# Distressed Comps

James N. Conklin, University of Georgia*
N. Edward Coulson, University of California, Irvine †
and
Moussa Diop, University of Southern California ‡

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**Abstract**

We consider the use and impact of distressed properties as comparables in residential appraisals. There are three aspects: first we consider the incidence of their use and their relative comparability; second, we consider their impact on the appraisal itself; third we consider their role in foreclosure externalities. We find, generally, that their tangible characteristics are largely good matches to their subject properties, which suggests that they are not necessarily used as a last resort. We nevertheless find that they are a drag on appraised value – they increase both the probability of a below-price appraisal and the use of non-standard weighting schemes, suggesting in turn that the adjustments made for the distressed circumstances in appraisals are not large enough. The role of distressed comps in prolonging the impact of foreclosure externalities in neighborhoods is discernible, though not large. This foreclosure externality channel is largely ignored in the literature.

*Terry College of Business, University of Georgia, Athens, GA
†Paul Merage School of Business, University of California, Irvine, Irvine, CA
‡Sol Price School of Public Policy, University of Southern California, Los Angeles, CA

# 1. Introduction

This paper considers the use of distressed properties as comparable sales in residential appraisal. Accurate appraisals are important to the transfer of property. Real property, such as single family homes, are traded infrequently, and given the heterogeneity of each unit (as embodied in the property's unique set of characteristics), no immediate evaluation is available, as there would be for more homogeneous products. Appraisals are particularly important to the suppliers of mortgage credit. Without credit, most homebuyers would not be able to finance or refinance a home purchase, but the lender's underwriting standards generally require that an independent appraisal be performed, and that the appraised value of the property be at least the transaction price. To obtain information about its current market value, appraisers will usually compare the subject property to recent sales of nearby homes. The sale prices of these comparable properties, or "comps", are believed to embody the most accurate information about the market value of the subject property.

Given the uniqueness of each unit, the sales prices of the comps are not exactly comparable to that of the subject property, and it is standard practice for appraisers to make adjustments to the comp prices based on the differences in the physical characteristics between the subject and the comp. That is, if the comparable sale property is, for example, larger, or has more bathrooms, than the subject property, the comp's sale price will be adjusted downward. The net effect of these adjustments will allow the use of the comp sale on an "apples to apples" basis. But not only do adjustments have to be made due to physical differences, differences in the characteristics of the transactions are subject to adjustment as well. Various forms of seller financing, buyer or seller concessions, inclusion of personal property and the like are all ways in which the comp sale and the subject transaction may be different. One particular circumstance for which adjustment can take place is when the comp is a distressed sale such as a foreclosure.[1] Foreclosure sales occur when a

[1]We will use the term "distressed sale" to collectively refer to foreclosure sales and short sales. In our analysis all foreclosures are real estate owned (REO) sales – where the lender forecloses, takes ownership, then sells it on the market. A short sale is a lender pre-approved sale in which the lender's net proceeds are less than the remaining

lienholder takes possession of a property after nonperformance by the mortgage borrower. There are a variety of circumstances that suggest that foreclosure is associated with a lower sale price, which we discuss momentarily, but for which the appraiser must presumably make the appropriate adjustments.

The use of distressed property as a comparable sale is controversial. On the one hand, guidelines from the Appraisal Institute, the leading professional organization of property appraisers, suggest that foreclosures are just like any other comp, and that with the appropriate adjustments, that "foreclosures ... can provide important information for appraisers"(Appraisal Institute)[2]. Our personal conversations with appraisers suggest, on the other hand, that in practice appraisers tend to avoid using foreclosures as comps, in the belief that the uncertainty surrounding such properties, and the difficulties of finding the appropriate adjustment, make distressed units less useful for the appraisal process.

There is, to be sure, a substantial amount of econometric evidence that foreclosure properties are discounted by the market. This evidence arises from hedonic regressions of transaction price on a vector of physical and locational characteristics, as well as an indicator variable for foreclosure (and potentially other characteristics of the sale). A negative coefficient on the indicator is evidence of a foreclosure discount. Carroll, Clauretie, and Neill (1997), Clauretie and Daneshvary (2009), Zhou et al. (2015), Chinloy, Hardin, and Wu (2017), and Conklin et al. (2021) all have estimated versions of such equations and provide evidence of lower sale prices of distressed units.[3] This evidence does not necessarily mean that appraisers should make that same adjustment (even if the literature agreed on the size of the discount) because the information sets of the appraiser and the econometrician may be much different. An econometric finding of a discount may be

mortgage balance.

