

Housing Market Effects of Appraising Below Contract

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Abstract

This paper studies the causes and impacts of low appraisals relative to contract prices for potential purchase transactions in the period from September 2011 to August 2012. Using a unique data set that includes appraisals from both realized and unrealized sales, we find that 8.2 percent of all appraisals in this period came in 2 percent or more below the contract price. Compared to appraisals at or above contract, a low appraisal dramatically raises the probability that the buyer can renegotiate a better price, from 8 percent to 51 percent. The probability that the sale is delayed or canceled rises from 25 percent to 32 percent. We also find that low appraisals are partly driven by a lack of available comps, appraisers lagging recovering markets, an increased reliance on distressed sales, and atypical property characteristics that may be more difficult to accurately evaluate. Across the top housing markets, we estimate that low appraisals have potentially decreased home prices by on average 0.2 percent (but as much as 0.8 percent) and resulted in, on average, 0.3 percent fewer purchase transactions (but as much as 1.3 percent) over the period studied.

JEL Classifications: G21, G28, K11, L85, R31

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1. OVERVIEW

Collateral valuation is a central feature of most credit contracts. This is particularly true in the residential mortgage industry where in most cases a professional appraiser's price opinion is required for underwriting a loan. The appraisal process is designed to provide the borrower, lender, and insurer of the mortgage with an independent assessment of its value as an assurance that the collateral value is sufficient to support a given loan amount. During the house price run-up of the mid-2000s and the ensuing housing price collapse, however, many works have argued both anecdotally and empirically that the appraisal process contributed to risk as over-valuations by appraisers – so-called “appraisal bias” – encouraged risks in mortgage underwriting (Agarwal et al. 2015; Wallison and Pinto 2012; Ben-David 2011; Avery and Hollans 2010; Duca et al. 2010; Hendershott et al. 2010; Mian and Sufi 2010; Murray 2010; Kelly 2006). For example, Ben-David (2011) presents evidence that homebuyers collude with home sellers to inflate transaction prices in order to increase the debt capacity of the house. Agarwal et al. (2015) document that average appraisal bias for residential refinance transactions is well above 5 percent. They argue that this is driven by highly leveraged borrowers seeking to lower their interest rate or maximize equity extraction with the cooperation of mortgage brokers and lenders.

In the wake of the housing crisis, New York Attorney General Andrew Cuomo sued eAppraiseIT, an appraisal management firm working with Washington Mutual, for forcing its appraisers to go along with artificially high valuations that were previously agreed upon by borrowers and lenders.¹ To help stamp out such behavior, the two government-sponsored entities (GSEs), Fannie Mae and Freddie Mac, along with their regulators agreed to adopt the Home Valuation Code of Conduct (HVCC), which became effective in May 2009. HVCC requires that lenders abstain from pressuring appraisers to hit “an anticipated, estimated, encouraged, or desired value for a subject property or a proposed or target amount to be loaned to the borrower.”² The GSEs further strengthened their effort for fair and independent appraising by investing tens of millions of dollars in standardizing various appraisal forms, capturing standardized digital

¹ See Wamu-eAppraiseIT case coverage on <http://www.reuters.com/article/2012/09/28/us-appraisal-settlement-idUSBRE88R02520120928>. Also, other media resources include <http://www.washingtonpost.com/wp-dyn/content/article/2007/02/02/AR2007020200712.html>, http://www.myrecordjournal.com/latestnews/article_15198981-28a6-575f-9b68-b93a607e64c4.html, http://www.mortgagenewsdaily.com/4252005_Appraisal_Fraud.asp.

² See the HVCC at <http://www.fhfa.gov/webfiles/2302/HVCCFinalCODE122308.pdf>. For more background and reaction to the HVCC see Abernethy and Hollans (2010).

appraisal data and implementing policies and analytics to improve appraisal quality. As a result, it is more difficult today for an appraisal to significantly exceed a benchmark value without adequate justifications (Agarwal et al. 2016).

Some have argued that the recent increase in attention to the appraisal process has potentially pushed appraisers to the other extreme of valuation - appraisal values that fall below an agreed-upon contract price, in the case of transactions, or below prices high enough to successfully refinance existing loans. For instance, the National Association of Realtors (NAR 2012) found that 33 percent of realtors surveyed in 2012 reported problems with low appraisals during the previous three months. According to the NAR president, appraising “in markets that are no longer in decline is the single most important” valuation obstacle to “seeing a real recovery.”³ Nakamura (2010) argues that reductions in appraisals matching contract cause home valuations to be underestimated, possibly making new mortgages harder to obtain and adding more uncertainty to home price formation. Ding and Nakamura (2014) present a chart in which the share of low appraisals rises from the 4 – 6 percent range in 2006 and 2007 to a peak of about 15 percent in 2009, dropping to below 10 percent in 2010, then moving up again slightly to about 12 percent in 2012. The converse of these numbers is the rate that appraisers either match or exceed the contract price of a purchase, namely 94 – 96percent of cases in 2006 and 2007, falling to 85 percent at its lowest point in 2009, then rising back to above 90 percent at a local peak in 2010. Thus it is possible that HVCC represents a modest and temporary reversal of the pattern of appraisals confirmation.⁴

In cases of legitimately overvalued contract prices, however, low appraisals can potentially disrupt problematic sales and protect borrowers, lenders, and insurers from risks associated with the overvaluation of collateral including increased default rates and loss severity. In this paper, we explore the causes of low appraisals using a novel data that matches appraisals to the corresponding loan applications as well originated loans. We find evidence that low appraisals can in part be explained by borrowers overbidding after appraisers accurately value the property, thereby providing appropriate protection for both the borrower and underwriter. After controlling for this factor, however, we find that low appraising is in part driven by the combination of increased

³ Los Angeles Times, <http://articles.latimes.com/2012/jun/24/business/la-fi-harney-20120624>.

⁴ Calem et al. (2015) remark “Since the 1990s, it has been well known that the vast majority of appraisals – typically about nine out of 10 – are at or above the transaction price.”

reliance on distressed sales, under-appraising in a rising home price environment, property characteristics (e.g. older properties and lower-valued properties like one bedrooms are more likely to be under-appraised), and a lack of available sales to use in the appraisal.

Previous studies evaluating the appraisal process rely on transaction-level data (see for instance Agarwal et al. 2015; Zhu and Kelley 2012 and Chinloy et al. 1997). This approach is unable to track cases in which the appraised value falls below the contract price and leads to a cancellation of the sale since these cases are censored from the data. Using the new appraisal data, however, we are able to track appraisals in support of purchase applications that do not ultimately result in sales. We find that between 3 and 4 percent of purchase mortgages in the largest 20 metropolitan statistical areas (MSAs) had appraisals that were 2 percent or more below the contract price (we label these “low appraisals”) from 2011 to 2012. For the same period, the new appraisal data shows that 8.2 percent of appraisals meet this criteria. As Figure 1 shows, Las Vegas has experienced the greatest share of low appraisals among the top twenty MSAs at 23 percent. Miami has the second largest share at 22 percent. These areas were also among the worst in terms of the severity of the housing price decline. Boston, Denver, and Seattle represent the MSAs in the observed group with the smallest incidence of low appraisals – each at 3 percent.

