***	0.007***	0.001	0.001	0.001
	(0.006)	(0.006)	(0.006)	(0.003)	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)	(0.003)
Orig. LTV (70,80]	0.095***	0.095***	0.096***	0.005**	0.005**	0.005**	0.001	0.001	0.001	0.005**	0.005**	0.005**
	(0.005)	(0.005)	(0.005)	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)
Orig. LTV (80,90)	-0.017***	-0.017***	-0.017***	0.009***	0.009***	0.009***	0.002	0.002	0.002	0.009***	0.009***	0.009***
	(0.006)	(0.006)	(0.006)	(0.003)	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)	(0.003)
Orig. LTV ≥90	-0.059***	-0.058***	-0.058***	0.004*	0.004*	0.005*	0.002	0.002	0.002	0.004*	0.004*	0.005*
	(0.005)	(0.005)	(0.005)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Orig. Amt. (200k,359650]	0.104***	0.104***	0.100***	0.008***	0.009***	0.007***	0.004***	0.004***	0.005***	0.008***	0.009***	0.007***
	(0.004)	(0.004)	(0.004)	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)
Orig. Amt. (359650,417K]	0.156***	0.156***	0.152***	0.025***	0.025***	0.024***	0.005**	0.006**	0.006***	0.025***	0.025***	0.024***
	(0.008)	(0.008)	(0.007)	(0.005)	(0.005)	(0.005)	(0.002)	(0.002)	(0.002)	(0.005)	(0.005)	(0.005)
Orig. Amt. (417K,700K]	0.117***	0.117***	0.116***	0.012*	0.012*	0.012*	0.014***	0.014***	0.014***	0.012*	0.012*	0.012*
	(0.008)	(0.008)	(0.008)	(0.006)	(0.006)	(0.006)	(0.003)	(0.003)	(0.003)	(0.006)	(0.006)	(0.006)
Orig. Amt. >700K	0.135***	0.136***	0.136***	0.012*	0.012*	0.013*	0.017***	0.016***	0.016***	0.012*	0.012*	0.013*
	(0.013)	(0.013)	(0.012)	(0.007)	(0.007)	(0.007)	(0.004)	(0.004)	(0.004)	(0.007)	(0.007)	(0.007)
Interest-Only Loan	0.099***	0.099***	0.097***	0.021***	0.021***	0.020***	-0.003	-0.003	-0.003	0.021***	0.021***	0.020***
	(0.006)	(0.006)	(0.006)	(0.003)	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)	(0.003)
Low Doc.	0.005	0.004	0.004	0.014***	0.014***	0.014***	-0.004***	-0.004***	-0.004***	0.014***	0.014***	0.014***
	(0.004)	(0.004)	(0.004)	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)
Unknown Doc.	-0.012**	-0.012**	-0.010*	0.007**	0.007**	0.007***	-0.009***	-0.009***	-0.009***	0.007**	0.007**	0.007***
	(0.006)	(0.006)	(0.005)	(0.003)	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)	(0.003)
Correspondent	0.011***	0.011***	0.011***	0.003**	0.003**	0.003**	-0.001	-0.001	-0.001	0.003**	0.003**	0.003**
	(0.004)	(0.004)	(0.004)	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)
Broker Originated	0.042***	0.042***	0.042***	0.015***	0.015***	0.015***	-0.001	-0.001	-0.001	0.015***	0.015***	0.015***
	(0.005)	(0.005)	(0.005)	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)