[2]Appraisal Institute (2012): "Making Sense of the Nonsense: Credible Appraisal in a Declining Market" http://www.appraisalinstitute.org/assets/1/7/AI_AppraisalsInDecliningMarkets_(1).pdf

[3]Harding, Rosenblatt, and Yao (2012) note that foreclosure sales do not yield higher subsequent rates of return for their purchasers. This merely indicates that the existence of a foreclosure discount is not an indication of an inefficient property market. There is also a larger literature on the external price effects of foreclosure sales which we discuss briefly below. This literature also presupposes a foreclosure discount on the distressed property itself.

due to characteristics that are omitted from the hedonic regression (and which are correlated with foreclosure). But the set of characteristics that appraisers use is usually more comprehensive and detailed than that used in the regression models. It would seem to be poor appraiser practice to let foreclosures proxy for omitted characteristics.[4]

However, the condition of the property may be lower in a distressed unit. Homeowners are generally thought to be good caretakers of their property (DiPasquale and Glaeser, 1999) but that assiduousness can be considerably weakened when foreclosure is imminent (Lambie-Hanson, 2015). Like the problem of omitted characteristics above, the condition of the property is not among the characteristics observed by the analyst. However, unlike physical attributes, it is not clear that the condition of the comp property is observable to the appraiser either. Appraisers do not generally do walk-throughs of a comp property and usually get their information on them through the multi-list, which may or may not have information on the property condition.[5] Knowing this, the appraiser may make an adjustment to a foreclosure comp even without direct evidence of a difference in condition.

Even if a foreclosure property does not have observable condition problems, the sale price might be lower due to "foreclosure stigma". Real estate transactions are routinely plagued by issues of asymmetric information, that sellers have more knowledge of the property than buyers (Kurlat and Stroebel, 2015). Foreclosure is a signal that the unobserved attributes of the house would detract from the value if the buyer only knew it, which in turn causes the buyer to lower the bid anyway. This would cause both an estimated foreclosure discount, and a foreclosure adjustment by the appraiser.

[4] In order to mitigate this problem for the econometric estimation of the discount, some authors (Groves and Rogers (2011); Chinloy, Hardin, and Wu (2017)) use models that attempt to correct for the endogeneity of the foreclosure indicator.

[5] In many cases the scope of work statement in the appraisal includes the following language: "The appraiser must, at a minimum...inspect each of the comparable sales from at least the street" (see Fannie Mae's Uniform Residential Appraisal Report at `https://singlefamily.fanniemae.com/media/12371/display`). Conversations with appraisers suggest that they often rely on MLS info, public records, or communications with other industry participants to source information on the quality and condition of comps. Any of these sources, however, is likely to be less informative of property condition than an on-site appraiser inspection.

Finally, the sellers of foreclosed properties, typically lenders, are thought to be more eager sellers. There is a well-known relationship between sale price and time on the market (e.g. Anglin, Rutherford, and Springer (2003)). As Clauretie and Daneshvary (2009) note, foreclosure sales do indeed have reduced time to sale, and this contributes to the differential in prices between distressed and non-distressed properties. Appraisers do not generally use time-to-sale as an adjustment factor but may invoke a foreclosure adjustment to account for the differential sale conditions.

In sum, the literature on foreclosure discounts thus suggests that the sale prices of distressed properties are lower, suggesting in turn that appraisers who use distressed sales as comps are required to make adjustments for that condition of the sale, primarily because of differences in condition, real or suspected (if such information is not otherwise conveyed), or because of differences in seller motivation. While as noted neither the Appraisal Institute (2012) nor Fannie Mae Appraisal Guidelines (2020)[6] discourage the use of foreclosures as comps, both note that thorough explanations must accompany any adjustments due to foreclosure.[7] Since these adjustments are inherently uncertain, it might be suspected that appraisers (a) avoid using distressed comps or admit them as comparables in a systematically different way than ordinary comps; (b) when making adjustments for distress, they do so in ways that have ramifications for the appraisal itself.

Therefore, in this paper, we address a set of questions related to the use of distressed properties as comparables in the appraisal process. In Section 2 we describe the data we use in our investigations. This is primarily from a database of appraisals from a large secondary mortgage market purchaser of residential mortgage loans, which contains not only the characteristics of the subject

[6]Fannie Mae (2020) "Selling Guide: Part B4-1.3-08, Comparable Properties" https://selling-guide.fanniemae.com/Selling-Guide/Origination-thru-Closing/Subpart-B4-Underwriting-Property/Chapter-B4-1-Appraisal-Requirements/Section-B4-1-3-Appraisal-Report-Assessment/1032992441/B4-1-3-08-Comparable-Sales-10-02-2018.htm

[7]It is worth quoting Fannie Mae's guidelines: "It is acceptable to use foreclosures and short sales as comparables if the appraiser believes they are the best and most appropriate sales available. The appraiser must address in the appraisal report the prevalence of such sales in the subject's neighborhood and the impact, if any, of such sales. The appraiser must identify and consider any differences from the subject property, such as the condition of the property and whether any stigma has been associated with it. The appraiser cannot assume it is equal to the subject property. For example, a foreclosure or short sale property may be in worse condition when compared to the subject property, especially if the subject property is new construction or was recently renovated." (Fannie Mae, 2020)

property but also of the comparable sales.