Because the appraisal value is a crucial input into the underwriting process, a low appraisal can potentially delay or cancel a sale or result in a lower renegotiated sale price. In underwriting a mortgage, the appraiser’s price opinion is the basis for calculating the extent of a borrower’s leverage. Appraised values are used directly as the denominator for calculating the loan to value ratio (LTV) for refinance transactions. In the case of purchase transactions, the denominator is calculated as the minimum of the appraised value and the contract price. Therefore when the appraisal is lower than the contract price, it raises the LTV for a given loan amount; or, from another perspective, it decreases the available loan amount for a given LTV. In the case of a purchase transaction, when a buyer and seller are faced with an appraisal that falls below the contract price there can be three possible outcomes: first, the buyer can use the lower value as leverage and successfully renegotiate a lower sale price, lowering the required loan amount and thus the LTV; second, the buyer may eventually delay or call off the bid if renegotiation efforts fail, particularly if the borrower faces binding liquidity constraints; finally, the buyer can proceed with the transaction and close, under the original contract price, with either a now higher LTV or the same LTV with a lower loan balance (i.e. an increase in the down payment from the borrower).

Among the realtors who experienced issues with low appraisals (NAR 2012), 11 percent reported a cancelled contract, 9 percent reported a delayed contract, and 15 percent reported a renegotiated sale price.⁵ Combining the new appraisal data with transactions data, we find that in the top twenty MSAs only 15 percent of buyers and sellers proceed with the original contract in the case of low appraisals, 51 percent of low appraisals have resulted in a renegotiated lower sale price, and 32 percent of contracts have been delayed or cancelled (Table 1).⁶ For instance, in Portland, Oregon 61 percent of low appraisals resulted in lower sale prices and 27 percent of deals failed. While in New York, 50 percent of contracts failed and only 34 percent were renegotiated to lower sale prices following a low appraisal. Contracts that were not low were much less likely than their low appraisal counterparts to result in a delayed/cancelled sale (25 percent) or lowered sale price (8 percent) (Table 2).

We formally investigate the impacts of low appraising to see how likely it was for a price to be renegotiated or a deal to be cancelled/delayed, controlling for other reasons that may compromise the deal (e.g. borrower credit or the condition of the property). We find that a sale price is more likely to decline or experience severe delays or cancellation due to a low appraisal. In particular, a low appraisal increases the relative likelihood of a lower sale price thirty times, compared to the case with an appraisal at or above the contract price, and that the effect is even greater for higher LTV borrowers.⁷ Low appraisals also increase the relative incidence of delayed/cancelled sales by a factor of 2.3, with the effect concentrated on liquidity constrained borrowers with an LTV exactly equal to 80. The effect increases as the appraisal value falls further below the contract price. In particular, we find that every 1 percent the appraisal falls below the contract price results in a 75 percent increase in the relative likelihood of a lower sale price and a 6 percent increase in the relative likelihood of a delayed or cancelled sale. We find similar effects

⁵ Apparently these are mutually exclusive categories in the NAR survey.

⁶ In our analysis, we combine delayed and cancelled sales and define them as a contract that does not result in a sale within 90 days of the contract date.

⁷ Technically the relative probability of a lowered price versus a non-lowered price, referred to as the *odds ratio*, increases 30 times for low appraisals versus appraisals that are not low. For instance, we find that for appraisals that are not low and result in a transaction within three months of the contract date, approximately 8 percent of the time the sale price is lowered and 92 percent of the time it is not. Thus the relative probability of a lower sale price in this case is $8/92 = 0.09$. If the odds ratio is 30, it implies that the new relative probability equals 0.09×30 or 2.7. This implies that the ceteris paribus probability of a lowered sale price given a low appraisal is 72.9, which is 2.7 times the corresponding likelihood of a non-lowered sale price (27.1). So the odds ratio equals $(72.9/27.1)/(8/92) = 30$, but the probability in this example of a lower price only increases from a baseline level of approximately 8 percent to a level of 72.9 percent (9.1 time increase) for low appraisals.

when we directly controlled for borrower overbidding by removing those observations where the borrower's bid is above the model-supported value (both AVM and mark-to-market values).

Finally, we apply our results to estimate the effect on home prices and transactions as a result of low appraising in the top twenty MSAs. We find that low appraisals have potentially decreased home prices between 0.1 to 0.7 percent at the MSA-level, with an average of 0.2 across all twenty MSAs during the sample period. Furthermore, the amount of purchase transactions without low appraisals would have been between 0.1 to 1.5 percent higher at the MSA level and 0.4 percent higher across all twenty MSAs over the same time period.

The next section provides an overview of the appraisal process and how low appraisal values play into the underwriting process. Section 3 describes the data. Sections 4 to 6 present evidence on the extent, causes, and effects of low appraisals, and Section 7 concludes.

2. APPRAISAL PROCESS

The purpose of an appraisal is to provide an unbiased and efficient estimate of the market value of a property to the buyer, the originator, and the insurer (e.g. GSEs or Primary Mortgage Insurance companies) of the property. In order to calculate the LTV ratio associated with the mortgage, the lenders use the minimum of the appraised value and the sale price for purchases, and the appraised value for refinances.

For example, assume that borrower will only be given a purchase money mortgage if the LTV of the loan is 80 percent or below. Further assume that the buyer has \$20,000 and agrees to pay the seller \$100,000, financing the remaining \$80,000. If the appraised value of the house is \$100,000 or above, then the LTV is 80 percent or lower and the loan is made. On the other hand, if the appraised value comes in below \$100,000, say at \$80,000, then the borrower's LTV would become 100 percent at the agreed price, making it impossible to obtain a loan approval. In the case of the \$80,000 appraisal, the maximum the buyer can borrow is \$64,000 if the borrower wants to keep the LTV below 80 percent. The borrower could potentially provide a bigger down payment of \$36,000, borrow \$64,000, and pay the seller \$100,000 to return the LTV to 80 percent. The seller could agree to a lower price of \$84,000, with the buyer borrowing \$64,000 and providing a \$20,000 down payment for an LTV of 80 percent. The seller and buyer could also agree to share

the burden of the previous two approaches with a higher down payment and a lower asking price. If the position of both buyer and seller is constrained enough to prevent a mutually acceptable outcome, the sale can potentially be cancelled. Thus, an appraised value below the contract price can potentially affect the real estate market negatively in two ways: one, lowering the price of an agreed-upon sale; two, cancelling a sale altogether or severely delaying the sale, resulting in an increased supply of homes and downward pressure on home prices.

