

Financial Literacy, Broker Borrower Interaction, and Mortgage  
Default

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# *Financial Literacy, Broker-Borrower Interaction, and Mortgage Default*

## **Abstract**

This paper examines the relationship between broker-borrower interaction in the origination process and subsequent mortgage performance. I show that face-to-face interaction between a mortgage broker and borrower before the loan funds is associated with lower levels of ex post default. The relation between face-to-face broker-borrower interaction and mortgage performance holds only for borrowers that have characteristics associated with low levels of financial literacy. Specifically, face-to-face interaction is negatively related to default for minorities, borrowers located in areas with low levels of education, low-income borrowers, and borrowers with low FICO scores. My results suggest that face-to-face interaction between the mortgage broker and borrower may reduce problems associated with financial illiteracy.

*Key words: Financial Literacy, Mortgage Brokerage, Default*

*JEL Classification: G2*

# 1 Introduction

Although mortgage brokers – intermediaries that match borrowers with lenders – have been around since the 1980s, until recently they attracted little attention in the academic literature. However, the mortgage crisis, along with the large share of loans that were originated through brokers, created additional interest in the role brokers play in mortgage markets. Traditionally, a broker’s role has been that of a matchmaker, bringing buyers and sellers together in imperfect markets (Yavaş (1992) and Yavaş (1994)). In this capacity, typical mortgage broker duties include gathering borrower information, performing an initial credit screening, communicating available product information to borrowers, and relaying pertinent information to the lender for underwriting purposes. As a matchmaker, the broker should not be connected with the subsequent performance of the loan, since essentially she is just introducing two willing trading partners.<sup>1</sup> In this paper, I step away from the view of the broker purely as a matchmaker, and consider whether the broker’s actions affect the borrower’s payment behavior. Specifically, I examine whether the type of interaction the broker has with the borrower (e.g. face-to-face or telephone) prior to loan funding is associated with subsequent mortgage performance.

Why would broker-borrower interaction that occurs prior to the loan funding be related to *ex post* mortgage default? One possibility is that face-to-face interaction between the broker and the borrower helps mitigate problems associated with financial illiteracy. For example, mortgage brokers, by acting as financial counselors, may have the potential to reduce mortgage default. Furthermore, the counseling they provide is likely to be most beneficial when delivered in person to the least financially sophisticated borrowers.<sup>2</sup> This view of mortgage brokers as financial counselors contrasts sharply with recent studies that present brokers primarily as opportunistic agents preying on the least financially sophisticated customers. For example, Jackson and Burlingame (2007) and Ernst et al. (2008) argue that mortgage brokers “steer” borrowers into suboptimal loans in order to extract rents from borrowers, and that this problem

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<sup>1</sup>Assuming that the broker truthfully reveals information to both the borrower and the lender.

<sup>2</sup>Incentives (e.g. the potential for repeat business, referrals, or higher conversion rates of applications to funded loans) must exist for the mortgage broker to undertake costly financial counseling. LaCour-Little and Chun (1999) provide evidence that mortgage brokers are incentivized by the potential for repeat business. In addition, in unreported analysis, I find that my measure of counseling is positively associated with an application converting into a funded loan, *ceteris paribus*.

is more severe for the most financially vulnerable customers.<sup>3</sup> However, the results presented in this paper suggest that mortgage brokers *also* have the ability to improve economic outcomes, particularly for the most financially vulnerable or least financially literate borrowers.<sup>4</sup>

Recent research shows that financial illiteracy is widespread and that it has serious consequences for economic behavior. For instance, Lusardi and Tufano (2009) show that only about one-third of the population understands interest compounding, and that individuals with low levels of debt literacy tend to engage in high-cost debt transactions. Financial literacy is also related to consumption and savings decisions, with financial literacy being positively correlated with retirement planning and savings (Lusardi and Mitchell (2009) and Lusardi and Mitchell (2011)). Hilgert et al. (2003) link financial knowledge to cash-flow management, credit management, saving, and investment.

Financial literacy is also associated with mortgage outcomes. With regard to mortgage choice, Bergstresser and Beshears (2010) argue that borrowers with lower levels of financial literacy are more likely to select adjustable rate mortgage (ARM) contracts. In addition, Bucks and Pence (2008) show that borrowers with ARMs do not fully comprehend the terms of their loans. Duca and Kumar (2014) provide evidence that financially illiterate borrowers are more likely to cash-out equity from their homes. As for loan performance, Gerardi et al. (2013) show that a borrower's numerical ability, which is closely linked to financial literacy, is negatively related to mortgage default and foreclosure in a sample of subprime mortgages. Agarwal et al. (2009) and Agarwal et al. (2010) show that borrowers receiving financial counseling or participating in a voluntary financial education program are less likely to default, suggesting a link between financial education and mortgage performance. Additionally, Hirad and Zorn (2001) provide evidence that financial counseling is associated with a lower probability of mortgage default. To summarize, financial illiteracy is common and it has real effects on

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<sup>3</sup>Several papers also argue that borrowers pay more for loans obtained through mortgage brokers relative to loans originated directly through the lender (Woodward (2008), LaCour-Little (2009), and Jackson and Burlingame (2007)).

<sup>4</sup>A few recent papers highlight other ways that mortgage brokers positively impact mortgage markets. Ambrose and Conklin (2014) show that mortgage broker competition reduces fees and increases pricing transparency. Ambrose and LaCour-Little (2001) provide evidence that mortgage brokers encourage optimal prepayment timing. Brokered loans also take less time to close (LaCour-Little (2007)). El Anshasy et al. (2006) and LaCour-Little (2007) show that brokered loans are less expensive than retail loans for certain loan products.

financial outcomes, including mortgage performance. However, the severity of the problems associated with financial illiteracy may be reduced through financial education or counseling.

Mortgage brokers have the potential to provide financial counseling or education to borrowers with low levels of financial literacy. In fact, in a letter to the Independent Banker's Association of America, HUD outlined the services normally performed in the origination process for which brokers could be compensated, and these services included "educating the prospective borrower in the home buying and financing process, advising the borrower about the different types of loan products available" and "assisting the borrower in understanding and clearing credit problems."<sup>5</sup> In other words, HUD explicitly recognized that the broker could act as an educator in the mortgage origination process.

To illustrate the concept, consider the following example. Suppose a borrower with poor credit meets with a mortgage broker to apply for a loan. The borrower wants to refinance only her primary mortgage to get a lower monthly payment. With the money she saves each month she plans to pay down her extensive high interest credit card bills over time. The broker suggests a different plan, which consolidates her debt through a cash-out refinance that lowers her monthly payments substantially so that she is able to put money each month into a savings account for unexpected financial shocks. The broker also advises the client on other debt and credit management strategies. After meeting with the broker, the borrower follows the broker's advice. As a result, the borrower is less likely to get into financial trouble in the future, and more likely to maintain her mortgage payment. In this example, the broker's counseling efforts have positively affected the subsequent loan performance.<sup>6</sup>

Conversations with mortgage brokers indicate that the scenario outlined above is common. Although in the hypothetical example the broker met with the borrower in person, one could argue that the same services can be provided over the telephone. However, *face-to-face* counseling is more likely to be effective. As Lee (2002) states, "face-to-face interaction gives customers a chance to see and feel...the information provided to them." Even though the same

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<sup>5</sup><http://www.hud.gov/offices/hsg/ramh/res/resp0222.cfm>.

<sup>6</sup>The broker's willingness to undertake costly counseling does not rely on his altruistic nature, but rather incentives for repeat or referral business, or an increased probability of an application converting into a funded loan (see Footnote 2).

advice can be given over the phone, the borrower is more likely to absorb and retain the information when it is given in-person. Consistent with this view, Hirad and Zorn (2001) show that face-to-face financial counseling is associated with a lower probability of mortgage default, but counseling delivered via telephone is not significantly related to mortgage outcomes. In addition, Quercia and Spader (2008) show that in-person counseling may improve how borrowers exercise prepayment options, but that home study or telephone counseling does not change borrower behavior. In other words, evidence suggests that face-to-face mortgage counseling is most effective.

In this paper, I test whether broker-borrower interaction is related to *ex post* mortgage performance in a large sample of subprime mortgages originated between 1998 and 2005. For each loan, I am able to determine whether the broker had a face-to-face meeting with the borrower or whether communication was impersonal (e.g. telephone). I show that a face-to-face meeting between the broker and borrower is significantly negatively related to subsequent mortgage default after controlling for loan characteristics, property characteristics, borrower characteristics, interest rate environment, and area characteristics. After demonstrating that broker-borrower interaction is significantly related to default, I examine the underlying cause of this relationship.

First, there is the possibility of a causal effect of face-to-face interaction on subsequent borrower mortgage behavior. For example, face-to-face interaction may serve as a mechanism to mitigate problems associated with financial illiteracy. My database, like many data sets, lacks direct measures of financial literacy (Duca and Kumar (2014)). In light of this, an identification strategy employed in this paper is to split the sample according to borrower characteristics that have been linked to financial illiteracy. If face-to-face broker-borrower interaction reduces problems associated with financial illiteracy, then I would expect broker-borrower interaction to be more significantly related to default in the low financial literacy subsamples. In support of this hypothesis, I find that face-to-face broker-borrower interaction is only statistically significantly related to default in the subsamples with borrower characteristics (e.g. minority, low education, low-income, and low FICO score) that are associated with lower

levels of financial literacy.<sup>7</sup> My findings are consistent with the hypothesis that face-to-face broker-borrower interaction reduces problems associated with financial literacy.<sup>8</sup>

Another possible explanation for the relationship between broker-borrower interaction and mortgage default is that the lender bases underwriting decisions on whether the broker meets with the borrower in-person. For example, if the lender gives favorable pricing (e.g. lower rates) or bases its accept/reject decision on face-to-face broker-borrower interaction, lower default rates may actually be attributable to the lender's underwriting process, rather than broker counseling. I find no evidence to suggest that the lender's underwriting decisions are driving the connection between face-to-face broker-borrower interaction and default.