In Section 3 we ask a number of questions about the use of distressed comps. Under what circumstances are foreclosure sales used as comps? Are comps used at a frequency congruent with their prevalence in the market? Are they of similar value to other comps? Are distressed comps better or worse comps for the subject property? If distressed comps are just like any other comp we would expect them to be used just as often, and be "just as comparable" as other comps. That is, their deviations in, say, size, should be the same as non-distressed comps. On the other hand, if their comparability is better than average, this would be an indication that they are primarily used when they are exceptionally good comparisons, while if it is worse than other comps this would perhaps be an indication that they are only used out of desperation. Direct evidence on many of these points is unavailable but the indirect evidence says that within any given appraisal, the distressed comps are only slightly different than other comps along most tangible dimensions, which in turn suggests that they are not always the "last resort" for appraisers.

In Section 4 that follows, we examine the effect that the use of a distressed sale as a comp has on the appraisal of the subject property. We are particularly interested in the role that foreclosure comps may have in contributing to appraised values that are below the transaction price. Such an appraisal has consequences, because the underwriting of a mortgage loan will be based on the lower of the transaction price and the appraised value. Given a fixed loan-to-value ratio, a below-price appraisal will require the borrower to make up the difference between the amount of the lower loan principal and the transaction price, something that borrowers are often unable or unwilling to do. We find that the use of a distressed property does lead to lower appraisal values on average, although this may be due to the lower value of distressed units and not directly due to distress itself. More importantly, perhaps, is that, at least at the beginning of our sample, that the use of a distressed comp is associated with a higher probability of a below-price appraisal.

In Section 5 we address the treatment of distressed comps in the appraisal process. We conduct two tests. First we examine the size of the adjustment in distressed and non-distressed comps

and find that distressed adjustments are larger. Second, we look at the phenomenon of "exact appraisals". Much of the prior research on appraisals, especially those which took place during the housing boom and subsequent crash, concentrated on the tendency of appraisals to exactly match the transaction price in order to avoid the problems of below-price appraisals (Ding and Nakamura (2016), Calem, Lambie-Hanson, and Nakamura (2017), Conklin et al. (2020), Eriksen, Kuang, and Zhu (2020), Kruger and Maturana (2020)). While the adoption of the Home Valuation Code of Conduct has reduced the incidence of exact matches (Shi and Zhang (2015), Ding and Nakamura (2016)) such matches are still higher than would be expected. Eriksen, Kuang, and Zhu (2020) note that appraisers will often deviate from the putatively default practice of averaging the adjusted prices to reach a final valuation of the subject property if such an average would be below the transaction price. Given our findings above that show that distressed appraisals tend to be low, it is of interest to investigate appraiser practice in this regard.

Following Eriksen, Kuang, and Zhu (2020), we take as "default" appraiser practice to be the simple averaging of the adjusted prices of the comparison properties, and note the incidence of appraisals that end up above that simple average. These are more-than-proportionately with appraisals that use distressed comps. This is congruent with the idea that foreclosure comps drag down appraisals, but instead of reporting a below price appraisal, the appraiser adjusts the weight on the foreclosure comp to compensate.

Our final investigation concerns the role that foreclosure comps have in perpetuating house price slumps. There is a large literature on "foreclosure externalities", the diminishment of sale prices generally in neighborhoods with foreclosure sales. (For a review of the literature in the immediate wake of the housing crash see Frame (2010); more recent studies include Anenberg and Kung (2014), Fisher, Lambie-Hanson, and Willen (2015), Zhang and Leonard (2014), Liu and Yezer (2019)). External effects of foreclosure have been blamed both on the increased supply of housing when foreclosures are added to the stock of property for sale, and also on externalities from lack of upkeep. However, a third possibility is that the use of foreclosures as appraisals

drives down appraised values which in turn drives down sale prices. Industry professionals have suggested this mechanism. The Appraisal Institute (2012) notes: "Appraisers have been accused of prolonging the nation's real estate downturn by developing value opinions that are below proposed sale prices. Specifically, they've been criticized for including foreclosure sales and so-called short sales among the comparable sales used in the valuation process." We therefore wish to assess the role of appraisal and foreclosure comps in the creation of the foreclosure externality.

We use a database of property sales and calculate the foreclosure intensity surrounding each sale. We find, as has the previous literature, that higher foreclosure intensity is associated with lower prices. We then include an indicator variable for the use of a distressed comparable property in the sale property's appraisal. Not only does this indicator variable have a negative and significant coefficient, but the coefficient on foreclosure intensity is reduced (though it remains negative and statistically significant). Thus at least part of what we think of as foreclosure externality arises from the use of nearby properties as comps, rather than nearby distressed properties as either competitors for buyers or unsightly landscapes. This "comparable channel" is largely ignored in the literature.

# 2. Data

Our empirical analysis uses appraisal data from a large secondary market purchaser of residential mortgage loans. Importantly, a substantial share of financial institutions rely on the data provider's collateral valuation and mortgage underwriting platform, even when they do not intend to sell the loan to the data provider. This results in broad market coverage – the data contains information on more than 7 million individual appraisals associated with residential mortgage applications for home purchases between 2013 and 2017. Detailed information on the subject property (e.g., number of bedrooms and bathrooms, square footage, etc.) is available, as well the contract sales price and the appraised value.