How do professional appraisers derive their price opinion? They exercise three approaches to arrive at an appraisal value for a residential property: the comparable sales approach, the income-generating approach (for investment properties), and the cost approach (for new constructions). We focus on the comparable sales approach because it is the most commonly used approach in residential appraising, especially for mortgages used in financing primary residences. Under the comparable sales approach, appraisers treat the subject property as part of the broader real estate market. Appraisers use data on multiple comparable recent real estate sales and listings (referred to as *comps*) and try to adjust the prices of the comps for the differences between the subject and comps in forming a value for the subject property. The fundamental difficulty facing the appraiser is that no two real estate properties are exactly alike. In order to generate an accurate value for the property, the appraiser must possess expert knowledge of the market, including recent transactions and market movements, and the ability to evaluate the features of a property. If an appraiser is faced with changing market conditions (i.e. recent price growth or decline) or an unfamiliar or atypical property characteristic, he/she may respond with a conservatively low valuation, especially in the face of increased scrutiny of appraisals following HVCC.

3. DATA AND STATISTICS

We combine a number of data sets for the analysis in this paper. The first is the Uniform Appraisal Data (UAD) set, which contains appraisals submitted to the GSEs from September 2011, when UAD took effect, until August 2012. This set allows us to isolate appraisal-level fields like contract price, appraisal price, condition of the property, characteristics of the comps, whether the sale was distressed or not, and the appraiser. We limit the appraisals to those used for purchasing

a home. For each appraisal, when there is a transaction we obtain additional transaction-level details from public records and use Fannie Mae's proprietary zip-level home price index (HPI) to control for market-level changes in home values. For a subset of appraisals, we obtain borrower-level information such as credit score (FICO) and initial LTV from our proprietary loan application database. We do not use origination FICO or LTV for those loans because we are interested in the information at the time of contract negotiation and loan application and much of the borrower and loan-level information can change between application and delivery.

Table 3 reports summary statistics for the variables we use in our analysis of appraisers in the largest twenty MSAs in terms of appraised volume for the period. The sample contains 285,494 appraisals with 171,750 appraisals matched to loan application. On average, the appraised value is \$341,000 and the contract price is \$337,000. Overall, the appraisers provide slightly higher home values than what buyers and sellers agree to in purchase contracts, with an average difference between appraised value and price of 1.9 percent. In this set, 8 percent of appraisals came in below the contract price by at least 2 percent (defined as low appraisals), while 28 percent of appraisals came in above the contract price by at least 2 percent (defined as high appraisals). In terms of outcomes, 45 percent of potential sales were cancelled or delayed, and 47 percent of potential sales were transacted within 90 days of the contract date, while 45 percent of potential sales transacting at the original contract price. Finally, 7 percent of the potential sales that transacted were renegotiated for various reasons, one of which is low appraisals.

We include variables in our analysis to identify whether a property is a foreclosure or not (12 percent of appraisals are for foreclosed properties); we also include the average share of distressed comps (short sales or foreclosures) used in the appraisal (15 percent average share of distressed properties). One advantage of the UAD is that appraisers are now required to report whether the subject and comps used in the appraisal are foreclosures or short sales. We use the share of distressed comps to quantify appraiser use of distressed sales. Appraisers are also now required to provide standard ratings of property condition on a scale of 1 to 6, highest to lowest (our sample has an average of 2.9). We identify low condition properties (properties that have a condition ratings of 5 or 6, which are 1 percent of our sample) that can potentially result in more issues like contract renegotiation or cancellation/delay. We can also determine a property's age and number of bedrooms from the appraisal. We proxy for appraiser uncertainty by looking to see if the property is an older property, if the number of bedrooms is atypical for the area (one

bedroom), and if the property is predicted to be expensive or cheap relative to other properties within the MSA (50 percent or more above or below the MSA-level model prediction). The model prediction we use is based on a proprietary automated valuation model (AVM) developed by Fannie Mae, a model that uses transaction and property characteristic data to perform an automated appraisal on a given subject property. We also use the AVM value to control for borrower overbidding. In particular, we identify cases where the model value is below the contract price as potential cases of overbidding and thus predictive of cases of low appraising.⁸

We measure past price growth as the lagged change in zip-level HPI quarter over quarter for the previous quarter. Since appraisers generally lag behind the market, we expect more price growth to be predictive of increased incidents of low appraising. We measure the availability of comps using the transactions in the current quarter within the zip code. As this number rises, we would expect the appraiser to be better informed and to potentially see less low appraising.

Finally, we use the loan application data to obtain FICO scores (759 on average), determine whether a loan is deemed approved/eligible or not (6 percent of cases), and arrive at a loan value which allows us to calculate two LTV measures – one based on the contract price (78 on average) and one based on the appraised value (77 on average). For both of these measures, we further isolate 80 as a unique point on the LTV gradient, since all conforming loans are required to obtain mortgage insurance if they have LTV in excess of 80, in order to calculate indicator variables for whether a loan is below, at, or above 80 LTV. We discuss the importance of LTV further in Section 5.

The UAD allows us for the first time to observe appraised values whether or not a sale is ultimately consummated. With transaction data, on the other hand, we can only observe the appraisals attached to a completed sale or an originated loan. Only looking at these cases linked to originations excludes appraisals that are low enough to break the sale and underestimates the true extent of low appraising. Table 1 provides the historic distribution of the share of low appraisals based on purchase mortgages for the period from 2000 to 2012 across the top twenty MSAs. Prior to 2009, low appraisals ranged between 1.3 and 3.1 percent, with an average of 2 percent, with the majority of appraisals coming in within 2 percent of the contract price. Over the last four years,

⁸ The contract price is on average 3.6 percent below AVM value in this sample. So cases where the model value dips below the contract provide a potentially strong signal of overbidding.

low appraisals have made up 3.8 percent of appraisals, with a lower share of appraisals coming in within 2 percent of the contract price.

With the new appraisal data, we are now able to measure the true distribution of low appraisals more accurately. Over the period from September 2011 to April 2012 (illustrated in Figure 1), 27.4 percent of all purchase appraisals come in 2 percent or more above the contract price and 8.2 percent of all purchase appraisals in the top twenty MSAs came in 2 percent or more below contract price, more than double the recent number based on deliveries.