There is also the possibility that broker-borrower interaction is endogenous. For example, borrowers that are more likely to meet with the broker in-person may be more committed to repaying their debt. Alternatively, "better" brokers may be more inclined to meet with borrowers in-person. To assuage endogeneity concerns, I employ an instrumental variables approach, a bivariate probit model, and a broker fixed effects model. Face-to-face broker-borrower interaction remains significantly negatively related to default after accounting for potential endogeneity.

To summarize, my results show that face-to-face broker-borrower interaction is significantly negatively related to subsequent mortgage default, particularly for borrowers that are likely to have low levels of financial literacy. The results do not necessarily imply that the face-to-face interaction improves the borrower's financial literacy, only that face-to-face interaction is important for borrowers with lower levels of financial literacy. Admittedly, and unfortunately, data limitations prevent me from determining why face-to-face interaction results in better mortgage outcomes for borrowers with lower levels of financial literacy. Perhaps the face-to-

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<sup>7</sup>Lusardi and Mitchell (2011), Lusardi and Tufano (2009), and Lusardi and Mitchell (2007) show that financial literacy is lower for minorities and individuals with lower levels of education. Lusardi and Tufano (2009) and Lusardi and Mitchell (2007) show that income is negatively related to financial literacy. Lusardi and Tufano (2009) provide evidence that borrowers with lower levels of financial literacy have more difficulty managing debt, while Hilgert et al. (2003) show financially knowledgeable consumers are more likely to pay bills on time. Furthermore, Collins (2010) argues in a recent study that a financial education program significantly reduced the percentage of individuals with a FICO score below 680.

<sup>8</sup>In an earlier version of this paper I investigated the effects of face-to-face interaction across different mortgage products as well. However, the complex relationship between broker-borrower interaction and mortgage choice is beyond the scope of this paper and I plan to deal with this in subsequent work.

face interaction allows the broker to educate and advise the borrower on her overall financial situation. Alternatively, the broker may be better able to explain contract features in-person. Certainly, other possibilities exist as well. Even though I am unable to identify exactly how the mechanism works, the preponderance of the evidence is consistent with the hypothesis that face-to-face broker-borrower interaction acts as a mechanism to reduce problems associated with financial illiteracy.

## 2 Data and Empirical Strategy

### 2.1 Sample

The primary data source is the origination and loan performance database from New Century Financial (NCEN). NCEN originated subprime mortgages and at one point was the second largest subprime lender in the United States. Along with loan origination, NCEN also serviced mortgage loans and held loans as investments in its portfolio. NCEN collected detailed loan-level information at the time of loan application including, but not limited to, borrower characteristics, property characteristics, and contractual features of the loans. In addition, the NCEN servicing database contains monthly mortgage performance data for the loans New Century serviced.

Since I am interested in the link between broker-borrower interaction and *ex post* mortgage default, I restrict the analysis to mortgages for which monthly servicing data is available. I also require that the distance between the broker and the subject property is less than 150 miles so that a face-to-face meeting between the broker and the borrower is possible.<sup>9</sup> The analysis focuses on first-lien mortgage applications in the New Century database originated from 1998 through 2005. I include loans located within an MSA for which I am able to obtain the location of the mortgage broker. To limit the effect of outliers and data entry errors, I exclude loans where (1) total fees are negative or greater than 15% of the loan amount; (2) the yield spread premium paid from the bank to the broker is negative or greater than 5% of the

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<sup>9</sup>The choice of 150 miles is arbitrary, however, I repeated the analysis using several other maximum distances (25 miles, 50 miles, 100 miles, no distance constraint) and the results remain qualitatively unchanged.



loan amount; (3) the combined loan to value at origination is negative or greater than 125%; (4) the borrower’s FICO score is less than 450 or greater than 850; (5) the debt-to-income ratio is negative or greater than 60%; (6) the borrower’s monthly income is negative or greater than \$26,900 and (7) borrower age is less than 18 or greater than 99. The full sample includes 411,166 mortgage, however, due to missing variables, the regression analysis includes 394,483 loans.<sup>10</sup>

## 2.2 Empirical Methodology

To determine whether broker-borrower interaction is associated with mortgage default I estimate a probit model of the following form:

$$Pr(Y_{ij} = 1) = \Phi(\beta FACE_i + \lambda OPTIONS_{ijt} + \delta X_i + \theta R_t + \vartheta W_{jt} + \phi T) \quad (1)$$

$Y_{ij} = 1$  if borrower  $i$  in area  $j$  defaults within the first 24 months after origination;  $FACE_i$  indicates whether the broker met with the borrower in person;  $\Phi(\cdot)$  is the standard normal cumulative distribution;  $OPTIONS_{ijt}$  is a vector of variables capturing the value of financial options in borrower  $i$ 's mortgage in area  $j$  at time  $t$ .<sup>11</sup> The loan, property, and borrower characteristics,  $X_i$ , capture information collected and recorded in the application process. This includes loan characteristics (fees charged on the loan, adjustable or fixed rate, loan amount, combined loan-to-value ratio, whether the loan has a prepayment penalty, purchase or refinance, cash-out or rate/term refinance, and whether the payments are interest-only), property characteristics (two-unit, condominium, owner-occupied or investment property), and borrower characteristics (FICO score, borrower age, borrower income, whether the borrower is self-employed, debt-to-income ratio). The area characteristics include the monthly MSA unemployment rate, the level of broker competition as computed in Ambrose and Conklin (2014), and the Pahl index capturing the level of broker regulation at the state level. Higher values of the Pahl index indicate stricter regulation of brokers at the state level (Pahl (2007)).

<sup>10</sup>(1) - (7) eliminate 203, 629, 3, 1150, 119, 6251, and 4100 observations, respectively.

<sup>11</sup>Default takes a value of one if the borrower becomes 60 days delinquent on the mortgage at any point within the first 24 months after origination. Unfortunately data limitations prevent us from observing loan performance in the mortgage crisis.

I also include a measure of education calculated as the percentage of adults in the zip code that have completed a bachelor’s degree. Indicator variables for census region (West, Midwest, South, Northeast, or Pacific) are also included.<sup>12</sup>  $T$  is a vector of origination year/quarter indicator variables.

In equation 1,  $OPTIONS_{ijt}$  captures the financial incentives for prepayment and default. To estimate the value of the borrower’s prepayment option I augment the approach of Deng et al. (2000) to account for the presence of a prepayment penalty:

$$PPOption_{it} = \frac{V_{it} - V_{it}^*}{V_{it}} - \frac{PPP_{it}(PRE\_\$_{it})}{V_{it}} \quad (2)$$

$V_{it}$  and  $V_{it}^*$  are the market value and book value of loan  $i$  at time  $t$ , respectively. The market value of the loan is the present value of the remaining mortgage payments at current mortgage rates, whereas the book value is the present value of the remaining payments at the contract interest rate.<sup>13</sup> The first term in equation 2 serves as a proxy for the value of the prepayment option for a loan with no prepayment penalty (Deng et al. (2000) and Agarwal et al. (2011)): as market interest rates drop, the prepayment option increases in value. Since the majority of the loans in the sample have a prepayment penalty, I must account for this when estimating the value of the prepayment option. The second term in equation 2 captures the effect a prepayment penalty has in reducing the value of the prepayment option.  $PPP_{it}$  is a dummy variable that indicates whether loan  $i$  has a prepayment penalty at time  $t$ , and  $PRE\_\$_{it}$  is the dollar amount of the prepayment penalty. Taken together, the two terms in equation 2 proxy for the value of the borrower’s prepayment option. A positive value of  $PPOption_{it}$  indicates that the prepayment option is in-the-money (Agarwal et al. (2011)).

To account for the value of the borrower’s default option, I calculate an estimate of the borrower’s current combined loan-to-value ratio ( $CURR\_CLTV$ ) each month using the outstanding balance on the observed mortgage and the initial balance of any reported second liens

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<sup>12</sup>Results are insensitive to the inclusion of MSA fixed effects.

<sup>13</sup>I use the average interest rate each year for loans in our data as a proxy for the market interest rate on subprime loans. I also used rates from the Freddie Mac Primary Mortgage Market Survey reported monthly to calculate the value of the option, and the results remain unchanged.

at the time of origination.<sup>14</sup> I match each loan observation with the Federal Housing Finance Agency’s MSA level quarterly house price index (HPI). Based on the changes in the HPI, I estimate the current value of the house. By dividing the sum of the outstanding loan balances by the current house value, I estimate a time-varying CLTV. As *CURR\_CLTV* rises, the value of the default option increases. Since “silent” seconds by definition are not reported to the originator of the first mortgage, the estimate of *CURR\_CLTV* does not reflect unreported mortgage liens. I also include a variable that records the number of months since the loan was originated.

Since I only include one observation per loan, the time varying covariates (*OPTIONS<sub>ijt</sub>* and the MSA level unemployment rate) are recorded for the final month the loan is observed in the data. For example, for a loan that defaults, the *OPTIONS<sub>ijt</sub>* and MSA unemployment rate variables will take the values that they have in the month the loan defaults. In robustness checks, I used alternative methods for calculating these variables. Specifically, I used the average over the period the loan is observed, the maximum over the period the loan is observed, and the value in the final month divided by the standard deviation over the period the loan is observed for each of the variables. The primary results are insensitive to alternative methods of measuring the time varying covariates.

The primary variable of interest is the indicator for broker-borrower interaction (*FACE*). If the broker’s role is purely that of a matchmaker, then no association should exist between *FACE* and default. However, finding that *FACE* is statistically significantly related to default would suggest that the broker-borrower interaction affects mortgage performance. After showing that *FACE* is significantly negatively related to default, I investigate the underlying cause of this relationship. An identification strategy employed in this paper is to split the sample according to certain mortgage contract features and borrower characteristics that have been linked to financial illiteracy and repeat the regression of equation 1 on these subsamples. If broker-borrower interaction works to reduce problems associated with financial illiteracy,

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<sup>14</sup>Since I cannot observe changes in the loan balance on second mortgages, I assume no amortization over time on reported second liens.

then I would expect *FACE* to be more significantly related to default in the subsamples that are likely to have low levels of financial literacy.