There are several unique features of the data that are critical for our analysis. First, the data

includes detailed information on the comparable sales (comps) used for each appraisal. Comp information has generally been unavailable to researchers.[8] For each comp we observe property characteristics, sales price, and adjustments to the sale price to arrive at the final adjusted value used in the appraisal. Additionally, the data includes a field indicating whether the comparable sale was an arm's length transaction, real estate owned (REO), or a short sale. Since our primary goal is to determine the effect of distressed sale comps on the appraisal process, this field is essential to our analysis. Finally, in contrast to most databases that only include appraisal information for originated loans, our data includes applications that did not result in funded loans as well. Thus, we are able to circumvent a selection issue that is common in the literature (Kruger and Maturana (2020), Conklin et al. (2020), and Eriksen, Kuang, and Zhu (2020)).

We supplement the appraisal data with tract level information from the 2013 American Community Survey (ACS). Specifically, we use the 5-year tract level estimates data obtained through the National Historic Geographic Information Systems website (Manson et al. (2019)). We also merge the data with time-varying county level unemployment data from the US Bureau of Labor Statistics (BLS) and house price indices from the the Federal Housing Administration (FHA).

The data includes 7,095,634 unique appraisals. Appendix Table A.1 reports names and descriptions of the variables that we use in our analysis. We drop observations with missing values for these variables.[9] We also exclude observations with missing county and Census tract identifiers. Our sample is restricted to properties with: i) appraised values and sale prices between $50,000 and $1,000,000, ii) 15 or less rooms, iii) less than 9,000 square feet, iv) less than 250 years old, and v) less than nine bedrooms. As a result of these restrictions, our final sample includes 6,838,144 unique appraisals. The majority of the excluded observations are due to a missing sales price (68,284) or value above $1 million (85,014). There are over 27 million comps used in

[8] Two recent exceptions are Eriksen et al. (2019) and Eriksen, Kuang, and Zhu (2020).

[9] An exception to this is Price Negotiated Down. This variable can only be calculated for a subset of appraisals where the loan funded and was sold to the data provider.

these appraisals. Two percent of these sold as distressed sales (REOs or short sale).[10]

Table 1 reports descriptive statistics for appraisals that did not use a distressed comp and appraisals that did, respectively. Within each subsample, the average appraised value, contract price, and AVM value are fairly similar. However, comparing across groups, property values are clearly lower in the distressed comps subsample, which likely reflects geographic differences across the two subsamples. Appraised values are 3% more likely to come in below the contract sales price when an appraisal includes a distressed sale. This is suggestive evidence that distressed comps may lead to understated appraised market values. Of course, the contract price is also a noisy estimate of value, so an appraisal below contract does not indicate a deficient appraisal value estimate. Distressed comp appraisals are also slightly more likely to have a final sales price below the initial sales contract price. Appraisals using distressed sales use more comps on average than no-distress appraisals. Interestingly, appraisers are more likely to report a final appraised value above the equally weighted comp adjusted value when distressed comps are used. Eriksen et al. (2019) argue that appraisers use subjective weighting schemes to increase appraised values. In our context, this provides some evidence that appraisers may use subjective weighting to counteract low sales prices of distressed comps.

Consistent with the value differences mentioned above, distressed comp appraisals tend to be smaller (square footage, rooms, beds, baths), and of inferior condition and quality on average. They are also located in counties that experienced slightly lower recent house price appreciation. Tract income and education is higher in the no distressed subsample, while distressed comp appraisals occur in areas with greater Hispanic and minority population shares. Unsurprisingly, this suggests that distressed and non-distressed appraisals occur in different locations. Thus, it will be important to account for location in our empirical analysis.

[10]Descriptive statistics for the sample of comps are available upon request. Below we investigate whether distressed comps are different from non-distressed comps across observable dimensions.

# 3. Distressed Comp Usage and Characteristics

We first look at the geography of distressed comp appraisals. Figure 1 maps the county-level share of appraisals that used distressed comps in 2013 for counties with at least 30 appraisals. There is wide variation in the share of distressed comp appraisals across the U.S. Distressed comp usage is more pronounced in the western part of the country and Florida, two areas that experienced large booms and busts in the recent housing cycle. A few metropolitan areas stand out as well: Atlanta, Minneapolis, Washington DC, and Chicago had high shares of distressed comp appraisals. Additionally, distressed comp usage was quite common across the lower half of Michigan, where several of the state's larger metropolitan areas are located (Grand Rapids, Lansing, and Detroit). Of the 1,296 counties with at least 30 appraisals, 9% had a distressed comp share of at least 20%, with 4% having over 30% share.

Table 2 lists the 10 counties with the largest share of distressed comp appraisals in 2013. Six of the top 10 counties are located in the Atlanta-Sandy Springs-Roswell, GA Metropolitan Statistical Area (MSA). The remaining counties are located within so-called Sand States (Arizona, Nevada, and California). Nearly 80% of appraisals in Santa Cruz County, AZ included distressed comps in 2013. Unsurprisingly, the majority of the counties in Table 2 experienced significant recent house price declines leading up to 2013.