4. CAUSES OF LOW APPRAISALS

Low appraisals can be driven by a variety of factors including protection of borrowers/lenders in the event of overbidding, higher share of comps from distressed sales, appraisers lagging behind a growing market, appraiser unfamiliarity with the market/property characteristics, and a lack of suitable comps to use in the appraisal. In order to quantify the role of each of these reasons in explaining the incidence of low appraising, we estimate this multivariate logistic model:

$$\begin{aligned}
 & \text{Pr(Low Appraisal)} \\
 & = f(\beta_0 + \beta_1 FCL + \beta_2 AGE\ LOW + \beta_3 BED\ LOW + \beta_4 PRED\ LOW \\
 & + \beta_5 PRED\ HIGH + \beta_6 LAG\ HPI + \beta_7 ZIP\ TRANS + \beta_8 DISTRESS\ SHARE \\
 & + \beta_9 LOW\ MODEL + \beta_{10} MSA \times QTR) \quad (1)
 \end{aligned}$$

Where *FCL* is the foreclosure indicator, *AGE LOW* is an indicator for new properties aged 2 years or newer, *BED LOW* is an indicator of small number of bedrooms, *PRED LOW* is an indicator for low-valued properties defined as AVM value 50 percent or more below MSA mean, while *PRED HIGH* is an indicator for high-valued properties defined as AVM value 150 percent or more above the MSA mean. In addition to the AVM value described above, we also use a much simpler valuation – the marked to market (MTM) value of the property calculated using zip-level HPI to update a property’s value based on cumulative price growth from the previous transaction date to

the current appraised date – to define low- and high-valued properties. We use *LAG HPI* – previous quarter’s HPI growth – to control for the home price trend in the local market. We also control for the number of transactions in the zip code in current quarter (*ZIP TRANS*) and the share of distressed comps at the appraisal-level (*DISTRESS SHARE*). The variable *LOW MODEL* is an indicator of whether the AVM value is below contract price and measures whether the contract price is supported by fundamental market factors as well as individual property characteristics. A potential overvaluation exists when buyers overbid beyond a property’s fundamental value. Finally we control for MSA and quarter fixed effects with a set of interaction terms ($MSA \times QTR$) in all regressions.

We present the logistic estimation results in Table 4. We find that all of the following factors increase the relative likelihood of low appraisals: foreclosure properties (14 percent increase), one bedroom properties (48 percent increase), low-valued properties (36 percent increase), those properties in areas that have experienced recent price growth (6 percent increase per 1 percent rise in last quarter’s HPI growth), properties with more distressed comps used in the appraisal (1 percent per 1 percent increase in the number of distressed properties used), and properties that potentially were overbid on (six times increase).⁹ We also find that new properties (46 percent decrease), high-valued properties (6 percent decrease), and those properties from areas with a large amount of transactions (4 percent decrease per one hundred sales at the zip level) are less likely to result in low appraisals.

Thus we find evidence that when the valuation model predicts a lower value than contract price, the likelihood of a low appraisal is much greater. This suggests that an appropriately low appraisal potentially protects both the borrower and the underwriter from overbidding, assuming the model value is accurate.¹⁰ In order to remove the influence of overbidding and isolate the effects of the remaining potential determinants of low appraising, we estimate the probability of low appraising just on properties that have contract prices supported by the valuation model (i.e. contract price > model value). The estimation results for this case are displayed in Column 2 of Table 4. The direction of the effects remains unchanged, but the magnitude increases for all of the effects except the reliance on distressed sales for comps (unchanged) and the model value effects

⁹ For a technical interpretation of the model coefficients, see Footnote 8.

¹⁰ It is possible, however, that the model value and the appraisal are highly correlated and could both incorrectly undervalue a particular property. For instance, a unique property may have a lack of comparable properties for both the appraiser and the model and result in an inappropriately low value in both cases.

which decrease for lower model values and increase for higher model values but are now insignificant. After controlling for borrower overbidding, we find compelling evidence that low appraisals are in part driven by an increased reliance of appraisers on distressed comps; a lack of available comps in a given market; lower-valuations by the appraiser in rising markets; atypical property characteristics including smaller, older, and lower-priced properties; and lower valuation of foreclosure properties.

5. EFFECTS OF LOW APPRAISALS

In order to investigate the effects of low appraising, we combine the new appraisal data and public property transaction records to examine the ultimate outcome of a negotiated contract. We summarize the outcome of a contract into three groups: transactions that occur at or above the contracted price within ninety days of the contract date, transactions that occur below the contracted sale price within ninety days of the contract date, and transactions that do not occur within ninety days of the contract date. According to the National Association of Realtors (NAR), approximately 65 percent of realtors surveyed in 2012 reported no problems with appraisals interfering with the execution of contracts.¹¹ Other realtors did experience issues with low appraisals, with 20 percent reporting a cancelled or delayed contract and 15 percent reporting a renegotiated sale price. The NAR numbers reveal the potential outcomes of low appraising, but do not allow us to fully understand the increased likelihood of a broken or lowered sale resulting from a given low appraisal.

In order to understand how low appraisal values influence the outcome of a contract, we break down the incidence of transactions by contract price, lowered sale price, and by occurrence of a delayed/cancelled sale for a low appraisal (an appraisal more than 2 percent below the contract price) versus all other appraisals in Table 2. It is clear that low appraisals are more likely to result in lower sales prices or canceled/delayed sales, with significantly low appraisals resulting in lower sales 51 percent of the time (versus 8 percent for other appraisals) and in delayed or cancelled sales 32 percent of the time (versus 25 percent for other appraisals). While this pattern holds across each

¹¹ Source: “Low Valuation in Home Appraisals Causing Steady Level of Contract Glitches,” National Association of Realtors, October 2012.

of the top twenty MSAs, we also want to control for other determinants of lower sale prices and/or delayed/canceled sales in order to isolate the effect of lower appraisals.

In addition to controlling for whether or not the appraisal is below the contract price, we also control for the foreclosure status and the condition and age of the property. These variables can potentially serve as proxies for issues that might arise due to unforeseen problems with the condition of the home that would cause a renegotiation to a lower sale price. Additionally, we control for the tightness of the market using the number of transactions at the zip level within the quarter (if the market is tighter, renegotiation is less likely), whether the borrower overbid for the property or not, and the geography and vintage of the loan (MSA, transaction quarter interaction). The functional form of our baseline logit equation is as follows:

$$\begin{aligned} \text{Pr(Lower Sale Price)} \\ = g(\alpha_0 + \alpha_1 \text{LOW APPR} + \alpha_2 \text{FCL} + \alpha_3 \text{COND} + \alpha_4 \text{AGE LOW} \\ + \alpha_5 \text{ZIP TRANS} + \alpha_6 \text{LOW MODEL} + \alpha_7 \text{MSA} \times \text{QTR}) \quad (2) \end{aligned}$$

Where *COND* is an indicator for low-condition properties and all the other variables are defined the same as in equation (1).

Table 5 reports results for 6 logistic regressions of probability of a renegotiated lower sale. Model 1 includes a low appraisal indicator, along with the control variables discussed above, and represents the baseline case. Model 2 introduces application variables (FICO and LTV). Model 3 interacts the low appraisal indicator with the percent difference between the appraised value and the contract price. In Column 1, we find that low appraisals increase the relative probability of a lower transaction price by a factor of thirty, controlling for the other causes of a lower sale price. We also find that a worse property condition results in an increased relative likelihood of a lowered price (44 percent increase) and, once we control for the condition, increases the likelihood of a lowered sale price by only 5 percent if the property is a foreclosure. Further, we find that newer properties are more likely to have their prices bid down, perhaps reflecting a motivated seller, and that tighter markets (more transactions) are less likely to result in lowered sale prices. Finally, we find that in cases where borrowers potentially overbid, lowered sale prices are more likely. Column 2 repeats the analysis with the MTM value used in place of the AVM value with similar findings.