### 2.3 Descriptive Statistics

Table 2 reports summary statistics for the variables used in the analysis. Following Agarwal and Hauswald (2010) and Agarwal et al. (2010), I consider default within a 24 month window to reduce the effect of idiosyncratic factors on default. Five percent of the loans in the sample defaulted at some point within the first 24 months after origination. This number reflects the high levels of credit risk contained in subprime mortgages, but does not reflect the full impact of the mortgage crisis since I can only follow loan performance into 2007. The primary independent variable of interest, *FACE*, indicates that face-to-face broker-borrower interaction occurred on 45% of the loans in the sample. Apparently, it was common for brokers to meet with borrowers in person.

The financial options variables show that on average the prepayment option was in the money, and the updated CLTV was 77%. Turning to the loan characteristics, the average *FEES* and *YSP* are 3% and 1%, respectively. Just over three quarters of the loans in the sample are adjustable rate mortgages with an average loan amount of \$161,000. The average CLTV at origination is 84%. The majority of the mortgages have a prepayment penalty (76%), and most loans are refinance loans in combination with equity extraction (54%). The average FICO score in the sample is 615, reflecting the lower credit quality of borrowers in the subprime market. Nearly 40% of the applications have limited or no income documentation. Since New Century did not offer many IO loans before 2004, only 15% of the loans had interest only payments. The average *DTI* in the sample is 40%.

Most of the mortgages are on single-family, primary residences. The average borrower is 42 years old with a monthly income of \$5,300. Almost 40% of the borrowers in my data are minorities, and 20% of all borrowers in the sample are self-employed. Turning to the area characteristics, Table 2 shows that on average, brokers were located about 16 miles from the subject property for the loan. In other words, brokers tended to originate loans locally. The

average percentage of county residents with at least a bachelor’s degree is 17%. Since NCEN began its operations in California and maintained its headquarters in Irvine, CA, a large share of the loans (43%, not listed in the table) are located in the western region of the country.<sup>15</sup> Also, consistent with the growth of the overall subprime market, over 60% of the originations occur in 2004 or 2005.

Table 2 presents descriptive statistics for two subsamples separated according to broker-borrower interaction. Column 1 presents averages for the 227,515 mortgages where the broker-borrower interaction was impersonal, and column 2 presents the statistics for the 183,651 mortgages where broker-borrower interaction was face-to-face. Column 3 reports the mean difference between columns 1 and 2. Due to the large sample sizes in columns 1 and 2, all of the mean differences which are not zero are statistically significant at the 1% level, except *DTI* which is significant at the 10% level. In general, most of the differences are not economically significant. However, a few minor differences in loan characteristics emerge across the two subsamples. A higher proportion of face-to-face loans are ARMs and stated income loans, whereas a lower proportion are cash-out refinances. Alternatively, a higher proportion of the loans with face-to-face interaction are for purchases. The face-to-face sample also has a five point higher average FICO score. Although some differences do exist across the two subsamples, the descriptive statistics do not appear systematically different across the two groups.

### 3 Results

#### 3.1 Broker-borrower interaction and mortgage default

In this section I examine the relationship between broker-borrower interaction and *ex post* mortgage default. Table 3 presents marginal effects from the probit regression of *DEFAULT* on the type of broker-borrower interaction, financial options, loan characteristics, property characteristics, borrower characteristics, interest rate environment variables, area characteristics

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<sup>15</sup>39% of the loans are originated in either California or Florida. The results remain unchanged when we exclude loans in originated in these two states.

and origination year/quarter dummies.<sup>16</sup> Throughout the analysis, unless otherwise stated, the reported standard errors are robust to heteroskedasticity and within cluster correlation of errors at the MSA level. The primary variable of interest is the type of broker-borrower interaction (*FACE*).

Table 3 shows that face-to-face interaction between the broker and the borrower is negatively related to default.<sup>17</sup> Since the average default rate is 5%, a face-to-face broker-borrower meeting is associated with a 3.2% decrease in the sample mean probability of default.<sup>18</sup> The results in Table 3 suggest an economically meaningful relation exists between broker-borrower interaction and mortgage default.<sup>19</sup> Although we are unable to observe loan performance during the mortgage crisis, the sheer size of the mortgage market (\$14.7 trillion outstanding in 2008), coupled with high foreclosure and delinquency rates (15% in 2010), suggest that face-to-face broker-borrower interaction had the potential to make an economically meaningful impact during the mortgage crisis.<sup>20</sup>

Turning to the financial options variables, Table 3 shows that *PPOption* is positively related to default, a finding that at first seems counter-intuitive. However, the first term in equation (2) reflects the difference between the market and book value of the loan using the average annual interest rate in the New Century data. For borrowers who have rates significantly higher than the average rate (e.g. the riskiest borrowers), the value of *PPOption* will be relatively high. These borrowers will also be more likely to default, which may explain the positive correlation between *PPOption* and default. As expected and consistent with previous literature, *CURR\_CLTV* is positively related to default. Intuitively, borrowers with less equity

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<sup>16</sup>The marginal effects in Table 3 for each independent variable are calculated holding all other independent variables at their mean values. These are referred to in the literature as marginal effects at the means (MEM).

<sup>17</sup>Robustness checks verified that the results are insensitive to the use of different windows lengths for when a loan defaults. The marginal effect of face-to-face interaction on default is -0.0017 and statistically significant when the window for default is within the first 12 or 36 months after origination.

<sup>18</sup>This is calculated as -0.0016/0.0500.

<sup>19</sup>A potential concern is that the significant coefficient on *FACE* is driven by the large sample size. Results in later sections of the paper show that even with a relatively large sample, *FACE* is not significantly related to *DEFAULT* for certain borrower and loan types (e.g. those associated with higher levels of financial literacy). In other words, my results are not driven purely by sample size.

<sup>20</sup>Estimates of the size of the mortgage market and default rates are from the Board of Governors of the Federal Reserve System (available at [www.federalreserve.gov/econresdata/releases/mortoutstand/mortoutstand20090331.htm](http://www.federalreserve.gov/econresdata/releases/mortoutstand/mortoutstand20090331.htm)) and MBA (2010), respectively.

in their house are more likely to default. Table 3 also shows a positive partial correlation between the number of months since origination and default.

Regarding loan characteristics, Table 3 shows that *FEES* is positively related to *DEFAULT*. Consistent with Berndt et al. (2012), this suggests a connection between fees and mortgage credit risk. Previous research shows ARMs are more likely to default (Ghent and Kudlyak (2011), Pennington-Cross and Ho (2010), Haughwout et al. (2009), and Ding et al. (2008)), and the positive and significant marginal effect for *ARM* in Table 3 supports this finding. *CLTV* at loan origination is not significantly related to mortgage default, but this is due to collinearity with *CURR\_CLTV*. If I remove *CURR\_CLTV* from the estimation, *CLTV* becomes significantly positively related to mortgage default. Not surprisingly, borrowers with higher FICO scores are less likely to default. Low-doc loans (*STATED*), where the borrower provides limited or no income documentation, have been shown to default at significantly higher rates than full income documentation loans (Berndt et al. (2012), Jiang et al. (2014), Haughwout et al. (2009), and Pennington-Cross and Ho (2010)). The results in Table 3 support this finding.

Turning to the property, borrower, and area characteristics, we see that borrowers are more likely to default on investment properties, and less likely to default on condominiums. Age and income are significantly negatively related to default, but minority status is positively associated with default. Loans originated in areas with lower levels of broker competition are more likely to default, but loans originated in states with stricter broker regulations have lower default rates. The county education level is also negatively related to default.

To summarize, Table 3 shows that broker-borrower interaction is significantly related to mortgage default. A face-to-face meeting between the broker and borrower is associated with a 3% decrease in the sample mean probability of default. Many of the other results reported in Table 3 are consistent with extant literature. The remaining sections of the paper will investigate the underlying cause of the relationship between broker-borrower interaction and mortgage default.

## 3.2 Broker-borrower interaction and financial literacy

### 3.2.1 Borrower characteristics associated with financial illiteracy

In this section I investigate whether the link between broker-borrower interaction and mortgage performance is related to financial literacy. Minorities tend to have lower levels of financial literacy, whereas income and education are positively correlated with financial literacy (Lusardi and Mitchell (2011), Lusardi and Tufano (2009), and Lusardi and Mitchell (2007)). Also, research suggests that individuals with lower levels of financial literacy have more difficulty managing their debt and credit (Lusardi and Tufano (2009) and Hilgert et al. (2003)), which is likely to result in lower FICO scores. In line with this idea, using data from the Long Island Community Development Corporation, Collins (2010) finds that a “[F]inancial education program led to a statistically significant decrease in the percentage of clients with credit scores in the subprime range (p. 15).” If broker-borrower interaction reduces problems of financial illiteracy, then one would expect the relationship between broker-borrower interaction and mortgage default to be particularly strong in subsamples where financial literacy is lower. I test this hypothesis by repeating the analysis from Table 3 after splitting the sample into groups that are more and less likely to have low levels of financial literacy (e.g. minority, low-education, low-income, and low-FICO). The sample median is used when splitting the data according to borrower characteristics that are measured on a continuous scale (*EDUC*, *INCOME*, and *FICO*).

Table 4 presents marginal effects estimates from probit regressions of mortgage default for each of the different subsamples. In the interest of space, I only report the marginal effects of face-to-face interaction for each of the regressions.<sup>21</sup> Column 1 includes loans for the low financial literacy subsamples (e.g. minorities, low education, low-income, low FICO), while column 2 repeats the regression for the higher financial literacy subsamples.

