

# Mortgage Brokers, Origination Fees, and Competition\*

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# *Mortgage Brokers, Origination Fees, and Competition*

## **Abstract**

This paper examines the relation between mortgage origination fees and mortgage broker competition. A reverse first-price sealed-bid auction model is used to motivate pricing behavior by brokers. Confirming the model predictions, our empirical analysis shows that increased mortgage brokerage competition at the Metropolitan Statistical Area level leads to lower origination fees. The findings are robust to different measures of fees as well as different measures of competition. We also provide evidence that broker competition reduces mortgage origination fees on retail (non-brokered) loans as well. Our results suggest that mortgage brokers increase competition and lower fees in the mortgage market.

*Key words: Mortgage Brokerage, Competition, Subprime, Cost*

*JEL Classification: G2*

# 1 Introduction

During the previous decade and coinciding with a significant bubble in house prices, mortgage lending activity in the U.S. increased from about \$5 trillion in 2000 to just over \$11 trillion in 2007. By 2004, mortgage brokers – intermediaries that bring borrowers and lenders together – accounted for approximately 50% of residential mortgage originations and had revenues totaling \$20 billion in 2006.<sup>1</sup> Given the significant role that mortgage brokers play in facilitating borrowers obtaining loans and in the wake of the mortgage default and foreclosure crisis, the mortgage brokerage industry received considerable criticism for the perceived lending excesses that occurred during the housing bubble.<sup>2</sup> Thus, the size of the mortgage brokerage industry, coupled with the recent mortgage crisis, has intensified research interest in mortgage brokers, particularly in how brokers are compensated.

Economic theory suggests that brokers play an important role in imperfect markets. For example, brokers can reduce buyer and seller search costs by improving efficiency in gathering, processing and disseminating information. In addition, brokers may also reduce uncertainty as to whether transactions will occur (LaCour-Little (2009)). In the mortgage market, borrower search costs may include learning what mortgage options are available, and which lender provides the best price. Examples of lenders' search costs include advertising and pre-screening of potential borrowers (El Anshasy, et al. (2006)). Since brokers may reduce both lender and borrower search costs, they can be compensated for their services in two ways: direct charges to the borrower or yield spread premium (YSP) from the lender. In the first case borrowers either pay direct charges out-of-pocket or add the fees to the balance of the loan. In the second scenario, lenders pay the broker a yield spread premium for originating a loan at an interest rate above the minimum rate at which the lender would be willing to fund the loan. For example, if the market (par) interest rate is 7%, then the lender would pay the broker

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<sup>1</sup>National Association of Mortgage Broker's (<http://www.namb.org/>) and LaCour-Little (2009).

<sup>2</sup>Alistair Barr, "Subprime Crisis shines light on mortgage brokers" (April 10, 2007) *Market Watch* <http://www.marketwatch.com/story/subprime-crisis-shines-spotlight-on-mortgage-broker-practices>.

a premium (YSP) for originating the loan at a contract rate of 7.5%. In effect, YSP is the opposite of discount points that borrowers pay to reduce the contract rate below the current market (par) interest rate. In this paper, we focus on the question of whether competition among mortgage brokers has an impact on mortgage origination fees. This question is fundamentally important to regulators and policy makers concerned with promoting an efficient and stable mortgage market.

The recent mortgage crisis raised concerns about whether mortgage brokers provide a benefit to participants in the mortgage market. Theoretically, benefits to the lender and borrower from using a broker should compensate for the additional costs of the intermediary, but it is often argued that in reality this is not the case in the mortgage brokerage market, resulting in the vilification of mortgage brokers in the press. For example, brokers are often accused of “steering” customers into loans with contract terms less favorable than those for which they qualify (Lieber (2009) and Brooks and Simon (2009)), and Barr (2009) even assigns culpability for the subprime crisis to mortgage brokers. Academic work usually focuses on the costs and benefits of using a broker from the borrower’s perspective and typically argues that using a broker is more costly to a borrower than dealing directly with the lender. Kim-Sung and Hermanson (2003) suggest that mortgage brokers engage in aggressive marketing that may encourage borrowers to refinance sub-optimally. They also argue that borrowers that obtain their loan through a broker, as opposed to directly through a lender, are less satisfied with their mortgage and less likely to believe they received honest information regarding their loan. In addition, several studies find that borrowers pay more for their mortgage loan when using a mortgage broker (LaCour-Little (2009), Woodward (2008), and Jackson and Burlingame (2007)).

Although the literature has focused on the differences between loans originated by brokers versus lenders, to our knowledge no study directly investigates the relationship between mortgage financing costs and broker competition.<sup>3</sup> Thus, claims arising from the

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<sup>3</sup>In a recent paper, Berndt, et al. (2010) include one measure of broker competition as a control variable in their research on broker profits. In contrast, we focus on broker competition as the primary independent variable of interest employing several measures of broker competition at the MSA level.

recent subprime crisis that mortgage brokers have harmed consumers may inadvertently ascribe the effects of competition (or lack thereof) to the mortgage brokerage industry in general, rather than focusing on the root cause: lack of competition.

Preliminary results suggest that there is a relation between origination fees and broker competition. Figure 1 plots the average number of brokers per Metropolitan Statistical Area (MSA) and the average origination fee as a percent of the loan amount between 1998 and 2005. We clearly see an inverse relation between the number of brokers and average origination fees. The average number of brokers per MSA increases steadily to a peak of 65 in mid-2004 while the average origination fees declined from over 5% at the beginning of 1998 to less than 2.5% at the end of 2004.<sup>4</sup> In figure 2, we plot the relation between average origination fees and the average MSA Hirfindahl-Hirschman Index (HHI). HHI proxies for the level of broker competition in a market where an HHI of one indicates a pure monopoly while an HHI approaching zero implies a perfectly competitive market. Figure 2 shows that the average HHI declines nearly 50% between 1998 and 2005, indicating a shift toward greater competition. Our subsequent empirical analysis that controls for loan, area, and borrower risk characteristics shows that higher broker competition leads to lower fees for borrowers. The results indicate that a two standard deviation increase in the level of competition leads to a \$1,300 decrease in fees for the average loan.

Next, we focus on the link between broker competition and borrower financing costs on retail (non-brokered) loans. We show that broker competition not only lowers fees on brokered loans, but on retail loans as well. Although the magnitude of the effect of broker competition on fees is somewhat muted in the retail loan market, the relation is still economically and statistically significant. After examining the connection between broker competition and retail loan fees, we investigate whether broker competition affects fee complexity. Carlin (2009) argues that firms may introduce fee complexity in more competitive environments to create a source of oligopoly. We find no evidence to suggest that brokers increase price complexity in competitive markets. However, since firms may

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<sup>4</sup>Fees are defined as all costs charged by New Century and the broker, including yield spread premium, divided by the total loan amount.

introduce complexity through other contractual features, we are careful not to interpret our fee complexity results too strongly. Finally, using 2SLS to control for the possibility of endogenously determined competition, we still find that broker competition reduces borrower financing costs.

The relation between mortgage broker competition and borrower financing costs is of particular interest in the context of current regulation debates. Discussions on preventing another mortgage crisis generally include the possibility of increased mortgage broker regulation. However, the results of this paper suggest additional regulations for mortgage brokers may make mortgage financing more costly for borrowers.

The paper proceeds as follows. Section 2 presents a brief review of related literature. Section 3 introduces a model for mortgage pricing. Sections 4 and 5 describe the data and primary empirical results, respectively, and Section 6 concludes.

## 2 Literature Review

We focus on the relation between the mortgage origination fees and broker competition. In economics, a vast literature exists concerning competition and market structure, but in this section we focus on competition in the financial services industry.<sup>5</sup>

Research investigating competition in the banking industry typically assumes that market concentration is inversely related to competition (Berger, et al. (2004)). Empirical tests employ multiple measures of market concentration with the most common measure being the Herfindahl-Hirschman Index (HHI).<sup>6</sup> The HHI is calculated as:

$$HHI = \sum_{i=1}^n S_i^2 \quad (1)$$

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<sup>5</sup>See Einav and Levin (2010) and Weiss (1989) for comprehensive reviews of the economics literature. For surveys on bank concentration see Berger, et. al (2004), Bikker and Haaf (2002) and Gilbert (1984).

<sup>6</sup>Bikker and Haaf (2002) provide an extensive review of concentration measures.

where  $S_i$  represents the market share of firm  $i$  and ranges between zero and one and  $n$  is the number of firms in the industry. A HHI of 1 implies a monopolistic market resulting in non-competitive pricing behavior (Bikker and Haaf (2002)) while a HHI near zero implies perfect competition.

In considering the effects of changing market structures on competition, Gande, et al. (1999) investigate the effect of bank entry on corporate debt underwriting spreads. Prior to 1990, banks were prohibited by law from underwriting corporate debt. The authors take advantage of a changing regulatory environment that allowed banks to underwrite corporate debt starting in 1990. This provides a natural experiment to determine if bank entry caused increased competition in the market. Underwriter spreads, the fee the firm or bank receives for underwriting corporate debt, decreased in the post-1989 era. Ex-ante yields, the spread between the corporate debt and government debt of similar maturity, also decreased after 1989. This suggests that increased competition in corporate debt underwriting decreased non-competitive pricing behavior.