Column 3 introduces data from loan applications to account for the borrower’s credit score and implied LTV of the loan. We define LTV in this case as the ratio of the requested loan amount and the appraised value. Thus borrowers who end up at 80 LTV or above after the appraisal are more likely to be credit constrained and to actively renegotiate. Our results confirm this argument with the highest incidence of renegotiation occurring at higher LTVs. We also find that borrowers with higher FICOs are usually savvier and have a higher chance of renegotiation. In Column 4, we estimate the effect of the percent the appraisal is below the contract price on the probability of a lower sale price and find that for every 1 percent the appraiser comes in below the contract price, the chance for renegotiation rises by 74 percent.

We can also repeat the above estimation exercise to gauge the effect of a low appraisal on the probability of a delayed or cancelled sale. A real estate contract can break down for a number of reasons. In general, most contracts provide contingencies allowing the buyer to opt out with no penalty. A number of real estate contracts contain an appraisal contingency under which a borrower can walk away from the sale if the appraisal reveals a value below the contract price. Other typical types of contingencies include a home inspection; the timely obtainment of a mortgage by the borrower; and insurance, title, statutory (e.g. HOA documentation), and attorney approval contingencies. These contingencies provide insight into the reasons behind a cancelled sale. We estimate the following equation to isolate the effect of low appraisals on the probability of a delayed or cancelled sale:

$$\begin{aligned}
 & \text{Pr(Delayed Cancelled Sale)} \\
 & = h(\delta_0 + \delta_1 \text{LOW APPR} + \delta_2 \text{FCL} + \delta_3 \text{COND} + \delta_4 \text{ZIP TRANS} \\
 & + \delta_5 \text{LOW MODEL} + \delta_6 \text{MSA} \times \text{QTR}) \quad (3)
 \end{aligned}$$

We present six versions of the model in Table 6: two baseline versions (Models 1 and 2), two versions with loan application control variables (Models 3 and 4), and two versions which allow the effect of a low appraisal to vary as the appraisal falls further below the contract price (Models 5 and 6). In the baseline case presented in the first column of Table 6, we find that low appraisals increase by 2.3 times the relative likelihood of delayed or cancelled sales compared with appraisals at or above the contract price. We also find that foreclosure properties are more likely to transact once a contract has been agreed upon and an appraisal has been ordered. However, properties with

a lower condition are more likely to result in a delayed sale. This is consistent with lower condition properties being more likely to have major problems (uncovered at inspection for instance) that lead to a cancellation of the sale under the home inspection contingency. We also find that when the market has more transactions, indicating a tighter seller's market, contracts are less likely to get delayed.

Using the loan application data, we again control for LTV and FICO, but we add an additional variable here to check whether the loan application is DU eligible. We also change the definition of LTV to the loan amount divided by the contract price (as opposed to the appraised value as was the case for the renegotiation equation (2)). For the case of cancelled sales, this means the original implied LTV value at the time of the contract. As the results in Column 2 indicate, if a borrower is exactly at an 80 LTV, it is extremely likely to break the sell, while values below or above 80 imply more flexibility and less cancelled sales. We also find that when borrowers have higher credit scores, the deal is less likely to break down; and when the application is deemed ineligible, the relative likelihood of the deal being delayed/cancelled increases by a factor of 3.8. The remaining effects remain roughly the same from Column 1. Finally, we attempt to measure how much an additional percent that the appraisal is below the contract price contributes to the probability of a delayed/cancelled sale. As the results in Column 3 indicate, for every additional 1 percent the appraisal comes in below the contract price, the likelihood of delay/cancellation increases by five percent.

In Table 7, we present evidence quantifying the degree of price drop when prices are renegotiated. We report the average price drop for low appraisals and high appraisals as well as the distribution of price drops. The average price drop is much greater for significantly low appraisals as compared to the drop for other appraisals (6 percent versus 2 percent). On average across the top twenty MSAs for the case of low appraisals, 53 percent of price drops are less than 5 percent, 32 percent are between 5 and 10 percent, and 16 percent are greater than 10 percent.

We next quantify the percentage drop in the final renegotiated sale price we should expect if the appraisal is below the contract price by one additional percentage point. We also control for the foreclosure status and condition of the property, whether the property is new, the transactions at the zip-level, and whether the buyer overbid:

%Drop in Price

$$= \gamma_0 + \gamma_1 \text{LOW APPR} \times \% \text{APPR BELOW CONTRACT} + \gamma_2 \text{FCL} + \gamma_3 \text{COND} \\ + \gamma_4 \text{AGE LOW} + \gamma_4 \text{ZIP TRANS} + \gamma_6 \text{LOW MODEL} + \gamma_7 \text{MSA} \times \text{QTR} \quad (4)$$

Table 8 presents results from a regression of the percent of price renegotiated after a low appraisal on the percent difference between the appraised value and the contract price (holding other determinants of the renegotiated price constant). For every 1 percent difference in the appraisal relative to contract price, the final price drops by 0.50 percent. Buyers are thus able to bargain down the final price by fifty cents for every dollar drop recommended by the appraiser.

6. REGIONAL IMPACTS

We next attempt to approximate the effects of low appraising on MSA-level home price, including the average hit to home prices and the lost transactions resulting from low appraising. Using the estimation results from Table 8, we can calculate the additional change in the transaction price from a low appraisal as the difference in the expected drop in price minus the counterfactual expected drop if the appraisal were not low and still assumed to transact, as follows:

$$\widehat{\text{Additional Drop in Price}}_{\text{low}} \\ = \widehat{\% \text{Drop in Price}}(\text{LOW APPR} = 1) - \widehat{\% \text{Drop in Price}}(\text{LOW APPR} = 0) \\ = \hat{\gamma}_1 \% \text{APPR BELOW CONTRACT} \quad (5)$$

Here the hat denotes expected values based on the parameter estimates of equation (4). We can estimate the effect of low appraising at the MSA level using the following calculation:

$$\text{MSA Price Effect} = \frac{\text{Low Appraisals in MSA that transact}}{\text{Total Appraisals in MSA that transact}} \times \\ \text{MSA Average Additional Drop in Price}_{\text{low}} \quad (6)$$

This calculation makes the simplifying assumptions that, one, MSA-level home prices can be thought of as an average of all transacted home prices and, two, the property would have transacted at the counterfactual predicted price in the absence of a low appraisal. We exclude significantly low appraisals that do not transact from the calculation. Thus the effect can be interpreted as the pure price effect of low appraising. The first three columns of Table 9 indicate that the HPI over the period from September 2011 to August 2012 dropped in the top twenty MSAs by between 0.1 and 0.5 percent, with an overall effect of 0.2 percent drop across all twenty MSAs.