The first row of Table 4 shows that broker-borrower interaction is only significantly related to default for the minority subsample. In other words, face-to-face interaction matters for the

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<sup>21</sup>Controls for financial options, loan characteristics, borrower characteristics, property characteristics, and area characteristics are included in these regressions. Full tables for each of the regressions are available on request.



borrowers that are likely to have lower levels of financial literacy. Furthermore, the size of the marginal effect is nearly twice as large in the minority subsample.

The second row of Table 4 repeats the analysis splitting the sample according to county-level education. Column 1 shows that broker-borrower interaction is negatively related to default for borrowers located in counties with low-education levels. However, the same result does not hold in the more highly educated counties.<sup>22</sup> Consistent with the results in the first row of Table 4, the estimated marginal effect of face-to-face interaction is larger and only significant in the subsample that is likely to have lower levels of financial sophistication.

Next, I separate the sample according to income. Loans to households that earn less than the median income in the sample are classified as “low-income.” The results show that *FACE* is negatively related to default for borrowers in the low-income group, but not for borrowers in the high-income group.<sup>23</sup> The magnitude of the marginal effect is roughly six times larger in the low-income subsample. This provides additional evidence that broker-borrower interaction matters most for those that are the most financially vulnerable.

Finally, I examine whether the link between broker-borrower interaction and mortgage performance is related to borrower credit ratings. I group the borrowers into “Low-FICO” and “High-FICO” groups according to the median FICO score of 614. The last row of Table 4 shows that a face-to-face meeting between the broker and the borrower reduces the probability of default, but only for the “Low-FICO” group. The marginal effect indicates that *FACE* is associated with a 6% lower probability of default about the mean for borrowers with poor credit ratings, but only a 1% decrease for the high-FICO subsample.

There are some potential concerns with sample splitting approach used in this section. First, as noted in the literature, comparing probit or logit coefficients across two groups (e.g. minority and non-minority borrowers) can lead to incorrect conclusions. But, as Hoetker (2007) points out, differing signs and significance levels of coefficient estimates can be informative. The

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<sup>22</sup>Ideally we would be able to measure the borrower’s education, but, due to data limitations, we use a county level proxy (*EDUC*).

<sup>23</sup>As a robustness check I used the median income of the geographic location to classify loans into “low-income” and “high-income” areas. The results remain qualitatively unchanged when I classify according to zip code median income from the 2000 Census. In other words, *FACE* is significantly related to default in “low-income” areas but not in “high-income” areas. I thank Peter Zorn for this suggestion.

pattern that emerges in Table 4 shows that that face-to-face interaction is only statistically significantly related to default for borrowers that are likely to have lower levels of financial literacy. A second potential concern is that since marginal effects are computed at the mean of the other independent variables (MEM), and mean differences in control variables may exist across groups, comparing marginal effects across subsamples may be problematic. The primary results remain unchanged when I compute average marginal effects (AME). Finally, an alternative approach to splitting the sample is to create interaction terms between *FACE* and the low financial literacy indicators (minority, low-education, low-income, low-FICO). The primary results remain unchanged using this method. I choose to report the results of the subsample splitting approach because likelihood ratio tests confirm that this method is significantly better at fitting the data.

To summarize, the results contained in Table 4 provide evidence that broker-borrower interaction is important, particularly for the groups of borrowers likely to be financially vulnerable or financially illiterate. Not only are the marginal effect estimates larger in the low-financial literacy subsamples, they are only statistically significantly related to default in the low-financial literacy subsamples. Taken together, these findings suggest that a face-to-face meeting between the broker and the borrower may mitigate problems associated with financial illiteracy.

### **3.2.2 Multiple financial illiteracy characteristics**

The empirical strategy in section 3.2.1 is to determine whether the relationship between face-to-face interaction and mortgage default is driven by subsamples of borrowers that are likely to have low levels of financial literacy. In Table 4, the sample is stratified one characteristic at a time. However, it may also be informative to examine the subsample where the borrower has several characteristics associated with financial illiteracy.

Table 5 presents marginal effects estimates of face-to-face interaction when the borrower falls into each of the low financial literacy categories: minority, low-education, low-income, and low-FICO score. Since these are the borrowers that are most likely to have low levels of financial literacy, face-to-face interaction may be particularly important for these borrowers.

As column 1 shows, the marginal effect of *FACE* is much larger for this subsample (-0.0043) as compared to the full sample (-0.0015). However, the average default rate for borrowers with multiple financial illiteracy characteristics, 8.86%, is also well above the overall sample average of 4.97%. That said, face-to-face interaction is still associated with a larger decrease in default about the mean for the borrowers with multiple financial illiteracy characteristics (5% versus 3%). I am careful to not interpret this result too strongly, however, since, as noted above, comparing marginal effect estimates across different groups can be problematic.

### 3.3 Broker-borrower interaction and underwriting outcomes

If the lender bases underwriting decisions on broker-borrower interaction, this may explain the correlation between *FACE* and *DEFAULT* in section 3.1. For example, the lender may use tougher screening procedures on applications where the broker met face-to-face with the borrower, which could show up in lower default rates for these loans. Or, if the lender offers favorable pricing on loans with face-to-face interaction between the broker and the borrower, the lower interest rates offered on these loans may be the underlying cause of the correlation between *FACE* and default. In this section, I investigate whether broker-borrower interaction is related to underwriting decisions made by the lender. Specifically, I test whether the type of interaction between the broker and the borrower is related to either the accept/reject decision or to loan pricing. Although the broker deals directly with the borrower, the lender makes the ultimate decision in granting and pricing credit, so it is possible that a the link between broker-borrower interaction and mortgage performance is actually caused by a connection between face-to-face interaction and underwriting outcomes.

I first examine the relationship between broker-borrower interaction and the lender's decision to approve or deny the loan application.<sup>24</sup> Column 1 of Table 6 reports marginal effect estimates from the probit regression of application rejection (*DENIED*) on broker-borrower interaction, loan characteristics, property characteristics, borrower characteristics, interest

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<sup>24</sup>Table 1 presents summary statistics only on loans for which servicing data was available since the majority of the analysis only includes these loans. The descriptive statistics are nearly identical for the 600,978 loan applications used in the analysis in this section. 8% of the applications submitted by brokers were rejected by NCEN. The average interest rate on the applications is 7.8%.

rate environment variables, area characteristics and origination year/quarter dummies. The broker-borrower interaction variable (*FACE*) is not significantly associated with the lender’s accept/reject decision. This suggests that the lender does not grant credit based upon whether the broker met in person with the borrower. Next we turn to mortgage pricing. Column 2 of Table 6 presents coefficient estimates from an OLS regression of the mortgage interest rate on broker-borrower interaction and the other control variables for the 600,978 loan applications. No significant relation exists between interest rate and *FACE*.<sup>25</sup> This provides further evidence that broker-borrower interaction is not being used by the lender in the underwriting process.

The results in Table 6 provide no evidence that a link between broker-borrower interaction and underwriting outcomes is the underlying cause of the relationship between *FACE* and *DEFAULT*. No significant association exists between the accept/reject decision and whether the broker had a face-to-face meeting with the borrower. Furthermore, *FACE* is not significantly related to mortgage pricing by the lender. These findings suggest that something other than the lender’s underwriting process must be driving the relationship between broker-borrower interaction and mortgage default.

## 4 Endogeneity

A potential concern with the estimation of equation (1) is that face-to-face interaction may be endogenous. For example, it is possible that borrowers with lower default probabilities also seek out face-to-face interactions. In other words, perhaps “better” borrowers are more likely to meet with a broker in person. Two methods are commonly used to estimate causal effects when both the endogenous regressor and the outcome variable are dichotomous: a linear instrumental variables approach or a bivariate probit model. In this section I employ both approaches to deal with the possibility that face-to-face interaction is endogenous. I discuss these approaches and the results below.

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<sup>25</sup>Two alternative measures of loan pricing are the annual percentage rate (APR) and the margin for ARMs. Results remain unchanged when I use either of these pricing measures as the dependent variable.

## 4.1 Linear IV

Since I am using a linear IV approach, in this section equation (1) becomes

$$Y_{ij} = \alpha + \beta FACE_i + \lambda OPTIONS_{ijt} + \delta X_i + \theta R_t + \vartheta W_{jt} + \phi T + \varepsilon_{ij} \quad (3)$$

with  $\varepsilon_{ij}$  being a mean zero error term and all other variables defined as in section 2.2. In order to assuage concerns regarding the endogeneity of  $FACE_i$ , I need to find an instrument,  $Z$ , that satisfies two properties: 1)  $Z$  must be correlated with  $FACE$ , conditional on other covariates, and 2)  $Z$  is not correlated with  $\varepsilon_{ij}$ . For each broker, I calculate the proportion of that broker's loans where a face-to-face interaction occurred ( $\%FACE$ ). I instrument  $FACE$  with  $\%FACE$ , with the intuition is as follows. Brokers that often meet with clients face-to-face are more likely to have face-to-face interaction with future clients. However, the broker's face-to-face interactions with other borrowers should not directly affect the current borrower's mortgage performance. In other words,  $\%FACE$  should be highly correlated with  $FACE$ , but not directly related to mortgage default. The first stage regression takes the form

$$FACE_i = \gamma_0 + \gamma_1 \%FACE_k + \gamma_3 X + \eta_i \quad (4)$$

where  $\%FACE$  is the proportion of broker  $k$ 's loans that had face-to face interaction;  $X$  is the vector of exogenous variables from equation (3); and  $\eta_i$  is a mean zero error term.<sup>26</sup> The second stage regression takes the form

$$Y_{ij} = \alpha + \beta \widehat{FACE}_i + \lambda OPTIONS_{ijt} + \delta X_i + \theta R_t + \vartheta W_{jt} + \phi T + \varepsilon_{ij} \quad (5)$$

where  $\widehat{FACE}_i$  is the fitted values from equation (4).