Figure 2 displays the 2013 map along with the corresponding versions for 2015 and 2017. Over time the county-level share of appraisals with distressed comps decreases. Whereas 9% of counties had over 20% distressed comp appraisal shares in 2013, this number declined to 2% in 2015. In 2017, none of the counties had a share above 20%. This makes sense given trends in house prices over this period. In 2013, only 34% of the counties had experienced positive recent (past three years) house price growth. In 2017, however, nearly all counties (94%) had experienced positive recent price appreciation.

Taken together, Figures 1 and 2 and Table 2 document several interesting facts regarding dis-

tressed comps. First, there is significant spatial variation in the use of distressed comps. Second, in some areas, the majority of appraisals included distressed comps in 2013. Third, there appears to be geographic clustering in the use of distressed comps, which is likely related to spatial correlation in house price growth. Finally, the use of distressed comps declines dramatically over time, suggesting that rising house prices preclude the need to use distressed comps.

We now turn to the geographic determinants of distressed comp usage. Table 3 presents results from linear probability models where the dependent variable is a binary indicator for whether any of the comps on an individual appraisal were distressed sales. All models control for house characteristics of the subject property.[11] Given the well documented negative relationship between home equity and foreclosure, it is somewhat surprising that house price appreciation is positively associated to the use of a distressed comp in column (1). But, the sign of this coefficient turns negative once we include locational fixed effects, as discussed below. In line with expectations, distressed comp appraisals are more common in areas with greater unemployment. They are also more likely in more populated areas, locations with a greater Hispanic or African-American share of the population, and places where a greater share of the tract's housing stock is vacant. The use of distressed comps is negatively related to tract income inequality, the number of housing units, and the educational attainment of the tract population.

In column (2) we add county fixed effects to account for time invariant unobservable differences across counties. Once we account for these unobservables, greater house price appreciation is negatively related to the use of distressed comps. Since greater house price appreciation should reduce the likelihood of negative equity and foreclosure, the negative coefficient in column (2) is in line with expectations. The other coefficients in column (2) are similar in sign and significance to those reported in column (1). In column (3), we add a more granular level of geographic (tract) fixed effects. Because all of the tract level covariates are time-invariant, they drop from the model.

[11] To economize on space we do not report the coefficient estimates for these characteristics, but they are available upon request.

The house price appreciation and unemployment rate coefficients are similar in columns (2) and (3). There is a modest increase in the R-squared moving across columns in Table 3, but most of the variation in the likelihood of a distressed comp remains unexplained.

A natural question is whether distressed comps differ systematically from non-distressed comps.[12] To answer this question, we use the sample of 27 million comps that underlie the individual appraisals. We estimate regression models where the dependent variables are characteristics of the individual comps and the independent variable is an indicator for whether the individual comp sold as a distressed sale. Importantly, we include individual appraisal fixed effects in the specification. Intuitively, we ask, within the same appraisal, whether a distressed sale comp is different than a non-distressed sale comp? Results are reported in Panel A of Table 4. Columns (1) - (3) show that distressed comps are slightly larger than non-distressed comps in terms of number of bedrooms, number of bathrooms, and square footage. However, the economic magnitude of these differences is quite small. Distressed comps are newer (2 years) than their non-distressed counterparts, but are of slightly lower quality and condition. Both condition and quality are subjective, though, so it is possible the appraiser reports consciously or subconsciously biased condition and quality figures for distressed comps. Finally, column (6) shows that non-distressed comps are approximately 0.857 miles away from the subject property, but distressed comps are 0.023 miles (120 feet) closer to the subject property on average. Taken together, Table 4 Panel A suggests that there are observable differences between distressed comps and non-distressed comps within the same appraisal, but these differences are modest.

We also ask a related, but distinct question: are distressed comps inferior matches than non-distressed comps, at least with respect to physical characteristics? For each comp we compute the absolute value of the difference in the comp's characteristic and the subject property's character-

[12] A related question is whether distressed comps are only used as a last resort. Appendix Figure A.1 plots the distribution of individual comp usage by sale type (no distressed versus distressed). A distressed transaction is much more likely to be used as a comp in only one appraisal, which could suggest that they are used as a last resort. However, we show in Table 4 that they are suitable comps for the subject property.

istic (|Diff from Subj.|). For example, if the comp is 1,100 sq. ft. and the subject property is 1,150 sq. ft., the value for this characteristics would be |1,100 - 1,150| = 50. The larger the value, the more different the comp is from the subject property. Panel B of Table 4 reports coefficients from regressions where |Diff from Subj.| for various property characteristics is the dependent variable. The positive, but small, coefficients indicate that distressed comps are very slightly inferior matches to the subject property in terms of observables. The one exception is the condition of the property, where the mismatch for distressed properties is about 1/3 greater than for non-distressed properties. Note, though, that this does not necessarily mean distressed comps are inferior matches overall. Indeed, it is just as important for an appraiser to match a subject property to comps that are similar along dimensions that are unobservable to the econometrician, as well as their more tangible characteristics.