We can similarly calculate the marginal effect using an analogous version of (5) for the change in the probability of a delayed/cancelled sale using the estimated equations specified in (3). We express the estimated change in this probability as $\Delta \Pr(\widehat{\text{Cancel}})|_{\text{low}}$. We can use this value to estimate the potentially lost transactions (as a percent of all observed transactions) within an MSA due to low appraisal values using the following calculation:

$$\begin{aligned}
 (7) \quad \text{MSA Transaction Effect} &= \frac{\text{Lost Transactions}|_{\text{low}}}{\text{Total Transactions}} \text{ in MSA} \\
 &= \text{MSA Avg } \Delta \Pr(\widehat{\text{Cancel}})|_{\text{low}} \times \frac{\text{Low Appr in MSA}}{\text{Total Transactions in MSA}}
 \end{aligned}$$

As the last three columns of Table 9 indicate, the transaction effect ranges between a 0.1 to 1.3 percent drop in transactions across all twenty MSAs for the period, with a 0.3 percent drop in transactions in total and a corresponding range of a 0.1 to 0.8 percent drop due to low appraisals.

7. DISCUSSIONS AND CONCLUSIONS

In response to the housing market downturn, policy efforts since 2008 have focused on two major goals: one, encouraging home price recovery through refinance and modification programs and increased liquidity to the housing market; two, preventing the types of behavior that led to the unsustainable run-up and resulting collapse in home prices. The former includes the Home Affordable Refinance Program (HARP) to help underwater borrowers with GSE-held loans refinance; the Home Affordable Modification Program (HAMP) to help delinquent borrowers, or borrowers who are facing financial hardships, modify their loans in order to get or stay current on their mortgage payments; and the quantitative easing programs under which the Federal Reserve

made large scale purchases of agency MBS and other outstanding long-term securities (so-called quantitative easing or QE) to drive down long-term rates. Other policies that have focused on preventing behaviors that led to the crisis include the HVCC (discussed in Section 1) and Dodd-Frank which (among other requirements) imposes safeguards on the independence of appraisers and increases the monitoring of appraisal practices.

While policy measures like HVCC have decreased risks in the mortgage underwriting process, in some cases the increased regulation has to some degree counteracted the other major post-crisis policy goal of home price growth. For instance, the increased scrutiny under the HVCC has sometimes resulted in conservatively low valuations by appraisers, either because of banks using more affordable but relatively inexperienced appraisers or because of appraisers being wary of accusations of overvaluation. Using a unique nationwide data set of purchase appraisals not necessarily tied to sales, for the first time we can measure the actual incidence of low appraisals. We find that in the top twenty MSAs over the period from 2011 to 2012, 8.2 percent of purchase appraisals have been 2 percent or more below the contract price versus only 3.8 percent of low appraisals among originated loans from the same period.

We find that low appraisal values are moderately more likely to result in a delayed or cancelled sale and much more likely to initiate renegotiation to a price lower than contract, after controlling for other factors that could potentially undermine the deal. Aggregating the effect to the MSA level, we find that low appraisals have potentially decreased prices by approximately 0.2 percent (and by as much as 0.8 percent). Furthermore, we find that over the same time period low appraisals potentially resulted in 0.4 percent fewer transactions in the top twenty MSAs (and as much as 1.3 percent fewer transactions).

In some cases of borrower overbidding, we find evidence that low appraisals are justified and potentially provide appropriate protection for both the borrower and the lender. However, we also find that a significant portion of low appraisals are driven by a lack of available comps, appraisers lagging recovering markets, an increased reliance on distressed sales, and atypical property characteristics which may be more difficult to appropriately evaluate. In these cases, the market issues underlying the low appraisal may result in the cancellation/delay or renegotiation of a potential sale that would have otherwise transacted at the contract price.

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Figure 1 Percent of Low and High Appraisals in UAD by Top Twenty MSA from September 2011 to April 2012

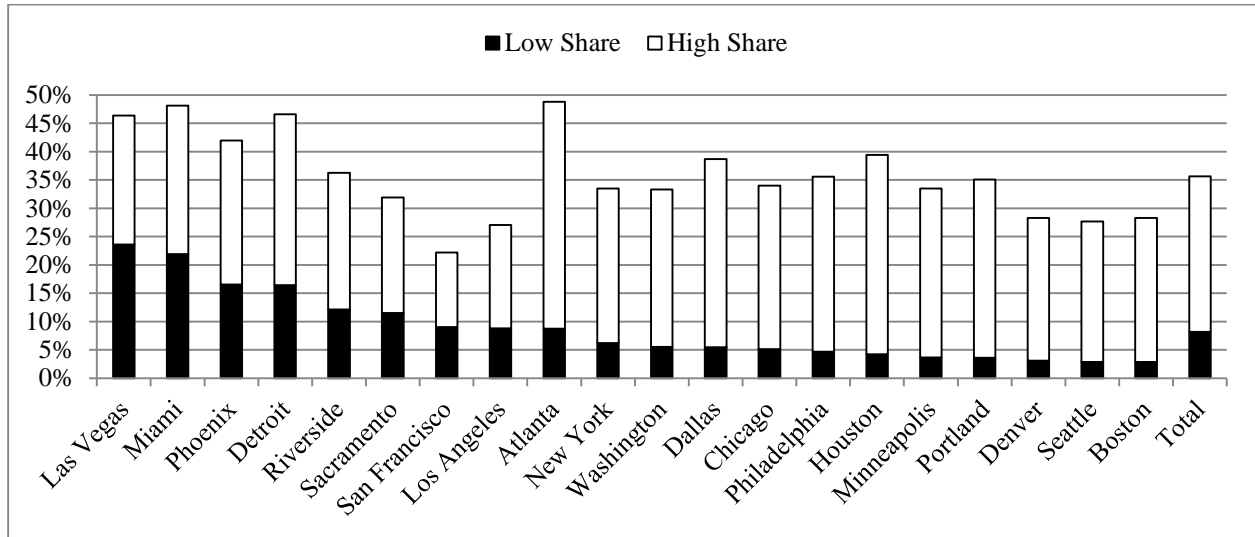


Table 1. Distribution of Appraisal Values Vs Sale Prices in Purchase Mortgages in Top 20 MSAs

Year	2% or More Below	Within 2%	2% or More Above
2000	2.3	77.0	20.7
2001	3.1	75.9	21.0
2002	1.6	76.0	22.4
2003	1.7	75.3	23.0
2004	2.0	74.8	23.2
2005	2.3	72.7	25.0
2006	1.4	67.4	31.2
2007	1.3	62.6	36.1
2008	1.5	58.8	39.7
2009	4.0	64.7	31.2
2010	4.1	67.7	28.2
2011	3.1	67.1	29.8
2012	4.0	69.5	26.5