Berger and Hannan (1989) examined competition and pricing in financial services by comparing interest rates on deposit accounts in different geographic markets. Using a sample of banks in 195 local banking markets, the authors find that banks in markets with higher concentration ratios pay lower interest rates on deposit accounts. Hannan (1991) performs a similar test using commercial loan rates charged to businesses and also finds that in areas with high concentration, higher rates are charged on commercial loans.

Aspinwall (1970) focuses on competition and pricing in the mortgage market. Since mortgage volume data was not available, market shares were calculated from lender deposit information, creating a proxy for mortgage lending concentration. MSA mortgage interest rates were then regressed on area characteristics and the concentration measures. Aspinwall found a statistically significant positive relationship between mortgage interest rates and concentration. Marlow (1982) employs the same basic model on a larger sample in a different year and finds similar results. Unfortunately, neither of these studies had access to detailed individual borrower information that would allow one to

control for differences in borrower risk. In this study, we make use of a recently available dataset that includes extensive loan level information not available in these earlier studies allowing us to effectively control for the impact of borrower risk characteristics in order to isolate the role of broker competition on borrower origination costs.

Recognizing the importance of mortgage brokers to the mortgage origination process, several recent articles have focused on mortgage financing costs that borrowers incur when originating a mortgage with a broker versus dealing directly with a lender. For example, El Anshasy, et al. (2006), using a sample of loans from 10 subprime lenders, find that broker originated mortgages have similar costs to the borrower as those originated by lenders. In contrast, LaCour-Little (2009) found that borrowers pay an additional 20 basis points to use a mortgage broker rather than deal directly with a lender in the prime mortgage market. In addition, Woodward (2008), using total charges to the borrower, finds that borrowers pay an additional \$410 - \$469 when their loan is originated through a broker versus directly with a lender.

Most recently, Berndt, et al. (2010) summarily mention the link between competition and mortgage finance charges in a study investigating broker incentive schemes. Berndt, et al. (2010) note that broker revenue trended downwards over the period covering 1997 to 2006 and hypothesize that this decline results from increased competition in the mortgage market during the real estate boom. Their paper develops a model based on market power and they employ a frontier model to estimate the cost and profit portions of revenue. Their main results are that brokers make greater profit when loan terms are complicated and when borrowers are less informed. Also, consistent with our findings, they show that profits are inversely related to the level of broker competition. However, we investigate competition at the MSA level and employ several different measures of competition.



### 3 Model

We model broker fees as a standard private value reverse first-price sealed-bid auction. In this framework, a borrower contacts various brokers to obtain information on fees and terms. Each broker submits a price bid to the borrower, and the borrower selects the broker with the lowest bid. The broker's bid is based on her privately known cost ( $c$ ) to originate the loan. We assume these costs are distributed randomly with a cumulative distribution and probability density function of  $F(\cdot)$  and  $f(\cdot)$ , respectively.

Brokers follow a symmetric, increasing, and differentiable bidding strategy  $B(c) \in [c, \bar{c}]$ , where  $\bar{c}$  represents a maximum amount the broker can charge for the loan. Let  $c^{n-1}$  represent the second lowest cost draw with a cdf of  $G(y) = [1 - F(y)]^{n-1}$ , and a pdf of  $g(y)$ .  $n$  represents the number of brokers competing for the loan and is known by all. In deciding whether to bid, the broker maximizes the following function:

$$\pi(b, c) = G(B^{-1}(b))(b - c) \quad (2)$$

where  $b$  is the bid and  $B^{-1}(\cdot)$  represents the inverse bid function.  $G(B^{-1}(b))$  represents the broker's probability of winning and  $(b - c)$  represents the profit on the loan. The resulting first order condition is

$$\frac{g(B^{-1}(b))}{B'(B^{-1}(b))}(b - c) + G(B^{-1}(b)) = 0 \quad (3)$$

where  $B'(\cdot)$  is the first derivative of the bid function. Solving for the bid function results in

$$B(c) = c + \int_c^{\bar{c}} \frac{G(y)}{G(c)} dy \quad (4)$$

or equivalently

$$B(c) = c + \int_c^{\bar{c}} \frac{[1 - F(y)]^{n-1}}{[1 - F(c)]^{n-1}} dy \quad (5)$$

$$= c + \frac{1 - F(c)}{nf(c)} \quad (6)$$

where  $B(c)$  is the broker's pricing function. The first term in (6) is the individual broker's cost for originating the loan. The second term in (6) is positive and represents the amount of profit the broker will earn on the loan conditional on winning the auction. Intuitively, the broker's bid includes his cost plus a margin. Therefore, the margin and thus the overall bid, depends on the number of brokers in the market.

Taking the derivative of (6) with respect to the number of brokers ( $n$ ) yields

$$\frac{\partial B(c)}{\partial n} < 0 \tag{7}$$

revealing that the broker's bid is inversely related to the level of competition in the market. Stated differently, increased broker competition lowers fees. This paper focuses on empirically testing equation (7). We expect to find a negative relationship between fees and our measures of competition in the mortgage market.

To test the theoretical prediction, we follow the empirical method of Berger and Hannan (1989) and estimate the following model:

$$y_{ij} = \beta_0 + \beta_1 comp_{jT} + \beta_2 x_{ij} + \beta_3 w_j + \beta_4 T + \varepsilon_{ij} \tag{8}$$

where  $y_{ij}$  is the cost of loan  $i$  in area  $j$ ,  $comp_{jT}$  is a measure of competition in area  $j$  at time  $T$ ,  $x_{ij}$  is a vector of borrower and loan characteristics,  $w_j$  is a vector of area characteristics,  $T$  includes quarter/year time dummies, and  $\varepsilon_{ij}$  is a mean zero error term. Following standard practice, we use the broker HHI as a proxy for market competition. The null hypothesis is that market concentration has no effect on fees.

## 4 Data

To estimate equation (8), we use loan level data available on mortgages originated or serviced by New Century Financial Corporation from 1998 through 2005. At the height of its operations, New Century was the second largest originator of subprime mortgages

in the United States. The database contains detailed loan level information on 988,364 mortgages at the time of origination including, but not limited to, loan amount, borrower credit quality (FICO) score, origination fees, borrower age, loan type, property zip code, and income documentation type. This detailed level of data allows us to accurately calculate the actual fees paid by borrowers, including direct fees as well as indirect fees embedded in broker yield spread premiums.

Our analysis focuses on the 370,253 funded 30-year first mortgage, refinance loans for single family residences contained in the New Century database. We excluded from the analysis loans without location information and loans with obvious data entry errors. In addition, to minimize the presence of data entry errors, we eliminated observations where (1) the borrower's FICO score was less than 450 or greater than 850; (2) the combined loan-to-value (CLTV) ratio was less than 10%; (3) the borrower's age was less than 18 or greater than 99; (4) the debt-to-income ratio was less than 5% or greater than 60%; and (5) fees were negative or more than 50% of the loan balance. We also eliminated observations if the number of brokers in an MSA in a given quarter was less than 10. After cleaning the data, our final sample contains 272,059 funded loans.

We use two different measures of borrower costs. First, we use the total dollar amount of fees charged by New Century and the broker, including yield spread, divided by the loan amount (*FEEES%*). Although yield spread is not a direct fee to the borrower, it is common practice for brokers to use it to defray out of pocket fees to the borrower. As a result, yield spread is just a different allocation of the borrower's fees and any measurement of loan fees should include the yield spread premium. Our second measure is the effective interest rate on the loan. Since the majority of mortgages in the New Century data are adjustable rate (ARMS), we calculate the effective rate (*EFF\_RATE*) assuming a holding period of two years. We used a two year holding period because the average prepayment penalty length in the data was two years. Also, most of the mortgages begin to adjust interest rates after the end of the second year.

We use the HHI identified in equation (1) as a proxy for competition in our analysis. The HHI is calculated for each MSA in each quarter. The squared market shares of

each broker operating within a MSA are calculated over each quarter, and summed over all brokers during that same quarter. A concern is that HHI is a non-stationary process, which could lead to spurious correlations in our regressions. To test if HHI is a stationary process, we employ the Levin, Lin, and Chu test (2002). Levin, Lin, and Chu suggest that their test is appropriate for panels of moderate size “(say, between 10 and 250 individuals, with 25-250 time series observations per individual” (p.3), thus we only include MSAs that have at least 25 time series observations. Using this test, we are able to reject the null hypothesis that HHI is a non-stationary process at the 1% level of significance. From application to funding, the loan underwriting process can take several months to complete. Thus, in order to measure market competition over the period prior to the actual funding date of the loan, we lag HHI one quarter to capture competition at the time when the loan process started.