Table 7 presents the results from the IV estimation. Column 1 reports coefficient estimates from the first stage regression, and as expected,  $\%FACE$  is significantly positively associated with  $FACE$ . The Angrist-Pischke first stage F-statistic of  $3.1 \times 10^5$  indicates that the instru-

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<sup>26</sup>  $FACE$  and  $\%FACE$  are highly correlated (0.66), and the correlation is significant at the 1% level of confidence.

ment is not weak. Column 2 presents the coefficient estimates for the second stage regression. Consistent with earlier results, face-to-face interaction between the broker and the borrower significantly reduces default even after controlling for the endogeneity of face-to-face interaction. This casts doubt on the hypothesis that the connection between default and face-to-face interaction is actually due to “better” borrowers meeting face-to-face. Put another way, the IV estimation provides additional support that face-to-face interaction has a causal effect on mortgage default.

## 4.2 Bivariate Probit

An alternative approach to the linear IV model is a bivariate probit model, which accounts for the binary nature of the outcome (*DEFAULT*) and treatment (*FACE*) variables (Chiburis et al. (2011)). Following Cameron and Trivedi (2010), Chiburis et al. (2011), and Avila et al. (2013), the bivariate probit model is

$$\begin{aligned} y_1^* &= x_1' \beta_1 + \varepsilon_1 \\ y_2^* &= x_2' \beta_2 + \varepsilon_2 \end{aligned} \tag{6}$$

and I observe the two outcomes

$$y_1 = \begin{cases} 1 & \text{if } y_1^* > 0 \\ 0 & \text{if } y_1^* \leq 0 \end{cases}$$

$$y_2 = \begin{cases} 1 & \text{if } y_2^* > 0 \\ 0 & \text{if } y_2^* \leq 0 \end{cases}$$

where  $y_1$  is a default indicator and  $y_2$  is *FACE*.<sup>27</sup> The error terms  $\varepsilon_1$  and  $\varepsilon_2$  are assumed to be standard bivariate normal with

$$\begin{aligned}\varepsilon_1 &\sim N(0, 1) \\ \varepsilon_2 &\sim N(0, 1) \\ \text{and } \text{Corr}(\varepsilon_1, \varepsilon_2) &= \rho\end{aligned}$$

If  $\rho = 0$  then the model collapses to two separate probit regressions for  $y_1$  and  $y_2$  (Cameron and Trivedi (2010)). Stated differently, when  $\rho = 0$  it is not necessary to model default and face-to-face interaction jointly.

The results of the bivariate probit model are presented in Table 8. Columns 1 and 2 report the coefficient estimates with *FACE* and *DEFAULT* as the dependent variables, respectively. The most important result of the bivariate probit model is reported near the bottom of the table. The correlation between the error terms,  $\rho$ , is low (0.0084) and not statistically significant. This suggests that default and face-to-face interaction can be modelled via separate probit models, as in section 3.1. Although the results imply that *FACE* is exogenous, the negative and statistically significant sign on *FACE* in column 2 is consistent with my previous results that face-to-face interaction is associated with lower default rates.

### 4.3 Broker Heterogeneity

Another potential concern is that “better” brokers meet face-to-face with borrowers, which drives the relationship between *FACE* and *DEFAULT*. I see this as a complimentary, rather than competing, interpretation of the results. “Better” brokers are likely to give sound financial advice, match borrowers with products that meet their needs, and counsel the borrowers through the loan origination process and beyond. Although I am less concerned about bias arising from broker unobservables, as compared to unobservable borrower characteristics, in this section I control for broker heterogeneity.

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<sup>27</sup> $x_1'$  and  $x_2'$  contain all the exogenous variables included in Section 4.1.

Table 9 presents coefficient estimates from a linear probability model of default with broker fixed effects. I employ a linear probability model due to the large number of broker fixed effects.<sup>28</sup> The results in Table 9 show that even after controlling for broker heterogeneity, *FACE* remains significantly negatively related to default. This reduces concerns that the connection between face-to-face broker-borrower interaction and default is driven by unobservable characteristics of the mortgage broker.

## 5 Conclusion

In this paper, I test whether broker-borrower interaction in the mortgage origination process is related to *ex post* loan performance. The results indicate that face-to-face interaction between the broker and the borrower in the application process is associated with a lower probability of subsequent mortgage default. The relation between face-to-face broker-borrower interaction and mortgage performance holds only for loans to borrowers with certain characteristics associated with lower levels of financial literacy. Unfortunately, data limitations prevent me from determining exactly how face-to-face interaction affects default for borrowers with lower levels of financial literacy. Even though I am unable to identify exactly how the mechanism works, the preponderance of the evidence is consistent with the hypothesis that face-to-face broker-borrower interaction acts as a mechanism to reduce problems associated with financial illiteracy.

This paper contributes to the rapidly growing literature on the incidence and economic consequences of financial illiteracy, and the ability of interventions to improve negative outcomes associated with financial illiteracy. Although I focus on the interaction between a mortgage broker and a borrower, the results may have broader implications. For example, face-to-face counseling for individuals with low levels of financial literacy may improve other economic outcomes as well (e.g. retirement planning, stock market participation, consumer debt repayment). My results also provide new insight into the role brokers play in the mortgage market. Much of the recent literature focuses on the negative impacts mortgage brokers have on the

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<sup>28</sup>Also, because of computing limitations, we include fixed effects for the 4,000 largest brokers in our sample.



market, however, my results suggest that mortgage brokers also have the ability to improve mortgage outcomes. In light of recent regulation changes that may reduce the supply of mortgage brokers (Andriotis (2013) and Smith (2011)), it is important to understand both the negative *and* positive effects brokers can have on the mortgage market.

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Table 1: Descriptive Statistics

Variable Name	Mean	Std. Dev.	Min	Max
Default	0.05	0.22	0.00	1.00
<b>Broker-Borrower Interaction</b>				
Face-to-face interview between broker and borrower (FACE)	0.45	0.50	0.00	1.00
<b>Financial Options</b>				
Value of the prepayment option (PPOption)	0.11	0.10	-0.26	0.50
Value of the default option (CURR_CLTV)	0.78	0.15	0.00	2.04
Months since origination	6.87	6.96	0.00	24.00
<b>Loan Characteristics</b>				
Fees as a percentage of loan amount (FEES)	0.03	0.02	0.00	0.15
Yield spread as a percentage of loan amount (YSP)	0.01	0.01	0.00	0.05
An indicator set to one if the loan was an adjustable rate mortgage (ARM)	0.77	0.42	0.00	1.00
Log loan amount at origination (LOAN_AMOUNT)	11.99	0.62	9.25	13.88
Combined loan to value ratio at origination (CLTV)	83.69	14.30	0.00	122.50
An indicator set to one if the loan was a prepayment penalty on the loan (PREPAY)	0.76	0.42	0.00	1.00
An indicator variable set to one if the loan was for a home purchase (PURCH)	0.36	0.48	0.00	1.00
An indicator variable set to one if the loan was a cash-out refinance (CASH)	0.54	0.50	0.00	1.00
The FICO score of the primary borrower at origination (FICO)	614.71	62.44	450.00	850.00
An indicator set to one if the loan was a stated income loan (STATED)	0.41	0.49	0.00	1.00
An indicator set to one if the loan had interest only payments (IO)	0.15	0.35	0.00	1.00
The ratio of the borrower's income to debt payments (DTI)	39.74	8.99	0.03	60.00
<b>Property Characteristics</b>				
An indicator set to one if the property was an investment property (INVESTMENT)	0.08	0.27	0.00	1.00
An indicator set to one if the property was a two-unit property (TWO_UNIT)	0.08	0.27	0.00	1.00
An indicator set to one if the property was a condo (CONDO)	0.07	0.25	0.00	1.00
<b>Borrower Characteristics</b>				
The age of the primary borrower (AGE)	42.30	11.42	18.00	99.00
An indicator set to one if the borrower was a minority (MINORITY)	0.39	0.49	0.00	1.00
The natural logarithm of one plus the borrower's income (INCOME)	8.58	0.57	0.00	10.20
An indicator set to one if the borrower was self-employed (SELF)	0.21	0.41	0.00	1.00
<b>Interest rate environment</b>				
The average monthly prime 30-year fixed rate at the time of origination (RATE_30)	6.04	0.52	5.23	8.52
The two year Treasury Rate at the time of origination (TREAS)	2.95	1.14	1.23	6.81
<b>Area Characteristics</b>				
Distance between originator and borrower (DIST)	2.75	1.07	0.00	5.01
Monthly unemployment rate at the MSA level (UNEMP)	5.32	1.40	1.30	23.10
MSA level Herfindahl-Hirschman index for broker competition (HHI)	0.08	0.11	0.01	1.00
Pahl-Index for state level broker regulations (REG)	7.80	3.56	0.00	14.60
The percentage of county residents with a bachelor's degree (EDUC)	0.17	0.07	0.00	0.88
MIDWEST	0.19	0.39	0.00	1.00
SOUTH	0.23	0.42	0.00	1.00
NORTHEAST	0.14	0.35	0.00	1.00
PACIFIC	0.01	0.10	0.00	1.00
<b>Origination Year</b>				
1999	0.02	0.13	0.00	1.00
2000	0.02	0.14	0.00	1.00
2001	0.04	0.19	0.00	1.00
2002	0.08	0.27	0.00	1.00
2003	0.21	0.41	0.00	1.00
2004	0.30	0.46	0.00	1.00
2005	0.32	0.47	0.00	1.00

Note: Descriptive statistics for the 411,166 funded loans.