# 4. The Effects of Distressed Comps on Subject Properties

We are primarily interested in the effect of distressed comp usage on subject property valuation. As mentioned in the introduction, a common complaint from appraisers is that using distressed comps prevents the appraisal from reflecting the market value of the property. We test this prediction formally below. Because reliance on distressed comps varies significantly over time, and appraisers may adapt in the way that they handle distressed comps, we perform our analysis separately for each year.

We first test whether the use of a distressed comp is associated with lower appraised values. Table 5 presents results from regression models using our sample of appraised properties. The dependent variable in Panel A is the natural logarithm of the appraised value of the subject property. We include an extensive set of controls and fixed effects. To account for time varying locational differences across properties, we include recent house price appreciation at the county level and the county unemployment rate in the year that the appraisal was completed. We also include

Census tract fixed effects to control for time invariant area characteristic at a granular level.[13] To control for time-varying macroeconomic factors, we include year by quarter fixed effects.[14] Our data also allows us to include a rich set of subject property characteristics to control for observable differences in property attributes.[15]

Our primary independent variable of interest is a binary variable that indicates whether any of the comparable transactions used in the appraisal were distressed sales. Column (1)-(5) of Table 5 show that appraisals with distressed comps have appraised values that are 8-10% lower than than those with no distressed comps, *ceteris paribus*. At first blush, this would seem to suggest that distressed comps do depress appraised values. However, this relationship may reflect unobserved differences in property characteristics or locational (e.g., neigbhorhood) factors. To examine this possibility, we use the contract sales price as our dependent variable and report the results in Panel B. The distressed sale comp coefficients in Panel B are nearly identical to the coefficients in Panel A. This seems to contradict the hypothesis that distressed comps reduce appraised values, and instead suggests that distressed comp appraisal properties are simply worth less.

As a more direct test of whether distressed comps prevent appraisals from reflecting market values, we estimate linear probability models where the dependent variable is a binary variable indicating whether the appraised value is below the contract sales price (Low Appraisal). If distressed comps artificially depress the appraised estimate below the market value, then distressed comp appraisals should be more likely to come in below the transaction price, since the contract price is an estimate of market value.[16] Coefficient estimates from our linear probability models

[13] Census tract is the most granular locational identifier in our data.

[14] Our results remain unchanged when we use Census tract by year/quarter fixed effects.

[15] Specifically, we include: square feet, square feet$^2$, age, age$^2$, number of rooms, number of bedrooms, number of bathrooms, a location type identifier, property condition, property quality, and property view.

[16] A below-transaction price appraisal can lead to application rejection,increased interest rate or downpayment requirements, contract renegotiation or cancellation (Fout, Mota, and Rosenblatt (2020), Conklin et al. (2020), and LaCour-Little and Malpezzi (2003)). Effectively, a below-transaction price appraisal lowers the likelihood that a transaction occurs. In practice, below-transaction appraisals are rare. For purchase mortgages, appraised values are overwhelmingly at or above the contract sale price (Eriksen et al. (2019), Conklin et al. (2020), and Kruger and Maturana (2020), among others.) This holds in our data as well – appraised values are below the contract price for only 8% of our observations.

are reported in Table 6. In 2013, the use of a distressed comp increases the likelihood of a below-contract appraisal by 1.3 percentage points. Since only 8 percent of appraisals are below contract, the economic magnitude of this effect is large. Interestingly, after 2013, distressed comp appraisals are less likely to be below-contract. Distressed comps may have impeded appraisers from providing true market value estimates in 2013, however, this doesn't appear to be the case in subsequent years as distressed comp usage declined. This could indicate that reliance on distressed comps inhibits valuation in the early stages of a housing market recovery, but not during a prolonged period of increasing house prices.

# 5. Do Appraisers Compensate for Distressed Comps?

Appraisals, by their nature, are subjective estimates of market value. This suggests that appraisers may be able to overcome any downward bias caused by the use of distressed comps. For example, the appraiser chooses the comps that are used in an appraisal. If the appraiser feels a comparable distressed sale does not reflect market value, he can exclude that property transaction as a comp in the appraisal. Unfortunately, we cannot identify the comparable transactions that the appraiser did not select, so we are unable to examine whether this is a way that appraisers combat downward pressure from distressed comp sales.

Something that we can examine, however, is adjustments to the comp transaction price. Appraisers make subjective adjustments to arrive at the final adjusted sales price of each comp. Thus, to counteract any downward influence of distressed comps, the appraiser may apply larger positive adjustments to distressed comps. To examine whether this is the case, Table 7 presents models where the dependent variable is the signed adjustment to the comp sales price in percentage terms. For example, if the comp sales price is $200,000, and the final adjusted value is $210,000, the dependent variable would be 5% for this observation. The average percentage adjustments in our sample is zero. All models in Table 7 exploit within appraisal variation in comp distressed sales and

adjustment percentage. Intuitively, are adjustments to sales price larger for distressed sale comps within the same appraisal? Distressed sales prices are adjusted upwards by 1.6 – 2.4 percentage points more than non-distressed comps within the same appraisal, suggesting that appraisers may subjectively adjust up distressed comp sales values. Moving across the columns of Table 7, we see that appraisers make larger adjustments to distressed comps over time.