The New Century database includes a wealth of information about each mortgage and mortgagee allowing us to include a comprehensive set of variables to control for loan and borrower characteristics. Specifically, we control for borrower credit quality via the credit (*FICO*) score of the primary borrower at the time of origination, the borrower’s total monthly income, as well as the borrower’s age, race, and gender. We control for differences in each mortgage such as the loan size, the combined loan-to-value (*CLTV*) ratio, whether the loan was a cash-out refinance, whether the borrower provided full income verification, whether the loan contained a prepayment penalty, and whether the loan contained an adjustable interest rate. In addition, we control for differences in the interest rate environment over time by matching each loan to the average 30-year fixed mortgage rate in the origination month as reported in Freddie Mac’s Primary Mortgage Market Survey.

We also include several variables to control for differences in mortgage location. For example, we control for differences in local regulatory environment (*REGULATION*) using the state level regulation index from Pahl (2007). Pahl collects data on mortgage broker regulations and occupational licensing requirements for each state from 1996-2007. She then creates an index meant to capture the level of mortgage broker

regulation in each state.<sup>7</sup> Higher values of *REGULATION* indicate stricter regulations on mortgage brokers. We also control for geographic region and changes in New Century's market share of subprime mortgages in the MSA from HMDA. In addition, we use UFA's *ForeScore*<sup>TM</sup> *Zip* index (*ForeScore*) to capture economic, demographic, and legal factors that empirically impact mortgage default risk at the zip code level each quarter. The index (*ForeScore*) rates the default probability associated with the zip code, and is analogous to a credit score for the location.

Table 1 contains summary statistics for the variables used in the analysis. The average mortgage origination fee is \$5,850 or 3.8% of the loan amount. The average effective interest rate ranges from 4.6% to 23% with a mean of 9.49%. In comparison, the average interest rate on a 30-year fixed rate mortgage was 6.21% over the same time period. During our study period, the most competitive market was Los Angeles-Long Beach, CA with a HHI of 0.01 in the first quarter of 2004, while the least competitive market was Fort Worth-Arlington, TX with a HHI of 0.76 in the fourth quarter of 2002.

Since our sample consists only of subprime loans, the average *FICO* score is relatively low at 595. The average loan amount is approximately \$182,000 and the average *CLTV* is 78%. An overwhelming majority of the loans are cash out refinances (84%), while roughly one third of the loans were stated income loans. Most of the sample consists of adjustable-rate mortgages (71%) and the majority have prepayment penalties (79%). Roughly 8% of the mortgages are interest only. In terms of demographic characteristics, we note that 42% of the loans are to minorities, the average age of the primary borrower is 45, and 37% of the primary borrowers are women. Since New Century began its operations on the West Coast, it is not surprising that 48% of the loans are located in the west region.

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<sup>7</sup>For each state we average the index over our sample period.

## 5 Results

### 5.1 Explaining borrower mortgage origination costs

In this section, we discuss our tests for whether market competition affects financing costs for the borrower. Table 2 reports the estimated coefficients from the ordinary least squares (OLS) regression of equation (8).<sup>8</sup> Our primary variable of interest is our proxy for broker competition ( $HHI$ ). As noted above, we include a variety of variables that control for loan characteristics (size, loan-to-value, purpose, type, and underwriting), borrower characteristics (income, race, age, and gender), prevailing market interest rate at origination, and location (regulatory environment, New Century market share, default zip-code level history index, and region).<sup>9</sup> All models include quarter/year fixed effects and standard errors adjusted for clustering at the MSA level.

Column (1) reports the estimated coefficients from the regression using origination fees as a percent of the loan amount ( $FEE\%$ ) as the dependent variable. The positive and statistically significant coefficient for  $HHI$  is consistent with our theoretical prediction that increased broker competition results in lower fees to borrowers, since a higher  $HHI$  indicates less competition. The estimated coefficient implies that a two standard deviation increase in  $HHI$  results in an increase of almost three quarters of a point in fees as a percent of the loan amount, ceteris paribus, or approximately \$1,300 on the average loan amount. As a result, broker competition appears to have an economically significant relation to broker origination fees.

With respect to the controls for loan characteristics, we find that most of the estimated coefficients are significant with the expected sign. For example, we find that borrowers obtaining a cash-out refinancing pay higher fees suggesting that borrowers seeking to extract equity are either less price sensitive or that brokers must expend

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<sup>8</sup>We believe that observations where the fee measure equals zero represent “true” zeros. Stated differently, the fee distribution is not censored at zero, and thus OLS is more appropriate than a Tobit model. However, the results remain unchanged when we use a Tobit model.

<sup>9</sup>Most variables are statistically significant at the 1% level and the signs on the coefficients match a priori expectations. All coefficient estimates are multiplied by 1,000 for the purpose of readability.

greater effort to secure financing for these borrowers. Interestingly, we see that the estimated coefficient for *CLTV* is negative and significant at the 1% level indicating that fees as a percent of the loan amount decline as loan-to-value ratios increase. However, given that many subprime loans were originated to borrowers who wrapped the origination fees into the loan amount, the negative relation between *CLTV* and origination fees may reflect broker incentives to keep loan-to-value ratios below maximum *CLTV* underwriting limits. The coefficient on *STATED* is positively related to fees, suggesting the cost of originating a stated income loan for a broker is higher than for full income documentation loans. The lack of significance on *PREPAY* suggests that borrowers do not receive a reduction in fees for including a prepayment penalty in their mortgage contract. The coefficient for *ARM* is not significantly different from 0, indicating that adjustable-rate mortgages and 30-year fixed mortgages have similar fees. Finally, we also find a significant and negative relation between origination fees and interest-only (*IO*) loans. However, it is not clear why interest only loans should be less expensive for the borrower. A possible explanation is that borrowers selecting interest only loans are income constrained, and brokers are more likely to take a “haircut” on their fees to ensure that the borrower qualifies for the loan.

Next we examine the relation between borrower characteristics and origination fees. Again, column (1) in Table 2 shows that higher *FICO* scores are associated with lower fees. Since brokers require less effort to place loans for borrowers with better credit quality, the negative coefficient suggests that brokers compete for these borrowers by lowering fees. We also find that minority borrowers pay higher fees, while women pay lower fees. Both of these findings are consistent with Courchane (2007). We also find a positive relationship between fees and the borrower’s age, consistent with Woodward (2008).

Finally, regarding the location controls, we see that the estimated coefficient on the regulatory environment variable is negative and statistically significant. The negative relation suggests that brokers in states with higher regulatory oversight are monitored more closely and thus are less able to charge higher fees to borrowers, all else being equal.

Furthermore, the *ForeScore* zip-code level index of mortgage default risk is significant and positive suggesting that it is more costly for brokers or lenders to originate loans in areas with high future default risk.<sup>10</sup>

In Table 2 column (2) we report the results of the same regression with the effective interest rate as the dependent variable. Again, our primary interest is on the effect of broker competition (HHI) on borrower costs as measured by the effective interest rate. Consistent with the previous model, the coefficient for *HHI* remains economically and statistically significant. The estimated coefficient indicates that a two standard deviation increase in HHI (indicating a significant reduction in competition) results in a 34 basis point increase in the effective rate. Again, this suggests that mortgage broker competition lowers the costs of borrowing.

In column (2), most of the controls variables match the sign and significance of those reported in column (1). However, some notable differences do occur. First, we now see that higher loan-to-value ratios (*CLTV*) are significantly positively related to our fee measure (effective interest rate). This is likely due to the fact that lenders have interest rate “bumps” around threshold levels of LTV. For example, an 81% LTV loan typically has a higher interest rate than an 80% LTV loan. Although *CLTV* is negatively related to *FEES%* because of payment constraints, it is positively related to the effective interest rate because of loan-to-value rate thresholds. The coefficient on borrower income is opposite of that predicted by the financial literacy literature, which argues that individuals with higher incomes are more financially literate (Lusardi and Tufano (2009) and Lusardi and Mitchell (2007)) and thus are less likely to get a “bad” deal. Finally, the regression estimates indicate that the presence of a prepayment penalty is negatively related to the effective interest rate. Thus, it appears that borrowers are being compensated through reduction in the effective interest rate as opposed to changes in origination fees to compensate for the presence of prepayment penalties.

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<sup>10</sup>We also employed regression specifications with state and MSA level fixed effects. The statistical significance and the sign on our competition measures remained unchanged. The economic significance of these coefficients was somewhat reduced. With state (MSA) level fixed effects a two standard deviation increase in HHI results in a 3.5% (1.5%) increase in fees.



In column (3) of Table 2, we repeat the regression analysis using the log of origination fees as the dependent variable. Because the coefficients are difficult to interpret when the dependent variable has been log-transformed, we also include a column labeled ‘Fee Effect’. For continuous and log-transformed independent variables, this reflects the percentage change in fees for a two standard deviation increase in the dependent variable. For indicator variables, this reflects the percentage change in fees moving from a value of zero to one. Again we see that *HHI* is statistically and economically significant. A two standard deviation increase in *HHI* results in an 8.59% increase in fees, *ceteras paribus*. This provides further evidence that competition is important in determining fees. We also see that the sign on loan size is positive indicating that gross fees increase with loan amount. The majority of the other control variables have the same sign and significance as those presented in columns (1) and (2).