Table 2 Outcomes of low appraisals versus all other appraisals

MSA	Low Appraisal			All Other Appraisals		
	Contract Price	Cancelled/ Delayed Sale	Lower Sale	Contract Price	Cancelled/ Delayed Sale	Lower Sale
Atlanta, GA	10%	44%	46%	64%	26%	7%
Boston, MA	31%	33%	35%	73%	19%	7%
Chicago, IL	19%	33%	48%	72%	21%	5%
Dallas, TX	11%	44%	45%	55%	34%	9%
Denver, CO	15%	22%	61%	74%	14%	9%
Detroit, MI	17%	29%	52%	71%	19%	7%
Houston, TX	8%	47%	44%	47%	43%	8%
Las Vegas, NV	12%	24%	62%	70%	19%	8%
Los Ang., CA	15%	36%	46%	63%	27%	8%
Miami, FL	15%	32%	50%	66%	23%	8%
Minneap., MN	17%	26%	56%	75%	17%	6%
New York, NY	16%	51%	33%	52%	36%	10%
Phila., PA	16%	42%	41%	59%	32%	7%
Phoenix, AZ	20%	21%	57%	74%	18%	5%
Portland, OR	11%	25%	62%	73%	17%	8%
Riverside, CA	9%	41%	48%	56%	33%	7%
Sacram., CA	10%	24%	63%	71%	17%	8%
San Fran, CA	20%	20%	59%	72%	14%	11%
Seattle, WA	8%	36%	55%	66%	24%	8%
Washing., DC	16%	22%	61%	73%	18%	6%
Total 20 MSA	15%	32%	51%	65%	25%	8%

NOTE: Those transactions that resulted in a sale price higher than the contract price are excluded, so the columns do not add up to 100 percent.

Table 3 Summary statistics for entire sample of UAD appraisals Aug 2011 – July 2012

Description	N	Mean	Std Dev	Min	Max
Appraised Amount	281,965	342,504	258,019	25,000	5,000,000
Contract Price	281,965	338,133	255,451	25,000	5,000,000
% Diff Appr Vs Contract	281,965	1.75%	10.19%	-92.63%	1281.27%
% Low Appraisals (2%+ < Contract)	281,965	8.21%	27.45%	0	1
% High Appraisals (2%+ > Contract)	281,965	27.43%	44.62%	0	1
% Lower Renegotiated Sale Price	281,965	7.91%	26.99%	0	1
% 5%+ Lowered Sale Price	281,965	1.69%	12.88%	0	1
% Delayed/Cancelled Sale	281,965	44.93%	49.74%	0	1
% Sale at Original Amount	281,965	45.51%	49.80%	0	1
% Distressed Indicator	276,404	21.50%	41.09%	0	1
% Share of Distressed Comps	276,931	15.41%	23.67%	0	1
Age of Property	281,965	31.08	28.39	1	362
% Age <= 2 Years	281,965	15.24%	35.94%	0	1
% Age More than 50% of MSA Mean	281,965	18.71%	39.00%	0	1
Bedrooms	250,483	3.38	0.84	1	10
% One Bedroom	250,483	0.62%	7.85%	0	1
Model Value	260,753	349,456	260,944	16,298.86	4,975,516
% Mod Value 50% Below MSA	260,753	15.89%	36.56%	0	1
% Model Value 50% Above MSA	260,753	14.42%	35.13%	0	1
% Contract Price > Model Value	260,759	37.18%	48.33%	0	1
% Diff Contract Vs Model Value	260,759	-3.82	14.74	-91.24	998.27
MTM Value	189,732	314,551	229,686	2,399.19	4,967,884
% MTM Value 50% Below MSA	189,732	13.85%	34.55%	0	1
% MTM Value 50% Above MSA	189,732	14.24%	34.95%	0	1
% Contract Price > MTM Value	281,965	40.20%	49.03%	0	1
% Diff Contract Vs MTM Value	281,965	5.99	35.86	-90.46	5044.61
Condition	281,608	2.94	0.89	1	6
% Low Condition (5 or 6)	281,608	0.54%	7.31%	0	1
Prev Qtr Zip-Level % HPI Growth	281,759	0.71	1.90	-17.46	17.30
Qtr Transaction Count at Zip-Level	281,965	200.14	151.26	0	1319
FICO	169,507	759.47	39.90	484	834
Not DU Approve/Eligible	169,724	5.53%	22.86%	0	1
Contract Price LTV	169,715	78.23	13.63	3	250
% Contract Price LTV < 80	169,715	37.25%	48.35%	0	1
% Contract Price LTV = 80	169,715	33.96%	47.36%	0	1
% Contract Price LTV > 80	169,715	28.79%	45.28%	0	1
Appraised Amount LTV	169,724	77.09	13.45	3	160
% Appraised Amount LTV < 80	169,715	51.20%	49.99%	0	1
% Appraised Amount LTV = 80	169,715	20.80%	40.59%	0	1
% Appraised Amount LTV > 80	169,715	28.00%	44.90%	0	1

Table 4 Causes of low appraisals

Variable	(1)	(2)	(3)	(4)
Intercept	-3.66***	-3.18***	-3.52***	-3.18***
FCL Indicator	-0.51***	.	-0.57***	.
Age<= 2 Years	-0.57***	-0.33***	-0.80***	-0.09
One Bedroom	0.37***	0.55**	0.42**	0.60***
Model Value < 50% of MSA Mean	0.33***	.	0.30***	.
Model Value > 150% of MSA Mean	-0.08***	.	-0.11**	.
MTM Value < 50% of MSA Mean	.	0.38***	.	0.42***
MTM Value > 150% of MSA Mean	.	-0.02	.	0.14**
Prev Quarter Zip-Level % HPI Growth	0.05***	0.05***	0.05***	0.06***
Qtr Transaction Count at Zip-Level	-0.04***	-0.05***	-0.06***	-0.07***
Share of Distressed Comps	0.02***	0.01***	0.02***	0.01***
Contract Price > Model Value	1.70***	.	.	.
Contract Price > MTM Price	.	0.88***	.	.
Somers' D	0.57	0.48	0.47	0.47
MSA*Quarter Effects	YES	YES	YES	YES
% Concordant	78.3	73.7	72.8	71.6
-2 Log L	114,951.0	74,832.5	47,456.8	14,989.8
NOBS	238,294	133,415	150,298	40,146

*** Significant at 1% Level

**Significant at 5% Level

*Significant at 10% Level

Table 5 Estimated effect of low appraisals on lower sale price

Variable	(1)	(2)	(3)	(4)	(5)	(6)
Intercept	-2.13***	-2.06***	-2.32***	-2.51***	-2.27***	-2.49***
Low Appraisal	3.41***	3.26***	.	.	.	.
Low (LTV < 80)	.	.	3.11***	3.00***	.	.
Low (LTV = 80)	.	.	3.67***	3.53***	.	.
Low (LTV > 80)	.	.	3.88***	3.78***	.	.
Low*% Appr Below Contract	.	.	.	.	0.55***	0.53***
Foreclosure Indicator	-0.13***	.	-0.18***	.	-0.21***	.
Low Condition	0.41***	0.27**	0.52***	0.48**	0.48***	0.43**
Age <= 2 Years	0.37***	0.40***	0.49**	0.52***	0.44***	0.49***
Quarter Transaction Count at Zip-Level	-0.05***	-0.06***	-0.07***	-0.08***	-0.07***	-0.07***
Contract Price > Model Value	0.15***	.	0.13***	.	0.19***	.
Contract Price > MTM Value	.	0.06***	.	0.05**	.	0.09***
FICO	.	.	0.04	0.07**	0.04	0.08**
Somers' D	0.47	0.46	0.45	0.43	0.45	0.43
MSA*Quarter Effects	YES	YES	YES	YES	YES	YES
Percent Concordant	73.0	72.3	71.9	71.2	71.8	71.0
-2 Log L	78,219.5	65,772.5	51,543.4	43,850.6	55,388.2	45,321.8
NOBS	116,657	92,947	74,552	59,905	74,552	59,905