Table 2: Descriptive Statistics By Type of Broker-Borrower Interaction

Variable Name	[1]	[2]	[3]	
	No Face Mean	Face-to-Face Mean	Std. Dev.	[1] - [2]
Default	0.05	0.05	0.22	0.21
<b>Financial Options</b>				
Value of the prepayment option (PFOption)	0.11	0.11	0.10	0.10
Value of the default option (CURR_CLTV)	0.78	0.79	0.15	-0.01
Months since origination	6.89	6.84	6.90	0.05
<b>Loan Characteristics</b>				
Fees as a percentage of loan amount (FEES)	0.03	0.03	0.02	0.00
Yield spread as a percentage of loan amount (YSP)	0.01	0.01	0.01	0.00
An indicator set to one if the loan was an adjustable rate mortgage (ARM)	0.76	0.78	0.43	-0.02
Log loan amount at origination (LOAN_AMOUNT)	12.00	11.97	0.63	0.03
Combined loan to value ratio at origination (CLTV)	83.29	84.19	14.42	-0.90
An indicator set to one if the loan was a prepayment penalty on the loan (PREPAY)	0.76	0.76	0.42	0.00
An indicator variable set to one if the loan was for a home purchase (PURCH)	0.33	0.40	0.47	-0.07
An indicator variable set to one if the loan was a cash-out refinance (CASH)	0.57	0.50	0.50	0.07
The FICO score of the primary borrower at origination (FICO)	612.46	617.49	61.94	-5.03
An indicator set to one if the loan was a stated income loan (STATED)	0.39	0.43	0.49	-0.04
An indicator set to one if the loan had interest only payments (IO)	0.15	0.14	0.36	0.01
The ratio of the borrower's income to debt payments (DTI)	39.72	39.77	9.03	-0.05
<b>Property Characteristics</b>				
An indicator set to one if the property was an investment property (INVESTMENT)	0.08	0.08	0.26	-0.01
An indicator set to one if the property was a two-unit property (TWO_UNIT)	0.07	0.08	0.26	-0.01
An indicator set to one if the property was a condo (CONDO)	0.06	0.07	0.25	-0.01
<b>Borrower Characteristics</b>				
The age of the primary borrower (AGE)	42.53	42.01	11.39	0.53
An indicator set to one if the borrower was a minority (MINORITY)	0.39	0.38	0.49	0.01
The natural logarithm of one plus the borrower's income (INCOME)	8.59	8.58	0.57	0.02
An indicator set to one if the borrower was self-employed (SELF)	0.20	0.22	0.40	-0.01
<b>Interest rate environment</b>				
The average monthly prime 30-year fixed rate at the time of origination (RATE_30)	6.01	6.07	0.48	-0.06
The two year Treasury Rate at the time of origination (TREAS)	2.94	2.96	1.10	-0.03
<b>Area Characteristics</b>				
Distance between originator and borrower (DJST)	2.91	2.54	1.07	0.37
Monthly unemployment rate at the MSA level (UNEMP)	5.26	5.38	1.34	-0.11
MSA level Herfindahl-Hirschman index for broker competition (HHI)	0.08	0.11	0.08	0.00
Pahl-Index for state level broker regulations (REG)	7.79	7.81	3.45	-0.02
The percentage of county residents with a bachelor's degree (EDUC)	0.17	0.17	0.07	0.00
MIDWEST	0.16	0.22	0.37	-0.06
SOUTH	0.22	0.42	0.42	-0.02
NORTHEAST	0.16	0.11	0.37	0.06
PACIFIC	0.01	0.01	0.10	0.00
<b>Origination Year</b>				
1999	0.02	0.02	0.13	0.00
2000	0.01	0.03	0.12	-0.02
2001	0.03	0.05	0.16	-0.02
2002	0.07	0.09	0.26	-0.01
2003	0.21	0.40	0.40	-0.02
2004	0.32	0.28	0.46	0.03
2005	0.34	0.30	0.47	0.04

Note: Descriptive statistics for the funded loans. Column 1 includes loans where the broker did not have a face-to-face interaction with the borrower, column 2 includes loans where the broker had a face-to-face interaction with the borrower, and column 3 presents the mean differences between columns 1 and 2. All of the mean differences that are not 0.00 are significant at the 1% level except DTI, which is significantly different at the 10% level.



Table 3: Explaining the relationship between broker-borrower interaction and mortgage performance

		[1]
	M.E.	Default Std. Err.
<b>Broker-Borrower Interaction</b>		
Face-to-face interview between broker and borrower (FACE)	-0.0016***	(0.0005)
<b>Financial Options</b>		
Value of the prepayment option (PPOption)	0.0481***	(0.0047)
Value of the default option (CURR_CLTV)	0.0703***	(0.0151)
Months since origination	0.0019***	(0.0001)
<b>Loan Characteristics</b>		
Fees as a percentage of loan amount (FEES)	0.2936***	(0.0315)
Yield spread as a percentage of loan amount (YSP)	0.2396***	(0.0523)
An indicator set to one if the loan was an adjustable rate mortgage (ARM)	0.0092***	(0.0009)
Log loan amount at origination (LOAN_AMOUNT)	0.0084***	(0.0015)
Combined loan to value ratio at origination (CLTV)	-0.0001	(0.0001)
An indicator set to one if the loan was a prepayment penalty on the loan (PREPAY)	0.0026**	(0.0012)
An indicator variable set to one if the loan was for a home purchase (PURCH)	0.0043***	(0.0012)
An indicator variable set to one if the loan was a cash-out refinance (CASH)	-0.0064***	(0.0009)
An indicator variable set to one if the loan was a cash-out refinance (CASH)	-0.0003***	(0.0000)
The FICO score of the primary borrower at origination (FICO)	0.0086***	(0.0009)
An indicator set to one if the loan was a stated income loan (STATED)	0.0015*	(0.0008)
An indicator set to one if the loan had interest only payments (IO)	0.0000	(0.0000)
The ratio of the borrower's income to debt payments (DTI)	0.0000	(0.0000)
<b>Property Characteristics</b>		
An indicator set to one if the property was an investment property (INVESTMENT)	0.0093***	(0.0017)
An indicator set to one if the property was a two-unit property (TWO_UNIT)	0.0018	(0.0016)
An indicator set to one if the property was a condo (CONDO)	-0.0056***	(0.0011)
<b>Borrower Characteristics</b>		
The age of the primary borrower (AGE)	-0.0002***	(0.0000)
An indicator set to one if the borrower was a minority (MINORITY)	0.0050***	(0.0010)
The natural logarithm of one plus the borrower's income (INCOME)	-0.0061***	(0.0010)
An indicator set to one if the borrower was self-employed (SELF)	0.0021***	(0.0007)
<b>Interest rate environment</b>		
The average monthly prime 30-year fixed rate at the time of origination (RATE_30)	0.0164***	(0.0031)
The two year Treasury Rate at the time of origination (TREAS)	0.0008	(0.0024)
<b>Area Characteristics</b>		
Monthly unemployment rate at the MSA level (UNEMP)	-0.0005	(0.0014)
MSA level Herfindahl-Hirschman index for broker competition (HHI)	0.0049	(0.0038)
Pahl-Index for state level broker regulations (REG)	-0.0007***	(0.0002)
The percentage of county residents with a bachelor's degree (EDUC)	-0.0113*	(0.0059)
MIDWEST	0.0075***	(0.0028)
SOUTH	0.0056	(0.0037)
NORTHEAST	0.0054***	(0.0020)
PACIFIC	-0.0076***	(0.0022)
<b>Origination Year/Quarter Fixed Effects</b>	Yes	
N	394,483	
Log likelihood	-65539	

Note: This table presents marginal effects estimates from a probit regression of mortgage default on broker-borrower interaction, financial options, loan characteristics, borrower characteristics, property characteristics, and area characteristics for the funded loans from the New Century database. MSA level cluster-robust standard errors are reported in parentheses. \*\*\*, \*\*, and \* denote significance at the 1%, 5%, and 10% level, respectively.

Table 4: Explaining the relationship between broker-borrower interaction and mortgage performance according to financial literacy

Dependent Variable	[1]	[2]
	Lower Literacy Subsamples Default	Higher Literacy Subsamples Default
<b>Reported: Marginal Effect for Broker-Borrower Interaction (FACE)</b>		
Minority	-0.0024*	(0.0013)
Low Education	-0.0025**	(0.0012)
Low Income	-0.0029***	(0.0011)
Low FICO	-0.0030**	(0.0012)

Note: This table presents marginal effects estimates from a probit regression of mortgage default on broker-borrower interaction, financial options, loan characteristics, borrower characteristics, property characteristics, and area characteristics for the funded loans from the New Century database. Columns 1 and 2 include the lower and higher financial literacy subsamples, respectively. For the low education, low-income, and low FICO subsamples, the data was split according to the median value of *ECUC*, *INCOME*, and *FICO*, respectively. Each reported coefficient represents a separate regression, but to conserve space, for each regression (8 in total) we only report the marginal effect for face-to-face interaction. Full regression coefficient estimates are available upon request. MSA level cluster-robust standard errors are reported in parentheses. \*\*\*, \*\*, and \* denote significance at the 1%, 5%, and 10% level, respectively.