To summarize, the results in Table 2 indicate that for each of the three measures of fees, we find a significant negative relationship between fees and the level of competition. This suggests that broker competition does act to reduce fees in the mortgage market.

## 5.2 Alternative measures of competition

In Table 2 we used *HHI* as our measure of competition. As a robustness check, we examine two alternate proxies for market competition. Our first alternate measure of market competition is the concentration ratio (*CR2*) of the top two market shareholders. This is an alternate measure of competition commonly employed in the literature (Bikker and Haaf (2002)). We calculate the concentration ratio as the sum of the market-shares of the top two market shareholders in an MSA in a given quarter.<sup>11</sup> In table 3 we report the results of regressions of the fee measures on this alternate measure of competition. A high value of *CR2* implies low competition. As indicated in Table 3, the results remain unchanged using *CR2* as the independent variable of interest. The estimated coefficient for *CR2* is economically and significantly positively related to each of our measures of fees, again implying that lower levels of competition lead to higher borrower costs.

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<sup>11</sup>The concentration ratio has a high correlation (.93) with our initial competition measure *HHI*.

Our second alternative measure is the number of brokers in an MSA in a given quarter divided by the total population of the MSA (*NUM\_BROK*). The number of brokers is taken from the New Century database and varies each quarter in each MSA. The population estimates were obtained from the 2000 Census. Higher values of *NUM\_BROK* are associated with higher levels of competition, thus we expect a negative relation between broker competition and *FEES%*. Table 3 presents results for this measure. In both columns (3) and (4), we see that broker competition is negatively related to our fee variables. These results provide additional evidence that increased broker competition is negatively related with fees.

### 5.3 Controlling for lender competition

Another possible concern is that our broker competition measures simply capture the effect of lender (rather than broker) competition at the MSA level. To investigate this possibility, we constructed a measure of subprime bank competition (*BANK\_COMP*) at the MSA level each year. Whereas our previous competition measures are intended to capture broker competition, *BANK\_COMP* captures the HHI at the lender level.<sup>12</sup> Table 4 reports the results of our regressions when we include *BANK\_COMP* as an explanatory variable.<sup>13</sup> *BANK\_COMP* is significantly negatively related to *FEES%* but not with the effective interest rate. Below we argue that these findings result from the fact that increased lender competition increases fees on brokered loans, and decrease the effective interest rate on retail (non-brokered) loans. More importantly, even after controlling for subprime bank competition, broker competition is still statistically and significantly inversely related to fees. This suggests that our competition measures capture broker competition rather than lender competition, and that broker competition is inversely related to fees in the subprime mortgage market.

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<sup>12</sup>This measure is calculated at the MSA level each year from HMDA origination data. Unfortunately the HMDA data does not indicate whether a loan was a subprime mortgage. Thus, we use HUD's annual subprime lender lists to determine which loans in HMDA are likely to be subprime mortgages (available at <http://www.huduser.org/portal/datasets/manu.html>).

<sup>13</sup>We lagged *BANK\_COMP* by one-year.

## 5.4 The effect of broker competition on retail (non-brokered) loans

Tables 2 - 4 show an economically significant relation between broker competition and origination fees in our sample, but this does not necessarily indicate that borrowers benefit from broker competition. In most markets, brokers compete not only with other brokers, but also against retail (direct) lenders. If *ceteras paribus*, retail lenders charge less to originate a loan, as argued by LaCour-Little (2009) and Woodward (2008), then simply showing that increased broker competition decreases fees on *brokered* loans is insufficient to argue that borrowers benefit from broker competition. Rather, to claim that broker competition benefits consumers, we need to show that broker competition also lowers fees on retail loans. If no significant relation exists between retail (non-brokered) loan fees and broker competition, borrowers may be better off by avoiding brokers entirely.<sup>14</sup> In this section, we examine the link between broker competition and retail origination fees.

In all but one MSA in our sample, New Century acted as both as a retail and wholesale lender.<sup>15</sup> Stated differently, New Century competed directly with its brokers in the markets in which it operated. Since New Century acted as both a retail and wholesale lender in our sample, this enables us to examine the relationship between

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<sup>14</sup>An alternative interpretation is that the mortgage market is segmented. In this view, borrowers self-select into brokered or non-brokered (retail) loans. A portion of the borrowers, acting rationally, self-select into brokered loans despite higher origination fees. A borrower with high search costs, for instance, may obtain a loan through a broker because higher fees are offset by reduced search costs. In this section we assume some overlap between these two markets.

<sup>15</sup>A wholesale lender funds loans originated by brokers, while a retail lender originates loans directly. Anchorage, Alaska was the only MSA in which New Century accepted brokered loans but did not originate loans directly.

retail fees and broker competition.<sup>16</sup> Finding that broker competition reduces fees on retail loans would weaken the argument that mortgage brokers harm consumers.

Table 5 reports the estimated coefficients from the ordinary least squares (OLS) regression of equation (8) for 51,801 retail loans in our sample. Again, our primary variable of interest is our broker competition measure ( $HHI$ ). Consistent with the idea that broker competition reduces fees in the *retail* loan market, the coefficient on  $HHI$  is positive and statistically significant. In addition, broker competition is economically significant. A two standard deviation increase in broker competition decreases fees by \$800. As one would expect, focusing on retail loans mutes the magnitude of the relationship between fees and broker competition. Intuitively, since some segmentation likely exists between brokered and retail loan markets, broker competition affects the retail market to a lesser degree.

Since our sample includes retail loans, we include our lender measure of competition ( $BANK\_COMP$ ) in Table 5 as well. Surprisingly, lender competition is not related to the fees charged on subprime loans. Most of the other coefficients on the control variables match the sign and significance of Table 2 column (1). However, a positive and significant relation now exists between  $PREPAY$  and fees, while the coefficient on  $ARM$  becomes negative and significant in Table 5.

Table 5 column (2) presents the results when the dependent variable is effective rate. As in column (1), an economically and statistically significant relation exists between broker competition and effective rate on retail loans. A two standard deviation increase in broker competition is associated with a 16 basis point reduction in effective rate. In contrast with column (1), lender competition is significantly negatively related to

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<sup>16</sup>LaCour-Little (2009) points out a potential problem with comparing retail and wholesale loans. Because brokers may misrepresent the risk of borrowers, lenders may place limits on the risk of loans they will accept from brokers. In this scenario, lenders will originate the riskiest loans directly, which makes the average risk higher in the pool of retail loans. Since higher risk represents additional cost to the lender, borrowers will be charged higher fees on average for retail loans. Although the average fees (4.40%) and effective rate (10.62%) on retail loans are higher in our sample, retail loans do not appear to be more risky on observable characteristics. On retail loans (versus brokered), the average CLTV is lower, borrowers are less likely to take cash out, and there is a lower proportion of stated income loans, suggesting that retail loans are not riskier on average than brokered loans. However, the average FICO score is five points lower on retail loans.

effective rate. This suggests that in more competitive lending markets, New Century competes with lenders through interest rates. The signs and significance on most control variables in Table 5 column (2) remain unchanged from Table 2.

In summary, Table 5 shows that broker competition is significantly negatively related to mortgage financing costs on retail (non-brokered) loans. Lender competition, however, only affects the effective rate on retail loans. This suggests that brokers help drive down costs not only on broker originated loans, but also on loans originated directly by the lender. Even if some segmentation exists between broker and retail mortgage markets, it appears that increased broker competition affects both markets.

## 5.5 Competition and fee complexity

In this section, we examine the relation between broker competition and fee complexity. As explained above, brokers are compensated either through direct fees from the borrower, yield spread from the lender, or some combination of the two. When comparing prices between brokers, borrowers must evaluate the total cost of the loan, including the direct fees and the yield spread (through the interest rate). However, as Woodward (2003) points out, mortgage transactions are complex, and borrowers often find it difficult to calculate the tradeoff between interest rates and direct fees.

In a recent paper, Carlin (2009) presents a model that links competition and pricing complexity. Specifically, his model predicts that as competition increases, firms add complexity to their pricing, or alternatively, firms make their price disclosures more opaque in competitive markets. Pricing complexity makes it more costly for consumers to compare prices across firms, resulting in less knowledgeable consumers. Since ignorance is a source of oligopoly (Carlin (2009) from Scitovsky (1950)), this allows firms to increase profits. In the model, firms increase complexity in competitive markets to increase oligopoly power (and profits), whereas firms operating in non-competitive markets have no need to use pricing complexity, since they already obtain the benefits of oligopoly.