Another way that appraisers may compensate for distress sales comps is through the subjective weighting scheme used to arrive at the final appraised value. After adjusting the sales price of the comps to reflect unmatched differences with the subject property, the appraiser applies a subjective weighting of these values to arrive at the final appraised value of the subject property. As Eriksen et al. (2019) point out, an equally weighted value estimate is likely the least biased estimator, and deviations from that may reflect appraisal bias. Indeed, Eriksen et al. (2019) show that appraisers are more likely to appraise above the equally weighted value when the equally weighted value would be below the sales contract. They interpret this as evidence that appraisers inflate values through the channel of subjective weighting schemes.

In our context, subjective weighting may be more benign. The appraiser has the ability to lower the amount of influence a distressed comp has on appraisal value by placing less weight on that comp. The subjective weighting scheme is not disclosed in our data. But, we can determine whether the appraised value is more likely to above the equally weighted value when a distressed comp is used. This would provide indirect evidence that appraisers counteract the effect of distressed comps through subjective weighting. The share of appraisals above, at, and below the equally weighted value is 28%, 14%, and 58%, respectively.

Table 8 reports estimates from linear probability models where the dependent variable is an indicator for whether the appraised value is above the equally weighted value. Distressed comp appraisals are significantly more likely to have values above the equally weighted value. In 2013, distressed comp usage increases the probability of an above equally weighted value appraisal by 3.6 percentage points, or a 13% increase relative to the mean. The magnitude of the effect de-

creases monotonically over time. In 2017 a distressed comp only increases the probability by 1.7 percentage points. The estimates in Table 8 are consistent with appraisers using subjective weighting schemes to counteract potential negative influence of distressed comps on appraised values.

Taken together, the results in Tables 7 are consistent with the appraiser using subjective means to limit the ability of distressed comps to depress appraised values. The ways that appraisers do this, however, appears to evolve over time. In the early years of our sample, appraisers lean more heavily on subjective weighting schemes, while in later years they seem to rely more on positive adjustments to comp sales prices.

# 6. The Comparable Effect Channel of Foreclosure Externatlities

There is wide agreement that foreclosures impose negative externalities, or spillover effects, on nearby properties. Determining the mechanisms through which these spillovers operate, however, remains an open area of research. The two leading explanations for foreclosure spillovers are: i) a "disamenity effect", and ii) a "competitive effect." The former holds that foreclosures, through neglect and vacancy, create a visual blight or attract crime and vandalism, thus lowering values of neighboring properties. The competitive effect refers to the idea that foreclosures increase the supply of homes for sale in a market, thus reducing nearby property values (Anenberg and Kung (2014) and Biswas et al. (2019)). We investigate a third explanation, which we term the "comparable effect," that is largely ignored in the literature – that the use of foreclosure comps drives down appraised values, which in turn brings down sales prices. To our knowledge, we are the first to empirically examine the "comparable effect" channel of foreclosure externalities. As we noted in the introduction, this was evidently a concern among real estate professionals, to the extent that the Appraisal Institute felt the need to argue against this channel.

The intuition of our approach to examine the comparable effect is straightforward. We begin by regressing an appraised property's value on a measure of neighborhood foreclosure intensity at the time of sale, as well as a rich set of control variables. The coefficient on foreclosure intensity will provide an estimate of the negative spillover effects from nearby foreclosures, but it will not distinguish between the disamenity effect, the competitive effect, and the comparable effect. Rather, it will be an estimate of the net combined effects. To disentangle the comparable effect from the other foreclosure externality channels, we add to the regression model a binary variable that indicates whether any of the comparable transactions used in the appraisal were distressed sales. If a comparable effect exists, then we would expect distressed comp usage to have a negative impact on value, independent of the foreclosure intensity measure. We would also expect a reduction in the (absolute) magnitude of the foreclosure intensity effect once the distressed comp indicator is included.

To perform this analysis, we must first create a time-varying measure of neighborhood foreclosure intensity. We use deeds data from RealtyTrac, a national real estate data provider. The panel dataset, which has broad nationwide coverage, contains information on properties with recorded liens (e.g., mortgages) over time. Importantly, it also indicates whether a property is currently in foreclosure. Using this information, we calculate quarterly tract-level foreclosure intensity as the total number of foreclosed properties in a tract/quarter divided by the total housing stock in the tract. This measure is meant to capture the foreclosure severity of a location at a given time. We note that there are a few limitations to the RealtyTrac data. First, it only has information on properties with recorded liens, so the denominator of our foreclosure intensity measure is likely understated. Second, although our appraisal data covers 2013 - 2017, we only have access to the RealtyTrac data through 2015. Finally, the RealtyTrac data does not cover all Census tracts in the U.S., but it is available for approximately 80% of the observations in our appraisal sample. The mean and standard deviation of our foreclosure intensity measure is 0.2% and 0.3%, respectively (see Panel A of Appendix Table A.2).