Table 5: Explaining the relationship between broker-borrower interaction and mortgage default for loans with multiple low financial literacy characteristics

	[1]
	Low Literacy
	Default
	M.E. Std. Err.
<b>Broker-Borrower Interaction</b>	
Face-to-face interview between broker and borrower (FACE)	-0.0043* (0.0025)
<b>Financial Options</b>	
Value of the prepayment option (PPOption)	0.1183*** (0.0156)
Value of the default option (CURR_CLTV)	0.1062** (0.0449)
Months since origination	0.0028*** (0.0003)
<b>Loan Characteristics</b>	
Fees as a percentage of loan amount (FEES)	0.0877 (0.0915)
Yield spread as a percentage of loan amount (YSP)	-0.2635 (0.2145)
An indicator set to one if the loan was an adjustable rate mortgage (ARM)	0.0170*** (0.0024)
Log loan amount at origination (LOAN_AMOUNT)	0.0015 (0.0038)
Combined loan to value ratio at origination (CLTV)	-0.0006 (0.0005)
An indicator set to one if the loan was a prepayment penalty on the loan (PREPAY)	0.0071** (0.0035)
An indicator variable set to one if the loan was for a home purchase (PURCH)	0.0198*** (0.0052)
An indicator variable set to one if the loan was a cash-out refinance (CASH)	-0.0155*** (0.0037)
The FICO score of the primary borrower at origination (FICO)	-0.0005*** (0.0000)
An indicator set to one if the loan was a stated income loan (STATED)	0.0111*** (0.0040)
An indicator set to one if the loan had interest only payments (IO)	-0.0033 (0.0081)
The ratio of the borrower's income to debt payments (DTI)	-0.0001 (0.0001)
<b>Property Characteristics</b>	
An indicator set to one if the property was an investment property (INVESTMENT)	0.0170*** (0.0051)
An indicator set to one if the property was a two-unit property (TWO_UNIT)	0.0095 (0.0062)
An indicator set to one if the property was a condo (CONDO)	-0.0238*** (0.0044)
<b>Borrower Characteristics</b>	
The age of the primary borrower (AGE)	-0.0008*** (0.0001)
The natural logarithm of one plus the borrower's income (INCOME)	-0.0142*** (0.0024)
An indicator set to one if the borrower was self-employed (SELF)	0.0020 (0.0050)
<b>Interest rate environment</b>	
The average monthly prime 30-year fixed rate at the time of origination (RATE_30)	0.0414*** (0.0096)
The two year Treasury Rate at the time of origination (TREAS)	0.0073 (0.0088)
<b>Area Characteristics</b>	
Monthly unemployment rate at the MSA level (UNEMP)	0.0021 (0.0039)
MSA level Herfindahl-Hirschman index for broker competition (HHI)	0.0149 (0.0122)
Pahl-Index for state level broker regulations (REG)	-0.0013** (0.0005)
The percentage of county residents with a bachelor's degree (EDUC)	0.0170 (0.0972)
MIDWEST	0.0219*** (0.0078)
SOUTH	0.0197* (0.0116)
NORTHEAST	0.0058 (0.0102)
PACIFIC	0.1108*** (0.0352)
<b>Origination Year/Quarter Fixed Effects</b>	Yes
N	29,501
Log likelihood	-7127

Note: This table presents marginal effects estimates from a probit regression of mortgage default on broker-borrower interaction, financial options, loan characteristics, borrower characteristics, property characteristics, and area characteristics for the funded loans from the New Century database. The sample includes loans where the borrower has multiple characteristics associated with low financial literacy (minority, low-education, low-income, and low-FICO). MSA level cluster-robust standard errors are reported in parentheses. \*\*\*, \*\*, and \* denote significance at the 1%, 5%, and 10% level, respectively.

Table 6: Explaining the relationship between broker-borrower interaction and underwriting outcomes

	[1]		[2]	
	M.E.	Denied Std. Err.	Coeff.	Rate Std. Err.
<b>Broker-Borrower Interaction</b>				
Face-to-face interview between broker and borrower (FACE)	0.0016	(0.0016)	0.0033	(0.0116)
<b>Loan Characteristics</b>				
Fees as a percentage of loan amount (FEES)	-0.6173***	(0.0501)	-1.9453***	(0.4155)
Yield spread as a percentage of loan amount (YSP)	-1.7664***	(0.1930)	41.7320***	(1.4132)
An indicator set to one if the loan was an adjustable rate mortgage (ARM)	0.0168***	(0.0024)	-0.3156***	(0.0190)
Log loan amount at origination (LOAN_AMOUNT)	-0.0131***	(0.0044)	-0.4364***	(0.0122)
Combined loan to value ratio at origination (CLTV)	-0.0006***	(0.0001)	0.0039***	(0.0004)
An indicator set to one if the loan was a prepayment penalty on the loan (PREPAY)	0.0108***	(0.0030)	-0.2047***	(0.0320)
An indicator variable set to one if the loan was for a home purchase (PURCH)	-0.0080***	(0.0036)	-0.001	(0.0118)
An indicator variable set to one if the loan was a cash-out refinance (CASH)	-0.0312***	(0.0030)	-0.0414***	(0.0097)
The FICO score of the primary borrower at origination (FICO)	-0.0002***	(0.0000)	-0.0087***	(0.0001)
An indicator set to one if the loan was a stated income loan (STATED)	-0.0030***	(0.0009)	0.6532***	(0.0225)
An indicator set to one if the loan had interest only payments (IO)	-0.0113***	(0.0021)	-0.1429***	(0.0181)
The ratio of the borrower's income to debt payments (DTI)	0.0001	(0.0001)	0.0040***	(0.0006)
<b>Property Characteristics</b>				
An indicator set to one if the property was an investment property (INVESTMENT)	0.0062***	(0.0025)	0.5125***	(0.0216)
An indicator set to one if the property was a two-unit property (TWO_UNIT)	0.0106***	(0.0019)	0.0642***	(0.0235)
An indicator set to one if the property was a condo (CONDO)	0.0014	(0.0041)	0.0232**	(0.0112)
<b>Borrower Characteristics</b>				
The age of the primary borrower (AGE)	0.0001	(0.0000)	0.0004	(0.0003)
An indicator set to one if the borrower was a minority (MINORITY)	0.0151***	(0.0024)	0.0523***	(0.0072)
The natural logarithm of one plus the borrower's income (INCOME)	0.0009	(0.0026)	0.1398***	(0.0218)
An indicator set to one if the borrower was self-employed (SELF)	0.0074***	(0.0012)	-0.0011	(0.0062)
<b>Interest rate environment</b>				
The average monthly prime 30-year fixed rate at the time of origination (RATE_30)	-0.0013	(0.0033)	0.2828***	(0.0198)
The two year Treasury Rate at the time of origination (TREAS)	-0.0026	(0.0031)	-0.1198***	(0.0209)
<b>Area Characteristics</b>				
MSA level Herfindahl-Hirschman index for broker competition (HHI)	0.0019	(0.0121)	0.2882***	(0.0687)
Pahl-Index for state level broker regulations (REG)	-0.0014**	(0.0007)	-0.0082***	(0.0039)
The percentage of county residents with a bachelor's degree (EDUC)	0.0034	(0.0211)	-0.5203***	(0.0806)
MIDWEST	0.0194***	(0.0051)	0.2351***	(0.0548)
SOUTH	0.0227***	(0.0070)	0.2221***	(0.0218)
NORTHEAST	0.0883***	(0.0266)	0.0537*	(0.0296)
PACIFIC	-0.0316***	(0.0045)	0.0445*	(0.0242)
<b>Origination Year/Quarter Fixed Effects</b>				
Yes	Yes		Yes	
Const			16.6818***	
N	600978		600978	
Adj. R <sup>2</sup>			0.703	
Log likelihood	-135451		-720805	

Note: Column 1 presents marginal effects estimates from a probit regression of application denial on broker-borrower interaction, financial options, loan characteristics, borrower characteristics, property characteristics, and area characteristics for the funded loans from the New Century database. Column 2 presents coefficient estimates from an OLS regression of mortgage rate on broker-borrower interaction, financial options, loan characteristics, borrower characteristics, property characteristics, and area characteristics for the funded loans from the New Century database. MSA level cluster-robust standard errors are reported in parentheses. \*\*\*, \*\*, and \* denote significance at the 1%, 5%, and 10% level, respectively.

Table 7: IV estimation for broker-borrower interaction and mortgage performance

	[1]	[2]
	First Stage Face-to-face Coeff.	Second Stage Default Coeff.
<b>Broker-Borrower Interaction</b>		
Face-to-face interview between broker and borrower (FACE)		-0.0057*** (0.0016)
<b>Financial Options</b>		
Value of the prepayment option (PPOption)	-0.0017 (0.0099)	0.0695*** (0.0080)
Value of the default option (CURR_CLTV)	0.0312* (0.0171)	0.1661*** (0.0292)
Months since origination	0.0003 (0.0002)	0.0035*** (0.0003)
<b>Loan Characteristics</b>		
Fees as a percentage of loan amount (FEES)	-0.1670* (0.0865)	0.4252*** (0.0499)
Yield spread as a percentage of loan amount (YSP)	-0.6086*** (0.1486)	0.4194*** (0.0830)
An indicator set to one if the loan was an adjustable rate mortgage (ARM)	0.0012 (0.0019)	0.0089*** (0.0014)
Log loan amount at origination (LOAN_AMOUNT)	0.0010 (0.0028)	0.0124*** (0.0023)
Combined loan to value ratio at origination (CLTV)	-0.0002 (0.0002)	-0.0011*** (0.0003)
An indicator set to one if the loan was a prepayment penalty on the loan (PREPAY)	-0.0020 (0.0042)	-0.0041* (0.0024)
An indicator variable set to one if the loan was for a home purchase (PURCH)	0.0171*** (0.0030)	0.0093*** (0.0021)
An indicator variable set to one if the loan was a cash-out refinance (CASH)	0.0030 (0.0021)	-0.0103*** (0.0014)
The FICO score of the primary borrower at origination (FICO)	0.0008*** (0.0000)	-0.0004*** (0.0000)
An indicator set to one if the loan was a stated income loan (STATED)	0.0047*** (0.0020)	0.0091*** (0.0015)
An indicator set to one if the loan had interest only payments (IO)	0.0007 (0.0024)	-0.0031** (0.0013)
The ratio of the borrower's income to debt payments (DTI)	-0.0002*** (0.0000)	0.0000 (0.0001)
<b>Property Characteristics</b>		
An indicator set to one if the property was an investment property (INVESTMENT)	0.0049 (0.0031)	0.0106*** (0.0025)
An indicator set to one if the property was a two-unit property (TWO_UNIT)	0.0130*** (0.0039)	0.0025 (0.0023)
An indicator set to one if the property was a condo (CONDO)	0.0002 (0.0028)	-0.0082*** (0.0021)
<b>Borrower Characteristics</b>		
The age of the primary borrower (AGE)	-0.0002** (0.0007)	-0.0004*** (0.0001)
An indicator set to one if the borrower was a minority (MINORITY)	-0.0378*** (0.0050)	0.0092*** (0.0019)
The natural logarithm of one plus the borrower's income (INCOME)	-0.0144*** (0.0023)	-0.0106*** (0.0019)
An indicator set to one if the borrower was self-employed (SELF)	0.0072*** (0.0023)	0.0041*** (0.0011)
<b>Interest rate environment</b>		
The average monthly prime 30-year fixed rate at the time of origination (RATE_30)	-0.0210*** (0.0066)	0.0214*** (0.0043)
The two year Treasury Rate at the time of origination (TREAS)	0.0212*** (0.0061)	0.0026 (0.0040)
<b>Area Characteristics</b>		
Monthly unemployment rate at the MSA level (UNEMP)	0.0005 (0.0007)	0.0003 (0.0023)
MSA level Herfindahl-Hirschman index for broker competition (HHI)	-0.0336 (0.0237)	0.0107 (0.0089)
Pahl-Index for state level broker regulations (REG)	-0.0003 (0.0004)	-0.0011*** (0.0004)
The percentage of county residents with a bachelor's degree (EDUC)	0.0215 (0.0136)	-0.0195*** (0.0095)
MIDWEST	-0.0005 (0.0037)	0.0104** (0.0044)
SOUTH	0.0119*** (0.0034)	0.0072 (0.0052)
NORTHEAST	-0.0006 (0.0036)	0.0055** (0.0025)
PACIFIC	0.0232*** (0.0042)	-0.0053 (0.0058)
The percentage of the broker's interactions that are face-to-face (Instrument)	0.9998*** (0.0018)	
Constant	0.0824 (0.0870)	0.0072 (0.0416)
<b>Origination Year/Quarter Fixed Effects</b>		
N	Yes	Yes
Adj. $R^2$	394,483 0.44	394,483 0.06