We employ yield spread as a percentage of total fees (YSP%) to proxy for price complexity. Jackson and Burlingame (2007) argue that “yield spread premiums constitute a separate and less well known way that mortgage brokers are compensated for their services” (p. 291). They go on to say “when yield spread premiums are present, consumers have a harder time telling how much they are paying their brokers” (p. 295-296). In other words, yield spread premium adds complexity to the pricing process. Since competition increases complexity, we expect higher levels of YSP% in more competitive markets.

Table 6 reports the estimated coefficients from the ordinary least squares (OLS) regression of equation (8) with YSP% as the dependent variable for 219,066 brokered loans.<sup>17</sup> If competition increases price complexity, we expect a negative relation between *HHI* and YSP%. However, in contrast with the theoretical prediction, Table 6 shows that broker competition is positively related to yield spread. This implies that in more competitive markets, brokers use less complex fee structures. We note, however, that one should be cautious in interpreting these results. Since the products (loans) mortgage brokers offer may be heterogeneous, complexity may be introduced in alternative ways. As an example, in a competitive market for a single customer, one broker may offer an ARM while another broker offers a fixed rate mortgage (FRM), making it difficult to compare prices across brokers.

Turning to the control variables, we see a positive connection between loan amount and YSP%. We interpret this finding as follows. With a relatively small increase in interest rate on a large loan, a broker gains substantial revenue in dollar terms. However, on a small mortgage, that same increase in rate would result in a very small change in dollar revenue. Therefore, we expect yield spread utilization to be greater on large loans, consistent with the results in Table 6. Yield spread is significantly lower on stated income loans, whereas *ARM* is significantly positively related to YSP%. Both of these results are consistent with Berndt, et al. (2010).

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<sup>17</sup>Results remain unchanged with the use of a tobit regression model.

Table 6 lends no support for Carlin’s (2009) hypothesis that competition leads to increased price complexity. In fact, we provide evidence that price complexity is negatively related to broker competition. However, we are careful not to interpret our fee complexity results too strongly, as brokers may use other loan characteristics to complicate price comparisons.

## 5.6 Endogeneity of competition

We also recognize that simultaneity potentially introduces a problem for the empirical specification of equation 8. If fees change the level of competition, then our ordinary least squares (OLS) coefficient estimates will be biased. To control for the possible endogeneity of competition, we use two-stage least squares (2SLS) estimation.

To identify the exogenous variation in competition, we use the number of new residential building permits issued one year earlier for each MSAs every quarter. The first stage regression takes the form

$$comp_{jt} = \gamma_0 + \gamma_1 PERMITS_{jT-4} + \gamma_2 x_{ij} + \gamma_3 w_j + \gamma_4 T + \eta_{ij} \quad (9)$$

where  $PERMITS$  is the number of new residential building permits issued in  $MSA_j$  at time  $T - 4$ <sup>18</sup>,  $x_{ij}$  is a vector of borrower and loan characteristics,  $w_j$  is a vector of area characteristics,  $T$  includes quarter/year time dummies, and  $\eta_{ij}$  is a mean zero error term. Our second stage regression takes the form

$$y_{ij} = \beta_0 + \beta_1 \widehat{comp}_{jT} + \beta_2 x_{ij} + \beta_3 w_j + \beta_4 T + \varepsilon_{ij} \quad (10)$$

where  $\widehat{comp}_{jT}$  are the fitted values from equation (9), with all other variables being the same as in equation (9).

The number of new residential building permits issued one year earlier should directly affect the current supply (competition), demand, and price of mortgage brokerage

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<sup>18</sup>Quarterly MSA permit data is available at <http://www.census.gov/construction/bps/>.

services in the *purchase* market. However, within the *refinance* market, only the supply of brokerage services should be directly related to the level of new building permits. In other words, *PERMITS* should only affect fees on refinance loans indirectly through the broker competition channel. Since our data only includes refinance loans, using the predicted values from equation 9 attenuates concerns regarding the endogeneity of competition.

We report results from the 2SLS estimation in Table 7. In column (1), as expected, we see a negative and significant relationship between the number of permits in an MSA (*PERMITS*) and *HHI*, or alternatively, competition is directly related to the level of new residential permits.<sup>19</sup> Column (2) presents coefficient estimates from the second stage regression. As in Table 2, a statistically and economically significant relation exists between competition and *FEES%*. The economic significance, statistical significance, and signs of the coefficients on the control variables are almost identical to those presented in Table 2. Column (3) repeats the first stage regression but includes *LOAN\_AMOUNT* since it is included as an exogenous variable when the independent variable is effective rate. As in column (1), the level of permits relates directly to the level of competition. In the second stage, reported in column (4), we see that increased competition reduces effective interest rates.

To summarize, the possibility exists of simultaneity bias between competition and fees. To address the endogeneity of competition, we employ 2SLS estimation with the level of building permits in an MSA one year earlier used to identify the exogenous variation in competition. Table 7 shows that a significant negative relation remains between broker competition and borrower origination costs after controlling for the endogeneity of competition.

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<sup>19</sup>Because loan level characteristics are used to explain an aggregate measure of competition, it is difficult to interpret the coefficient estimates from equation (9), however, this does not concern us since our only goal is finding a valid instrument.



## 6 Conclusion

Although mortgage brokers became an important player in the mortgage lending process over the past two decades, relatively little academic research focuses specifically on brokers. This paper examines the relation between price and competition in the mortgage brokerage market. We model price as a private value reverse first-price sealed-bid auction. Employing a database of loan originations from a former subprime mortgage originator that was one of the largest during the recent real estate boom, we find in our sample that increased broker competition at the MSA level is associated with lower price for borrowers. The results are robust to several different measures of fees, as well as different proxies for competition in the mortgage brokerage market. We also provide evidence that broker competition lowers fees on retail (non-brokered) loans as well. Regarding fee structure, we find no evidence that brokers increase price complexity in more competitive markets. Finally, we use 2SLS estimation to account for the possibility that broker competition is endogenous. Broker competition continues to reduce borrower origination costs in our 2SLS estimation. The findings presented here suggest that consumer protection policies that limit broker competition may ultimately result in borrowers paying higher costs.

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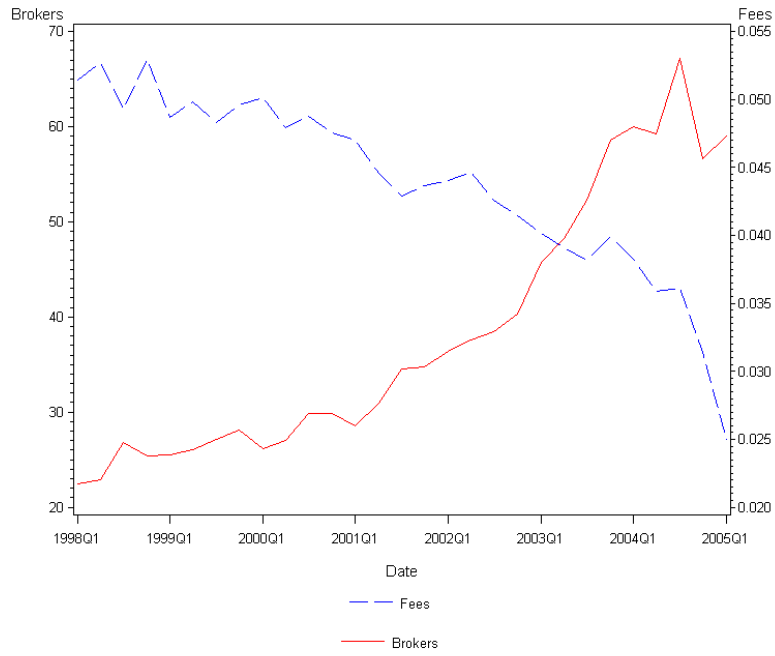