Portfolio	-0.004	-0.004	-0.005	0.003	0.003	0.003	-0.002	-0.002	-0.001	0.003	0.003	0.003
	(0.005)	(0.005)	(0.005)	(0.003)	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)	(0.003)
Private Securitized	0.059***	0.059***	0.059***	0.011***	0.011***	0.011***	-0.004**	-0.004**	-0.004**	0.011***	0.011***	0.011***
	(0.005)	(0.005)	(0.005)	(0.003)	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)	(0.003)
Maturity 15/20 years	-0.001	-0.001	-0.001	0.009**	0.009**	0.009**	-0.004*	-0.004*	-0.004*	0.009**	0.009**	0.009**
	(0.007)	(0.007)	(0.007)	(0.004)	(0.004)	(0.004)	(0.002)	(0.002)	(0.002)	(0.004)	(0.004)	(0.004)
Maturity 40 years	0.004	0.004	-0.003	-0.001	-0.000	-0.003	-0.001	-0.001	-0.001	-0.001	-0.000	-0.003
	-0.004	-0.004	-0.005	0.003	0.003	0.003	-0.002	-0.002	-0.001	0.003	0.003	0.003
ARM: 1-year fixed	0.031**	0.031**	0.033**	0.003	0.004	0.004	-0.011**	-0.011**	-0.011**	0.003	0.004	0.004
	(0.014)	(0.014)	(0.014)	(0.008)	(0.008)	(0.008)	(0.005)	(0.005)	(0.005)	(0.008)	(0.008)	(0.008)
ARM: 2-year fixed	0.092***	0.092***	0.094***	0.045***	0.045***	0.046***	-0.007**	-0.007**	-0.007***	0.045***	0.045***	0.046***
	(0.011)	(0.011)	(0.011)	(0.006)	(0.006)	(0.006)	(0.003)	(0.003)	(0.003)	(0.006)	(0.006)	(0.006)
ARM: 3-year fixed	0.060***	0.060***	0.063***	0.030***	0.030***	0.031***	-0.010**	-0.010**	-0.011**	0.030***	0.030***	0.031***
	(0.013)	(0.013)	(0.014)	(0.007)	(0.007)	(0.007)	(0.004)	(0.004)	(0.004)	(0.007)	(0.007)	(0.007)
ARM: 5-year fixed	0.022***	0.023***	0.023***	0.011***	0.011***	0.011***	-0.012***	-0.012***	-0.012***	0.011***	0.011***	0.011***
	(0.007)	(0.007)	(0.007)	(0.004)	(0.004)	(0.004)	(0.003)	(0.003)	(0.003)	(0.004)	(0.004)	(0.004)
ARM: 7-year fixed	-0.048***	-0.048***	-0.047***	-0.022***	-0.022***	-0.022***	-0.006	-0.006	-0.006	-0.022***	-0.022***	-0.022***
	(0.011)	(0.011)	(0.011)	(0.005)	(0.005)	(0.005)	(0.004)	(0.004)	(0.004)	(0.005)	(0.005)	(0.005)
ARM: 10-year fixed	-0.080***	-0.080***	-0.078***	-0.027***	-0.027***	-0.027***	-0.005	-0.005	-0.005	-0.027***	-0.027***	-0.027***
	(0.011)	(0.011)	(0.011)	(0.005)	(0.005)	(0.005)	(0.003)	(0.003)	(0.003)	(0.005)	(0.005)	(0.005)
Option ARM	0.015	0.016	0.015	0.031***	0.031***	0.031***	0.001	0.000	0.001	0.031***	0.031***	0.031***
	(0.010)	(0.010)	(0.010)	(0.006)	(0.006)	(0.006)	(0.003)	(0.003)	(0.003)	(0.006)	(0.006)	(0.006)
Constant	0.421***	0.402***	0.434***	-0.057***	-0.064***	-0.052***	0.804***	0.811***	0.802***	-0.057***	-0.064***	-0.052***
	(0.010)	(0.013)	(0.010)	(0.006)	(0.007)	(0.006)	(0.003)	(0.004)	(0.003)	(0.006)	(0.007)	(0.006)
Observations	95317	95317	95317	95317	95317	95317	95317	95317	95317	95317	95317	95317