*** Significant at 1% Level

**Significant at 5% Level

*Significant at 10% Level

Table 6 Estimated effects of low appraisals on probability of delayed/cancelled sale

Variable	(1)	(2)	(3)	(4)	(5)	(6)
Intercept	-1.06***	-0.73***	-1.29***	-1.01***	-1.30***	-1.01***
Low Appraisal	0.53***	0.50***	.	.	.	.
Low (LTV < 80)	.	.	0.28***	0.23***	.	.
Low (LTV = 80)	.	.	1.28***	1.24***	.	.
Low (LTV > 80)	.	.	0.24***	0.28***	.	.
Low*% Appr Below Contract	.	.	.	.	0.04***	0.04***
Foreclosure Indicator	0.04**	.	-0.09***	.	-0.10***	.
Low Condition	0.79***	0.37***	0.85***	0.14	0.84***	0.11***
Quarter Transaction Count at Zip-Level	-0.16***	-0.08***	-0.11***	-0.02**	-0.11***	-0.02**
Contract Price > Model Value	-0.04***		0.00	.	0.00	
Contract Price > MTM Value	.	-0.76***	.	-0.88***		-0.87***
FICO	.	.	-0.04	-0.02	-0.04***	-0.02
DU Ineligible			1.02***	0.92***	1.01***	0.92***
Somers' D	0.32	0.38	0.31	0.39	0.31	0.39
MSA*Quarter Effects	YES	YES	YES	YES	YES	YES
Percent Concordant	65.5	68.8	65.2	69.3	65.2	69.2
-2 Log L	152,291.0	134,067.0	76,543.1	70,125.1	76,547.2	71,381.7
NOBS	150,972	124,762	89,631	74,284	89,632	75,657

*** Significant at 1% Level

**Significant at 5% Level

*Significant at 10% Level

Table 7 Distribution of price drops for transactions with lowered sale prices after low appraisals

MSA	Average Price Change			Distribution by Price Change Sig Low Appraisal		
	Significantly Low Appraisal	All Other Appraisal	Diff	0 to -5%	-5 to -10%	<=-10%
Atlanta, GA	-7.7	-2.2	-5.5	38.6	38.9	18.0
Boston, MA	-4.8	-2.0	-2.8	60.4	32.1	7.6
Chicago, IL	-6.0	-2.6	-3.4	53.2	32.5	11.7
Dallas, TX	-5.2	-1.2	-4.0	64.5	24.4	10.4
Denver, CO	-5.0	-1.6	-3.4	64.9	28.1	6.1
Detroit, MI	-7.4	-5.3	-2.1	45.6	31.3	19.2
Houston, TX	-5.4	-2.0	-3.4	58.6	30.5	10.0
Las Vegas, NV	-6.6	-2.8	-3.8	44.6	37.7	16.4
Los Angeles, CA	-5.4	-2.2	-3.2	56.2	31.1	12.3
Miami, FL	-7.0	-2.4	-4.6	45.6	34.6	16.6
Minneapolis, MN	-5.8	-5.6	-0.2	58.9	28.6	9.8
New York, NY	-5.5	-1.3	-4.2	59.0	29.1	10.7
Philadelphia, PA	-5.9	-1.2	-4.7	51.8	32.4	15.8
Phoenix, AZ	-6.3	-2.7	-3.6	50.4	32.0	15.3
Portland, OR	-5.1	-1.9	-3.2	63.8	26.6	8.5
Riverside, CA	-5.6	-2.2	-3.4	54.1	35.9	9.1
Sacramento, CA	-5.8	-2.2	-3.6	55.4	31.2	12.1
San Francisco, CA	-5.4	-1.9	-3.5	60.5	29.8	8.2
Seattle, WA	-4.9	-1.5	-3.4	61.5	29.7	8.8
Washington, DC	-4.3	-2.2	-2.1	69.6	24.1	5.6
Total 20 M	-6.1	-2.1	-4.0	52.8	32.1	15.1

Table 8 Estimated effects of low appraisals on % of drop in price.

Variable	(1)	(2)
Intercept	0.16***	0.18***
%Appraisal Below Contract	0.50***	0.46***
Foreclosure Indicator	0.09***	
Low Condition	0.14**	-0.09
Age <= 2 Years	-0.03	-0.02
Quarter Transaction Count at Zip-Level	-0.03***	-0.03***
Contract Price > Model Value	0.12***	
Contract Price > MTM Value		0.06***
R2	0.41	0.39
MSA*Quarter Effects	YES	YES
NOBS	116,657	91,104

*** Significant at 1% Level

**Significant at 5% Level

*Significant at 10% Level

Table 9 Estimated effects of low appraisal by top 20 MSAs

MSA	Avg Drop in Price for Low Appraisal	×	% of Trans w/ Low Appraisal	=	Price Effect (Drop in HPI)	Avg Change in Prob of Cancel	×	Low Appraisal/ Trans	=	Trans Effect (Lost /Trans)
Atlanta, GA	4.1		6.4		0.3	5.5		11.4		0.6
Boston, MA	2.7		2.3		0.1	2.9		3.4		0.1
Chicago, IL	3.7		4.1		0.1	3.4		6.0		0.2
Dallas, TX	2.8		4.5		0.1	3.5		8.0		0.3
Denver, CO	2.9		2.7		0.1	1.6		3.4		0.1
Detroit, MI	4.2		13.7		0.6	4.8		19.3		0.9
Houston, TX	2.9		3.5		0.1	3.6		6.6		0.2
Las Vegas, NV	3.7		19.8		0.7	2.5		26.2		0.7
Los Angeles, CA	3.2		6.3		0.2	2.1		10.0		0.2
Miami, FL	4.0		18.5		0.7	4.9		27.1		1.3
Minneapolis, MN	3.1		2.8		0.1	2.3		3.8		0.1
New York, NY	3.1		4.3		0.1	5.5		8.7		0.5
Philadelphia, PA	3.1		3.8		0.1	4.8		6.6		0.3
Phoenix, AZ	3.7		14.6		0.5	1.4		18.5		0.3
Portland, OR	2.9		2.9		0.1	2.8		3.9		0.1
Riverside, CA	3.2		9.3		0.3	2.3		15.8		0.4
Sacramento, CA	3.2		9.3		0.3	2.4		12.3		0.3
San Francisco, CA	2.9		6.9		0.2	1.4		8.7		0.1
Seattle, WA	3.0		2.0		0.1	1.7		3.1		0.1
Washington, DC	2.7		4.8		0.1	1.6		6.1		0.1
All Top 20 MSAs	3.5		6.9		0.2	3.0		10.1		0.3