Figure 1: Number of Brokers and Average Fees by Date

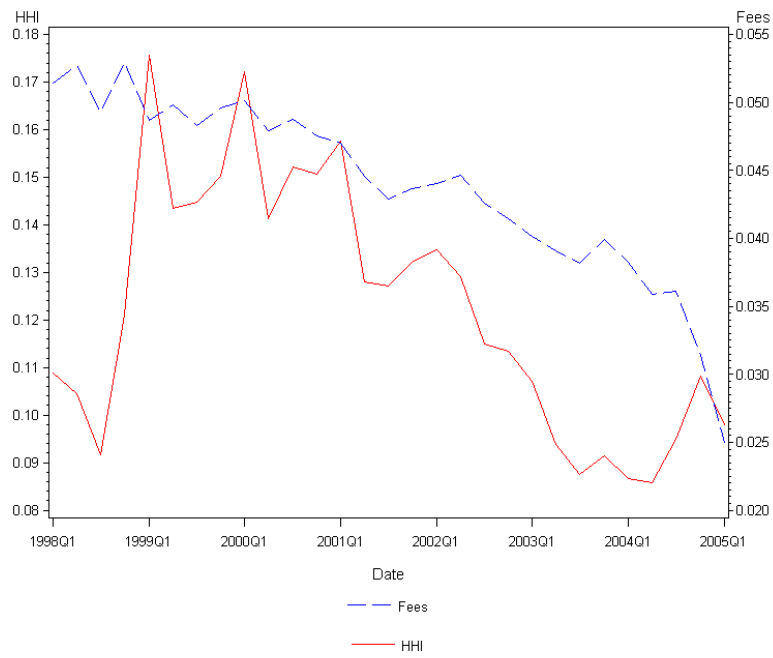


Figure 2: Average HHI and Broker Fees by Date

Table 1: Descriptive Statistics

Variable Name	Mean	Std. Dev.	Minimum	Maximum
<b>Origination Fee Variables</b>				
Total fees on the loan charged by the broker and New Century (Fees)	\$5,849.12	\$3,416.12	\$0.00	\$56,062.50
Fees as a percent of the loan amount (FEES%)	3.76%	1.78%	0.00%	16.66%
Effective interest rate on the loan (EFF_RATE)	9.49%	2.19%	4.60%	23.27%
The natural logarithm of one plus Fees (LOG_FEES)	8.34	0.89	0.00	10.94
<b>Competition</b>				
MSA level Herfindahl-Hirschman index calculated over the previous quarter (HHI)	0.08	0.09	0.01	0.76
<b>Loan Characteristics</b>				
Log loan amount at origination (LOAN_AMOUNT)	11.93	0.62	9.62	14.36
The combined loan to value ratio at origination (CLTV)	78.00	13.45	10.00	125.00
An indicator variable set to one if the loan was a cash-out refinance (CASH)	0.84	0.37	0.00	1.00
An indicator variable set to one if the loan was a stated income loan (STATED)	0.31	0.46	0.00	1.00
An indicator variable set to one if the loan had a prepayment penalty (PREPAY)	0.79	0.41	0.00	1.00
An indicator variable set to one if the loan was an adjustable rate mortgage (ARM)	0.71	0.45	0.00	1.00
An indicator variable set to one if the loan was an interest only mortgage (IO)	0.08	0.27	0.00	1.00
<b>Borrower Characteristics</b>				
The FICO credit score used by New Century when underwriting the loan (FICO)	594.76	58.10	450.00	825.00
The natural logarithm of one plus the borrower's income (LOG_INCOME)	8.50	0.58	0.00	13.29
An indicator variable set to one if the borrower is a minority (MINORITY)	0.42	0.49	0.00	1.00
Age of the primary borrower at origination (AGE)	45.20	11.28	18.00	99.00
An indicator set to one if the primary borrower is female (FEMALE)	0.37	0.48	0.00	1.00
<b>Area Characteristics</b>				
Average of the state broker regulation index over the period 1997 to 2006 (REGULATION)	7.70	3.36	0.00	14.60
The change in New Century's annual market share at the MSA level (NCMS)	0.18	0.78	-0.58	30.55
Zip code index of default rate (DEF_HIST)	1.16	0.60	0.35	6.79
WEST	0.48	0.50	0.00	1.00
MIDWEST	0.22	0.41	0.00	1.00
NORTHEAST	0.10	0.30	0.00	1.00
PACIFIC	0.00	0.05	0.00	1.00
SOUTH	0.19	0.39	0.00	1.00
The average monthly prime 30-year fixed mortgage interest rate from the Primary Mortgage Market Survey (RATE_30)	6.21	0.66	5.23	8.52

Note: Descriptive statistics for the origination fee variables, competition, loan characteristics, borrower characteristics, and area characteristics for the sample of 272,059 first mortgage refinance loans from the New Century database.

Table 2: Explaining Borrower Mortgage Origination Costs

	[1]		[2]		[3]	
	FEEs%	Effective Rate	Log Fees	Coef.	Std. Err.	Fee Effect
	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.
<b>Competition</b>						
MSA level Herfindahl-Hirschman index calculated over the previous quarter (HHI)	36.72***	(4.47)	1867.7***	(239.90)	458.00***	(109.40)
<b>Loan Characteristics</b>						
Log loan amount at origination (LOAN_AMOUNT)	-1401.30***	(52.93)	-1401.30***	(52.93)	572.90***	(17.39)
The combined loan to value ratio at origination (CLTV)	10.34***	(0.02)	10.34***	(0.02)	-0.01	(0.42)
An indicator variable set to one if the loan was a cash-out refinance (CASH)	2.61***	(0.23)	179.10***	(14.33)	122.30***	(8.36)
An indicator variable set to one if the loan was a stated income loan (STATED)	0.56***	(0.19)	563.30***	(14.19)	22.24**	(8.63)
An indicator variable set to one if the loan had a prepayment penalty (PREPAY)	0.71	(1.29)	-260.20***	(71.23)	80.46***	(29.65)
An indicator variable set to one if the loan was an adjustable rate mortgage (ARM)	-0.66	(0.46)	-283.10***	(24.92)	47.03***	(10.03)
An indicator variable set to one if the loan was an interest only mortgage (IO)	-1.26***	(0.38)	27.72	(24.17)	4.943	(9.155)
<b>Borrower Characteristics</b>						
The FICO credit score used by New Century when underwriting the loan (FICO)	-0.03***	(0.00)	-10.52***	(0.26)	-0.49***	(0.06)
The natural logarithm of one plus the borrower's income (LOG_INCOME)	-7.42***	(0.30)	205.50***	(14.70)	-42.96***	(9.67)
An indicator variable set to one if the borrower is a minority (MINORITY)	2.11***	(0.46)	117.10***	(19.91)	34.02***	(8.17)
Age of the primary borrower at origination (AGE)	0.08***	(0.001)	4.84***	(0.36)	3.29***	(0.18)
An indicator set to one if the primary borrower is female (FEMALE)	-0.20**	(0.09)	15.13*	(7.73)	-4.01	(3.51)
<b>Area Characteristics</b>						
Average of the state broker regulation index over the period 1997 to 2006 (REGULATION)	-0.34**	(0.15)	-16.02**	(6.36)	-8.99*	(4.61)
The change in New Century's annual market share at the MSA level (NCMS)	0.06	(0.16)	-21.11*	(12.03)	-9.47	(7.55)
Zip code index of default rate (DEF_HIST)	3.69***	(0.93)	96.84***	(23.85)	56.94***	(13.16)
MIDWEST	0.88	(1.49)	4.64	(79.50)	-150.40***	(28.13)
NORTHEAST	-0.27	(1.97)	4.34	(65.57)	-8.91	(32.86)
PACIFIC	-0.94	(0.77)	453.20***	(47.10)	194.00***	(25.39)
SOUTH	6.39***	(1.64)	325.30***	(64.93)	10.87	(49.76)
The average monthly prime 30-year fixed mortgage interest rate from the Primary Mortgage Market Survey (RATE_30)	-1.41***	(0.26)	-5.31	(20.40)	-17.46	(12.25)
CONST	0.12***	(0.00)	28.35***	(0.77)	2.01***	(0.16)
N	272059		272059		272059	
Adj. R <sup>2</sup>	0.28		0.74		0.16	

Note: This table presents coefficient estimates from OLS regressions of fee measures on competition (HHI), loan characteristics, borrower characteristics, and area characteristics for the 272,059 loans from the New Century database. All coefficients are multiplied by 1,000. Quarter/year fixed effects are included in each estimation (not reported). Standard errors adjusted for clustering at the MSA level are reported in parentheses. \*\*\*, \*\*, and \* denote significance at the 1%, 5%, and 10% level, respectively.