Note: Linear probability models for the likelihood of a borrower having one or more characteristics are used to define fraud. The sample is restricted to loans that report being owner-occupied in CRISM. All specifications include constant, and origination half-year and state fixed effects. FICO at origination is from McDash. Standard errors (clustered by preorigination CCP county) are in parentheses; *** p<0.01, ** p<0.05, * p<0.1.

Source: Authors' calculations of McDash, CCP, CRISM, CoreLogic, and BLS data.

Table 9b: Alternative Hypothesis: "Accidental Fraud" – Mortgage Default

	(1) Default	(2) Default	(3) Default	(4) Default
Honest Homeowner	-0.056***	-0.055***	-0.055***	-0.055***
	(0.004)	(0.004)	(0.008)	(0.007)
Investor	-0.051***	-0.050***	-0.064***	-0.063***
	(0.005)	(0.005)	(0.007)	(0.007)
Second Home	-0.052***	-0.052***	-0.075***	-0.075***
	(0.006)	(0.006)	(0.007)	(0.007)
Has Second Lien	0.019***	0.019***	0.021***	0.021***
	(0.002)	(0.002)	(0.002)	(0.002)
DOM [60,120)		0.007**		0.007**
		(0.003)		(0.003)
DOM [120,180)		0.010***		0.010***
		(0.004)		(0.004)
DOM [180,365)		0.014***		0.014***
		(0.004)		(0.004)
DOM ≥365		0.013**		0.012**
		(0.005)		(0.005)
Single First Lien			-0.033***	-0.033***
			(0.002)	(0.002)
Moved			0.017***	0.018***
			(0.004)	(0.004)
ZIP Distance >75 mi.			0.049***	0.049***
			(0.005)	(0.005)
Maturity 15/20 years	-0.037***	-0.037***	-0.036***	-0.036***
	(0.006)	(0.006)	(0.006)	(0.006)
Maturity 40 years	0.029***	0.029***	0.028***	0.029***
	(0.005)	(0.005)	(0.005)	(0.005)
ARM: 1-year fixed	-0.003	-0.003	-0.006	-0.005
	(0.006)	(0.006)	(0.006)	(0.006)
ARM: 2-year fixed	0.043***	0.043***	0.040***	0.040***
	(0.004)	(0.004)	(0.004)	(0.004)
ARM: 3-year fixed	0.037***	0.037***	0.035***	0.035***
	(0.005)	(0.005)	(0.005)	(0.005)
ARM: 5-year fixed	0.012***	0.013***	0.011***	0.011***
	(0.003)	(0.003)	(0.003)	(0.003)
ARM: 7-year fixed	-0.014***	-0.013***	-0.013***	-0.013***
	(0.005)	(0.005)	(0.005)	(0.005)
ARM: 10-year fixed	-0.022***	-0.022***	-0.021***	-0.021***
	(0.004)	(0.004)	(0.004)	(0.004)
Interest Rate (at Orig.)	0.030***	0.029***	0.029***	0.029***
	(0.001)	(0.001)	(0.001)	(0.001)
FICO Orig. in [660,700)	-0.060***	-0.060***	-0.063***	-0.063***
	(0.004)	(0.004)	(0.004)	(0.004)
FICO Orig. in [700,750)	-0.094***	-0.094***	-0.096***	-0.096***
	(0.004)	(0.004)	(0.004)	(0.004)
FICO Orig. in [750,800)	-0.125***	-0.125***	-0.126***	-0.126***
	(0.004)	(0.004)	(0.004)	(0.004)
FICO Orig. ≥800	-0.140***	-0.140***	-0.140***	-0.140***
	(0.005)	(0.005)	(0.005)	(0.005)
Orig. Amt. in (200000,359650]	0.008***	0.008***	0.005**	0.005**
	(0.002)	(0.002)	(0.002)	(0.002)
Orig. Amt. in (359650,417000]	0.018***	0.018***	0.013***	0.013***
	(0.004)	(0.004)	(0.004)	(0.004)
Orig. Amt. in (417000,700000]	0.002	0.002	-0.002	-0.002
	(0.004)	(0.004)	(0.004)	(0.004)
Orig. Amt. >700000	-0.014**	-0.014**	-0.017***	-0.017***
	(0.006)	(0.006)	(0.006)	(0.006)
LTV Orig. in (70,80]	0.020***	0.020***	0.018***	0.019***
	(0.003)	(0.003)	(0.003)	(0.003)
LTV Orig. in (80,90)	0.007*	0.007*	0.009**	0.009**
	(0.004)	(0.004)	(0.004)	(0.004)
LTV Orig. ≥90	0.021***	0.021***	0.026***	0.026***
	(0.004)	(0.004)	(0.004)	(0.004)
Interest-Only Loan	0.038***	0.038***	0.035***	0.034***

	(0.003)	(0.003)	(0.003)	(0.003)
Low Doc.	0.024***	0.024***	0.022***	0.022***
	(0.002)	(0.002)	(0.002)	(0.002)
Unknown Doc.	-0.021***	-0.022***	-0.021***	-0.021***
	(0.003)	(0.003)	(0.003)	(0.003)
Correspondent	-0.003	-0.003	-0.002	-0.002
	(0.002)	(0.002)	(0.002)	(0.002)
Broker Originated	0.015***	0.015***	0.015***	0.015***
	(0.002)	(0.002)	(0.002)	(0.002)
Updated LTV [80, 90)	0.012***	0.012***	0.012***	0.011***
	(0.002)	(0.002)	(0.002)	(0.002)
Updated LTV [90, 100)	0.029***	0.029***	0.027***	0.027***
	(0.003)	(0.003)	(0.003)	(0.003)
Updated LTV [100, 120)	0.055***	0.055***	0.053***	0.053***
	(0.003)	(0.003)	(0.003)	(0.003)
Updated LTV ≥120	0.118***	0.118***	0.113***	0.114***
	(0.006)	(0.006)	(0.006)	(0.006)
Chg. Unemp. (Close-Dec. 2008) [1.4, 2.2)	-0.003	-0.003	-0.003	-0.003
	(0.003)	(0.003)	(0.002)	(0.002)
Chg. Unemp. (Close-Dec. 2008) [2.2, 3.4)	-0.003	-0.003	-0.002	-0.003
	(0.003)	(0.003)	(0.003)	(0.003)
Chg. Unemp. (Close-Dec. 2008) [3.4, 20)	0.007*	0.006	0.007*	0.006
	(0.004)	(0.004)	(0.004)	(0.004)
Portfolio	0.014***	0.014***	0.014***	0.014***
	(0.003)	(0.003)	(0.003)	(0.003)
Private Securitized	0.022***	0.022***	0.021***	0.021***
	(0.002)	(0.002)	(0.002)	(0.002)
Observations	111594	111594	111594	111594

Note: Probit models (like those of Table 7a) for the probability of a borrower being 60+ DPD as of December 2008. This table reports marginal effects. All models include origination half-year and state fixed effects. FICO at Origination is from McDash. Standard errors are in parentheses (clustered at the county level); *** p<0.01, ** p<0.05, * p<0.1.

Source: Authors' calculations of McDash, CCP, CRISM, CoreLogic, and BLS data.