Note: This table presents coefficient estimates from a instrumental variable regression of mortgage default and broker-borrower interaction on financial options, loan characteristics, borrower characteristics, property characteristics, and area characteristics for the funded loans from the New Century database. Columns 1 presents the estimates from the first stage with broker-borrower interaction as the dependent variable and column 2 reports the second stage estimates with default as the dependent variable. MSA level cluster-robust standard errors are reported in parentheses. \*\*\*, \*\*, and \* denote significance at the 1%, 5%, and 10% level, respectively.

Table 8: Bivariate probit estimation for broker-borrower interaction and mortgage performance

	[1]	[2]
	Face-to-face Coeff.	Default Coeff.
	Std. Err.	Std. Err.
<b>Broker-Borrower Interaction</b>		
Face-to-face interview between broker and borrower (FACE)	-0.0344**	(0.0170)
<b>Financial Options</b>		
Value of the prepayment option (PPOption)	-0.0677**	(0.0335)
Value of the default option (CURR_CLTV)	0.1262*	(0.0715)
Months since origination	0.0006	(0.0009)
<b>Loan Characteristics</b>		
Fees as a percentage of loan amount (FEES)	-0.7852**	(0.3617)
Yield spread as a percentage of loan amount (YSP)	-1.7422***	(0.5548)
An indicator set to one if the loan was an adjustable rate mortgage (ARM)	0.0082	(0.0085)
Log loan amount at origination (LOAN_AMOUNT)	0.0002	(0.0105)
Combined loan to value ratio at origination (CLTV)	-0.0006	(0.0007)
An indicator set to one if the loan was a prepayment penalty on the loan (PREPAY)	-0.0128	(0.0160)
An indicator variable set to one if the loan was for a home purchase (PURCH)	0.0696***	(0.0125)
An indicator variable set to one if the loan was a cash-out refinance (CASH)	0.0077	(0.0082)
The FICO score of the primary borrower at origination (FICO)	0.0003***	(0.0001)
An indicator set to one if the loan was a stated income loan (STATED)	0.0240***	(0.0091)
An indicator set to one if the loan had interest only payments (IO)	0.0067	(0.0100)
The ratio of the borrower's income to debt payments (DHI)	-0.0008***	(0.0003)
<b>Property Characteristics</b>		
An indicator set to one if the property was an investment property (INVESTMENT)	0.0249**	(0.0119)
An indicator set to one if the property was a two-unit property (TWO_UNIT)	0.0581***	(0.0160)
An indicator set to one if the property was a condo (CONDO)	0.0058	(0.0127)
<b>Borrower Characteristics</b>		
The age of the primary borrower (AGE)	-0.0007***	(0.0003)
An indicator set to one if the borrower was a minority (MINORITY)	-0.1593***	(0.0223)
The natural logarithm of one plus the borrower's income (INCOME)	-0.0580***	(0.0094)
An indicator set to one if the borrower was self-employed (SELF)	0.0311***	(0.0095)
<b>Interest rate environment</b>		
The average monthly prime 30-year fixed rate at the time of origination (RATE_30)	-0.0758***	(0.0277)
The two year Treasury Rate at the time of origination (TREAS)	0.0769***	(0.0251)
<b>Area Characteristics</b>		
Monthly unemployment rate at the MSA level (UNEMP)	-0.0033	(0.0029)
MSA level Herfindahl-Hirschman index for broker competition (HHI)	-0.1418	(0.0884)
Pahl-Index for state level broker regulations (REG)	-0.0015	(0.0020)
The percentage of county residents with a bachelor's degree (EDUC)	0.1072*	(0.0576)
MIDWEST	0.0160	(0.0163)
SOUTH	0.0690***	(0.0199)
NORTHEAST	-0.0025	(0.0166)
PACIFIC	0.0685***	(0.0238)
The percentage of the broker's interactions that are face-to-face (Instrument)	3.3633***	(0.0259)
Constant	-1.3202***	(0.3094)
<b>Origination Year/Quarter Fixed Effects</b>		
Yes	0.0084	(0.0108)
No	394.483	394.483
Log likelihood	-234888	-234888

Note: This table presents coefficient estimates from a bivariate probit regression of mortgage default and broker-borrower interaction on financial options, loan characteristics, borrower characteristics, property characteristics, and area characteristics for the funded loans from the New Century database. Column 1 presents the estimates with broker-borrower interaction as the dependent variable and column 2 reports the estimates with default as the dependent variable. MSA level cluster-robust standard errors are reported in parentheses. \*\*\*, \*\*, \* and \* denote significance at the 1%, 5%, and 10% level, respectively.

Table 9: Accounting for broker heterogeneity

	[1]	
	Coeff.	Default Std. Err.
<b>Broker-Borrower Interaction</b>		
Face-to-face interview broker and borrower (FACE)	-0.0021***	(0.0008)
<b>Financial Options</b>		
Value of the prepayment option (PPOption)	0.0627***	(0.0048)
Value of the default option (CURR-CLTV)	0.1473***	(0.0080)
Months since origination	0.0033***	(0.0001)
<b>Loan Characteristics</b>		
Fees as a percentage of loan amount (FEES)	0.4389***	(0.0341)
Yield spread as a percentage of loan amount (YSP)	0.5006***	(0.0599)
An indicator set to one if the loan was an adjustable rate mortgage (ARM)	0.0095***	(0.0009)
Log loan amount at origination (LOAN-AMOUNT)	0.0145***	(0.0012)
Combined loan to value ratio at origination (CLTV)	-0.0009***	(0.0001)
An indicator set to one if the loan was a prepayment penalty on the loan (PREPAY)	0.0025**	(0.0010)
An indicator variable set to one if the loan was for a home purchase (PURCH)	0.0077***	(0.0014)
An indicator variable set to one if the loan was a cash-out refinance (CASH)	-0.0100***	(0.0012)
The FICO score of the primary borrower at origination (FICO)	-0.0004***	(0.0000)
An indicator set to one if the loan was a stated income loan (STATED)	0.0099***	(0.0009)
An indicator set to one if the loan had interest only payments (IO)	-0.0027**	(0.0012)
The ratio of the borrower's income to debt payments (DTI)	0.0000	(0.0000)
<b>Property Characteristics</b>		
An indicator set to one if the property was an investment property (INVESTMENT)	0.0091***	(0.0015)
An indicator set to one if the property was a two-unit property (TWO-UNIT)	0.0025*	(0.0014)
An indicator set to one if the property was a condo (CONDO)	-0.0070***	(0.0012)
<b>Borrower Characteristics</b>		
The age of the primary borrower (AGE)	-0.0004***	(0.0000)
An indicator set to one if the borrower was a minority (MINORITY)	0.0081***	(0.0008)
The natural logarithm of one plus the borrower's income (INCOME)	-0.0103***	(0.0010)
An indicator set to one if the borrower was self-employed (SELF)	0.0036***	(0.0009)
<b>Interest rate environment</b>		
The average monthly prime 30-year fixed rate at the time of origination (RATE.30)	0.0224***	(0.0036)
The two year Treasury Rate at the time of origination (TREAS)	0.0015	(0.0036)
<b>Area Characteristics</b>		
Monthly unemployment rate at the MSA level (UNEMP)	-0.0000	(0.0004)
MSA level Herfindahl-Hirschman index for broker competition (HHI)	0.0110***	(0.0052)
Pahl-Index for state level broker regulations (REG)	-0.0014***	(0.0002)
The percentage of county residents with a bachelor's degree (EDUC)	-0.0146**	(0.0058)
MIDWEST	0.0136***	(0.0017)
SOUTH	0.0102***	(0.0015)
NORTHEAST	0.0045***	(0.0017)
PACIFIC	-0.0079*	(0.0043)
Constant	-0.0172	(0.0250)
Origination Year/Quarter Fixed Effects	Yes	
Broker Fixed Effects	Yes	
N	394,482	
Adjusted R <sup>2</sup>	0.07	

Note: This table presents coefficient estimates from a OLS regression of mortgage default on broker-borrower interaction, financial options, loan characteristics, borrower characteristics, property characteristics, area characteristics, and broker fixed effects for the funded loans from the New Century database. MSA level cluster-robust standard errors are reported in parentheses. \*\*\*, \*\*, and \* denote significance at the 1%, 5%, and 10% level, respectively.