Table 3: Robustness checks using alternative measures of competition

	[1]		[2]		[3]		[4]	
	Coef.	Std. Err.	Effective Rate Coef.	Std. Err.	FEES% Coef.	Std. Err.	Effective Rate Coef.	Std. Err.
<b>Competition</b>								
The sum of the market-shares of the top two market shareholders in an MSA (CR2)	0.02***	(0.00)	1.08***	(0.16)	-2.64***	(0.68)	-71.00**	(28.10)
The number of brokers in an MSA in a given quarter								
divided by the total population of the MSA (NUM_BROK)								
<b>Loan Characteristics</b>								
Log loan amount at origination (LOAN_AMOUNT)			-1394.50***	(53.79)			-1478.80***	(49.67)
The combined loan to value ratio at origination (CLTV)	-0.10***	(0.02)	10.06***	(0.98)	-0.08***	(0.02)	11.43***	(1.06)
An indicator variable set to one if the loan was a cash-out refinance (CASH)	2.64***	(0.22)	179.80***	(14.35)	2.44***	(0.27)	173.80***	(14.72)
An indicator variable set to one if the loan was a stated income loan (STATED)	0.59***	(0.20)	564.70***	(14.03)	0.39*	(0.21)	555.10***	(14.38)
An indicator variable set to one if the loan had a prepayment penalty (PREPAY)	0.30	(1.23)	-282.00***	(69.18)	-0.11	(1.58)	-302.10***	(87.11)
An indicator variable set to one if the loan was an adjustable rate mortgage (ARM)	-0.71*	(0.43)	-286.90***	(24.43)	-0.94*	(0.53)	-293.10***	(26.47)
An indicator variable set to one if the loan was an interest only mortgage (IO)	-1.13***	(0.37)	31.58	(24.36)	-1.76***	(0.42)	17.36	(22.78)
<b>Borrower Characteristics</b>								
The FICO credit score used by New Century when underwriting the loan (FICO)	-0.03***	(0.00134)	-10.52***	(0.26)	-0.03***	(0.00)	-10.57***	(0.26)
The natural logarithm of one plus the borrower's income (LOG_INCOME)	-7.29***	(0.29)	207.10***	(14.56)	-7.78***	(0.35)	226.30***	(13.18)
An indicator variable set to one if the borrower is a minority (MINORITY)	2.18***	(0.44)	119.40***	(19.04)	1.59***	(0.50)	91.91***	(22.02)
Age of the primary borrower at origination (AGE)	0.07***	(0.00)	4.76***	(0.360)	0.08***	(0.00)	5.05***	(0.41)
An indicator set to one if the primary borrower is female (FEMALE)	-0.194**	(0.09)	15.19*	(7.83)	-0.32***	(0.09)	12.45	(7.88)
<b>Area Characteristics</b>								
Average of the state broker regulation index over the period 1997 to 2006 (REGULATION)	-0.31**	(0.15)	-14.78**	(6.55)	-0.46**	(0.20)	-20.71**	(9.13)
The change in New Century's annual market share at the MSA level (NCMS)	0.07	(0.16)	-20.48*	(12.23)	-0.00	(0.17)	-25.01**	(11.49)
Zip code index of default rate (DEF_HIST)	3.78***	(0.93)	100.20***	(22.89)	3.13***	(0.82)	58.85***	(21.90)
MIDWEST	0.40	(1.53)	-15.08	(80.77)	1.52	(1.83)	4.89	(99.46)
NORTHEAST	-0.90	(1.97)	-24.45	(68.16)	0.15	(2.52)	20.58	(87.42)
PACIFIC	-1.83**	(0.81)	409.90***	(51.43)	-0.38	(0.89)	510.60***	(46.88)
SOUTH	6.18***	(1.52)	325.20***	(61.68)	9.50***	(2.02)	439.40***	(89.33)
The average monthly prime 30-year fixed mortgage interest rate from the Primary Mortgage Market Survey (RATE_30)	-1.40***	(0.26)	-5.31	(20.41)	-1.46***	(0.27)	-4.89	(19.93)
CONST	0.11***	(0.00)	28.14***	(0.78)	0.13***	(0.00)	29.29***	(0.74)
N	272059		272059		272059		272059	
Adj. R <sup>2</sup>	0.28		0.74		0.28		0.74	

Note: This table presents coefficient estimates from OLS regressions of fee measures on two alternate measures of market competition (CR2 and NUM\_BROK), loan characteristics, borrower characteristics, and area characteristics for the 272,059 loans from the New Century database. All coefficients are multiplied by 1,000. Quarter/year fixed effects are included in each estimation (not reported). Standard errors adjusted for clustering at the MSA level are reported in parentheses. \*\*\*, \*\*, and \* denote significance at the 1%, 5%, and 10% level, respectively.



Table 4: Robustness checks controlling for bank/lender competition

	[1]	[2]
	FEES%	Effective Rate
	Coeff.	Coeff.
	Std. Err.	Std. Err.
<b>Competition</b>		
MSA level Herfindahl-Hirschman index calculated over the previous quarter (HHI)	37.53***	1889.30***
MSA level measure of competition between subprime lenders (not including brokers) from the previous year (BANK_COMP)	-0.05**	-1.01
	(4.52)	(238.60)
	(0.02)	(0.92)
<b>Loan Characteristics</b>		
Log loan amount at origination (LOAN_AMOUNT)	-0.10***	-1398.60***
The combined loan to value ratio at origination (CLTV)	2.61***	10.29***
An indicator variable set to one if the loan was a cash-out refinance (CASH)	0.57***	178.90***
An indicator variable set to one if the loan was a stated income loan (STATED)	0.56	563.70***
An indicator variable set to one if the loan had a prepayment penalty (PREPAY)	-0.70	-263.50***
An indicator variable set to one if the loan was an adjustable rate mortgage (ARM)	-1.29***	-284.20***
An indicator variable set to one if the loan was an interest only mortgage (IO)		26.68
	(0.02)	(52.83)
	(0.23)	(1.00)
	(0.19)	(14.29)
	(1.30)	(14.33)
	(0.46)	(71.94)
	(0.38)	(24.84)
		(24.25)
<b>Borrower Characteristics</b>		
The FICO credit score used by New Century when underwriting the loan (FICO)	-0.03***	-10.52***
The natural logarithm of one plus the borrower's income (LOG_INCOME)	-7.37***	205.30***
An indicator variable set to one if the borrower is a minority (MINORITY)	2.13***	117.50***
Age of the primary borrower at origination (AGE)	0.08***	4.84***
An indicator set to one if the primary borrower is female (FEMALE)	-0.21**	14.88*
	(0.00)	(0.26)
	(0.28)	(14.83)
	(0.47)	(20.01)
	(0.00)	(0.36)
	(0.09)	(7.73)
<b>Area Characteristics</b>		
Average of the state broker regulation index over the period 1997 to 2006 (REGULATION)	-0.36**	-16.32**
The change in New Century's annual market share at the MSA level (NCMS)	0.09	-20.35*
Zip code index of default rate (DEF_HHST)	3.59***	95.14***
MIDWEST	0.53	-2.11
NORTHEAST	-0.04	9.53
PACIFIC	2.35	525.00***
SOUTH	5.86***	314.60***
The average monthly prime 30-year fixed mortgage interest rate from the Primary Mortgage Market Survey (RATE_30)	-1.42***	-5.56
	(0.15)	(6.39)
	(0.17)	(12.26)
	(0.94)	(24.57)
	(1.51)	(78.99)
	(1.81)	(63.26)
	(1.86)	(84.31)
	(1.71)	(66.70)
	(0.26)	(20.44)
CONST	0.12***	28.38***
N	272059	272059
Adj. R <sup>2</sup>	0.28	0.74

Note: This table presents coefficient estimates from OLS regressions of fee measures on competition (HHI), loan characteristics, borrower characteristics, and area characteristics while controlling for subprime lender competition at the MSA level (BANK\_COMP) for the 272,059 loans from the New Century database. All coefficients are multiplied by 1,000. Quarter/year fixed effects are included in each estimation (not reported). Standard errors adjusted for clustering at the MSA level are reported in parentheses. \*\*\*, \*\*, and \* denote significance at the 1%, 5%, and 10% level, respectively.

Table 5: Explaining borrower origination fees on Retail (non-brokered) loans

	[1]		[2]	
	FEES%	Effective Rate	Coef.	Std. Err
	Coef.	Std. Err.	Coef.	Std. Err
<b>Competition</b>				
MSA level Herfindahl-Hirschman index calculated over the previous quarter (HHI)	20.73***	(3.89)	648.70***	(136.40)
MSA level measure of competition between subprime lenders (not including brokers) from the previous year (BANK_COMP)	0.01	(0.02)	1.81*	(0.97)
<b>Loan Characteristics</b>				
Log loan amount at origination (LOAN_AMOUNT)	-0.09***	(0.02)	-1362.1***	(29.42)
The combined loan to value ratio at origination (CLTV)	4.72***	(0.36)	6.51***	(1.05)
An indicator variable set to one if the loan was a cash-out refinance (CASH)	1.67***	(0.31)	256.00***	(17.86)
An indicator variable set to one if the loan was a stated income loan (STATED)	3.71***	(0.83)	585.10***	(22.82)
An indicator variable set to one if the loan had a prepayment penalty (PREPAY)	-4.15***	(0.46)	-102.80**	(46.70)
An indicator variable set to one if the loan was an adjustable rate mortgage (ARM)	-2.85***	(0.59)	-260.00***	(20.09)
An indicator variable set to one if the loan was an interest only mortgage (IO)			-92.96***	(34.72)
<b>Borrower Characteristics</b>				
The FICO credit score used by New Century when underwriting the loan (FICO)	-0.03***	(0.00)	-12.07***	(0.38)
The natural logarithm of one plus the borrower's income (LOG_INCOME)	-8.19***	(0.38)	200.90***	(13.78)
An indicator variable set to one if the borrower is a minority (MINORITY)	-0.15	(0.28)	38.01**	(19.16)
Age of the primary borrower at origination (AGE)	0.03***	(0.01)	3.45***	(0.48)
An indicator set to one if the primary borrower is female (FEMALE)	0.07	(0.19)	20.39*	(12.07)
<b>Area Characteristics</b>				
Average of the state broker regulation index over the period 1997 to 2006 (REGULATION)	0.07	(0.15)	3.15	(5.98)
The change in New Century's annual market share at the MSA level (NCMS)	0.14	(0.38)	-10.88	(19.67)
Zip code index of default rate (DEF_HHST)	1.40*	(0.77)	-18.54	(27.31)
MIDWEST	-1.22	(1.08)	-80.20*	(44.43)
NORTHEAST	-1.07	(1.66)	14.13	(68.68)
PACIFIC	5.54***	(1.48)	494.90***	(87.71)
SOUTH	5.09***	(1.54)	242.70***	(56.94)
The average monthly prime 30-year fixed mortgage interest rate from the Primary Mortgage Market Survey (RATE_30)	0.52	(0.47)	110.90***	(37.70)
CONST	0.12***	(0.00)	29.12***	(0.52)
N	51801		51801	
Adj. R <sup>2</sup>	0.32		0.75	

Note: This table presents coefficient estimates from OLS regressions of fee measures on competition (HHI), loan characteristics, borrower characteristics, and area characteristics while controlling for subprime lender competition at the MSA level (BANK\_COMP) for the 51,801 retail (non-brokered) loans from the New Century database. All coefficients are multiplied by 1,000. Quarter/year fixed effects are included in each estimation (not reported). Standard errors adjusted for clustering at the MSA level are reported in parentheses. \*\*\*, \*\*, and \* denote significance at the 1%, 5%, and 10% level, respectively.

Table 6: Explaining yield spread as a percentage of total fees

	[1]	
	YSP%	
	Coeff.	Std. Err.
<b>Competition</b>		
MSA level Herfindahl-Hirschman index calculated over the previous quarter (HHI)	84.73*	(46.85)
<b>Loan Characteristics</b>		
Log loan amount at origination (LOAN_AMOUNT)	48.79***	(8.15)
The combined loan to value ratio at origination (CLTV)	-0.57***	(0.13)
An indicator variable set to one if the loan was a cash-out refinance (CASH)	-16.98***	(2.15)
An indicator variable set to one if the loan was a stated income loan (STATED)	-29.21***	(4.91)
An indicator variable set to one if the loan had a prepayment penalty (PREPAY)	-13.12	(10.25)
An indicator variable set to one if the loan was an adjustable rate mortgage (ARM)	105.80***	(3.41)
An indicator variable set to one if the loan was an interest only mortgage (IO)	-20.84***	(3.55)
<b>Borrower Characteristics</b>		
The FICO credit score used by New Century when underwriting the loan (FICO)	0.10***	(0.03)
The natural logarithm of one plus the borrower's income (LOG_INCOME)	38.53***	(2.81)
An indicator variable set to one if the borrower is a minority (MINORITY)	-20.92***	(4.24)
Age of the primary borrower at origination (AGE)	-0.31***	(0.07)
An indicator set to one if the primary borrower is female (FEMALE)	-0.08	(1.53)
<b>Area Characteristics</b>		
Average of the state broker regulation index over the period 1997 to 2006 (REGULATION)	0.93	(1.65)
The change in New Century's annual market share at the MSA level (NCMS)	3.54**	(1.75)
Zip code index of default rate (DEF_HIST)	-23.86***	(6.31)
MIDWEST	94.45***	(15.95)
NORTHEAST	-5.46	(17.40)
PACIFIC	-124.30***	(11.26)
SOUTH	59.93***	(18.25)
The average monthly prime 30-year fixed mortgage interest rate from the Primary Mortgage Market Survey (RATE_30)	-6.59*	(3.96)
CONSTANT	-0.65***	(0.09)
N	219066	
Adj. R <sup>2</sup>	0.125	

Note: This table presents coefficient estimates from OLS regressions of yield spread as a percentage of total fees (YSP%) on competition (HHI), loan characteristics, borrower characteristics, and area characteristics while controlling for subprime lender competition at the MSA level (BANK\_COMP) for the 219,066 wholesale (brokered) loans from the New Century database. All coefficients are multiplied by 1,000. Quarter/year fixed effects are included in each estimation (not reported). Standard errors adjusted for clustering at the MSA level are reported in parentheses. \*\*\*, \*\*, and \* denote significance at the 1%, 5%, and 10% level, respectively.

Table 7: Explaining borrower origination fees using two stage least squares

	First Stage [1]		Second Stage [2]		First Stage [3]		Second Stage [4]	
	Coeff.	Std. Err.	Coeff.	Std. Err.	Coeff.	Std. Err.	Coeff.	Std. Err.
<b>Competition</b>								
MSA level Herfindahl-Hirschman index calculated over the previous quarter (HHI)			33.97***	(2.25)			2178.80***	(182.60)
<b>Loan Characteristics</b>								
Log loan amount at origination (LOAN_AMOUNT)	0.00***	(0.00)	-0.10***	(0.00)	-0.04***	(0.00)	-1399.80***	(9.91)
The combined loan to value ratio at origination (CLTV)	-0.00***	(0.00)	2.65***	(0.09)	0.00***	(0.00)	9.93***	(0.22)
An indicator variable set to one if the loan was a cash-out refinance (CASH)	-0.00***	(0.00)	0.54***	(0.07)	-0.00***	(0.00)	177.60***	(6.60)
An indicator variable set to one if the loan had a stated income loan (STATED)	-0.03***	(0.00)	0.61***	(0.10)	-0.03***	(0.00)	555.00***	(4.97)
An indicator variable set to one if the loan had a prepayment penalty (PREPAY)	-0.01***	(0.00)	-0.72***	(0.08)	-0.00***	(0.00)	-249.90***	(7.46)
An indicator variable set to one if the loan was an adjustable rate mortgage (ARM)	-0.01***	(0.00)	-1.42***	(0.11)	-0.00***	(0.00)	-283.80***	(5.62)
An indicator variable set to one if the loan was an interest only mortgage (IO)							20.01***	(7.50)
<b>Borrower Characteristics</b>								
The FICO credit score used by New Century when underwriting the loan (FICO)	-0.00***	(0.00)	-0.03***	(0.00)	-0.00***	(0.00)	-10.54***	(0.04)
The natural logarithm of one plus the borrower's income (LOG_INCOME)	-0.01***	(0.00)	-7.51***	(0.09)	0.01***	(0.00)	201.40***	(5.92)
An indicator variable set to one if the borrower is a minority (MINORITY)	-0.01***	(0.00)	2.21***	(0.07)	-0.01***	(0.00)	126.10***	(5.08)
Age of the primary borrower at origination (AGE)	0.00***	(0.00)	0.08***	(0.00)	0.00***	(0.00)	4.86***	(0.21)
An indicator set to one if the primary borrower is female (FEMALE)	-0.00***	(0.00)	-0.22***	(0.06)	-0.00***	(0.00)	15.00***	(4.69)
<b>Area Characteristics</b>								
The average of the state broker regulation index over the period 1997 to 2006 (REGULATION)	-0.00***	(0.00)	-0.39***	(0.01)	-0.00***	(0.00)	-16.61***	(0.90)
The change in New Century's annual market share at the MSA level (NCMS)	-0.00***	(0.00)	0.04	(0.04)	-0.00***	(0.00)	-20.58***	(3.66)
Zip code index of default rate (DEF_HIST)	-0.02***	(0.00)	3.61***	(0.08)	-0.02***	(0.00)	106.00***	(5.64)
MIDWEST	0.01***	(0.00)	0.82***	(0.10)	-0.00***	(0.00)	0.29	(7.26)
NORTHEAST	0.01***	(0.00)	0.41***	(0.12)	0.00***	(0.00)	-2.34	(9.14)
PACIFIC	0.01***	(0.00)	-1.09***	(0.41)	0.02***	(0.00)	450.60***	(34.23)
SOUTH	0.08***	(0.00)	6.56***	(0.20)	0.06***	(0.00)	311.10***	(12.63)
The average monthly prime 30-year fixed mortgage interest rate from the Primary Mortgage Market Survey (RATE_30)	-0.00***	(0.00)	-1.44***	(0.21)	-0.00	(0.00)	-1.69	(16.06)
Number of new construction permits filed each quarter in each MSA (PERMITS)	-0.04***	(0.00)			-0.03***	(0.00)		
CONST	0.00***	(0.00)	0.12***	(0.00154)	0.00***	(0.00)	28.34***	(0.145)
N	263038		263038		263038		263038	
Adj. R <sup>2</sup>	0.32		0.274		0.35		0.736	

Note: This table presents coefficient estimates from 2SLS regressions of fee measures on competition (HHI), loan characteristics, borrower characteristics, and area characteristics for the 263,038 loans from the New Century database for which permit information was available. Total MSA quarterly residential construction permits (PERMITS) is the instrumental variable used in the first stage regression for HHI. All coefficients are multiplied by 1,000 (except PERMITS which is multiplied by 10,000,000). Numbers between -0.005 and 0 are reported as -0.00 while numbers greater than 0.00 and less than 0.005 are reported as 0.00. Quarter/year fixed effects are included in each estimation (not reported). White's (1980) standard errors are reported in parentheses. \*\*\*, \*\*, \* and \* denote significance at the 1%, 5%, and 10% level, respectively.