The results of the foreclosure externality regressions are reported in Table 9.[17] Column (1) shows that higher levels of foreclosure intensity are associated with lower appraised values, consistent with the negative spillover effects documented in the literature. In column (2) we include our distressed comp indicator variable, and find that distressed comp usage has a negative impact on value that is independent from foreclosure intensity. Also, the absolute magnitude of the foreclosure intensity variable declines slightly as well. The same patterns hold in 2014 (columns (2) and (3)) and 2015 (columns (3) and (4)). These results suggest that there is indeed a "comparable effect" channel to foreclosure externalities.

# 7. Conclusion

This paper addresses a set of questions related to the use of distressed properties as comparables in the appraisal process. We find that distressed properties are not particularly bad matches to their subject properties along their tangible, physical dimensions, except for property condition. We then show that distressed comparables are a drag on appraised value because they increase both the probability of a below-price appraisal and the use of non-standard weighting schemes, suggesting in turn that the adjustments made for the distressed circumstances in appraisals are not large enough. The role of the use of distressed comps in prolonging the impact of foreclosure externalities in neighborhoods is discernible, though not large.

[17] Although our tract-level intensity measure varies over time, most of the variation is across, rather than within-tracts. Panel B of Appendix Table A.2 regresses quarterly tract-level foreclosure intensity on tract dummies. Depending on the year, the tract dummies explain between 65 - 90% of the variation in foceclosure intensity. Due to the lack of within-tract variation in foreclosure intensity, we exclude tract fixed effects from our regression models in Table 9, but include tract controls.

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# 8. Figures

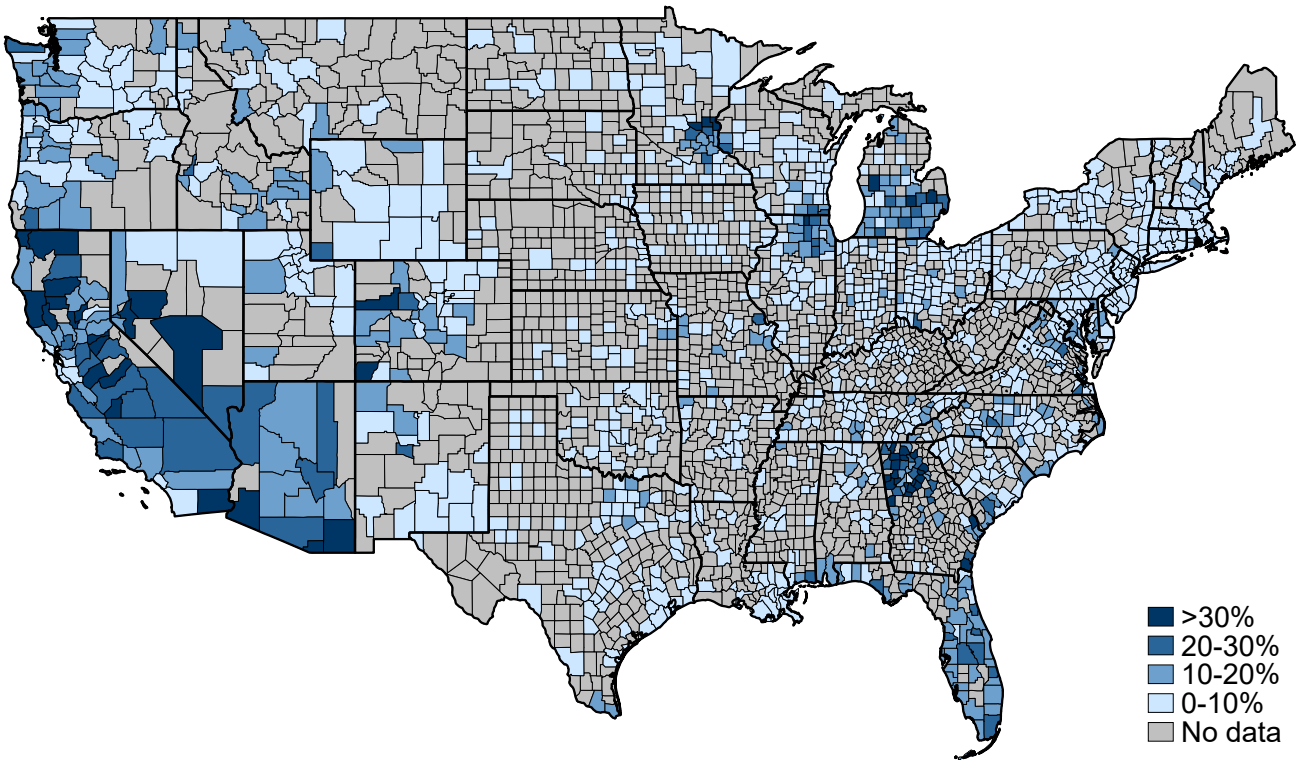


Figure 1. County Share of Appraisals with Distressed Comp in 2013

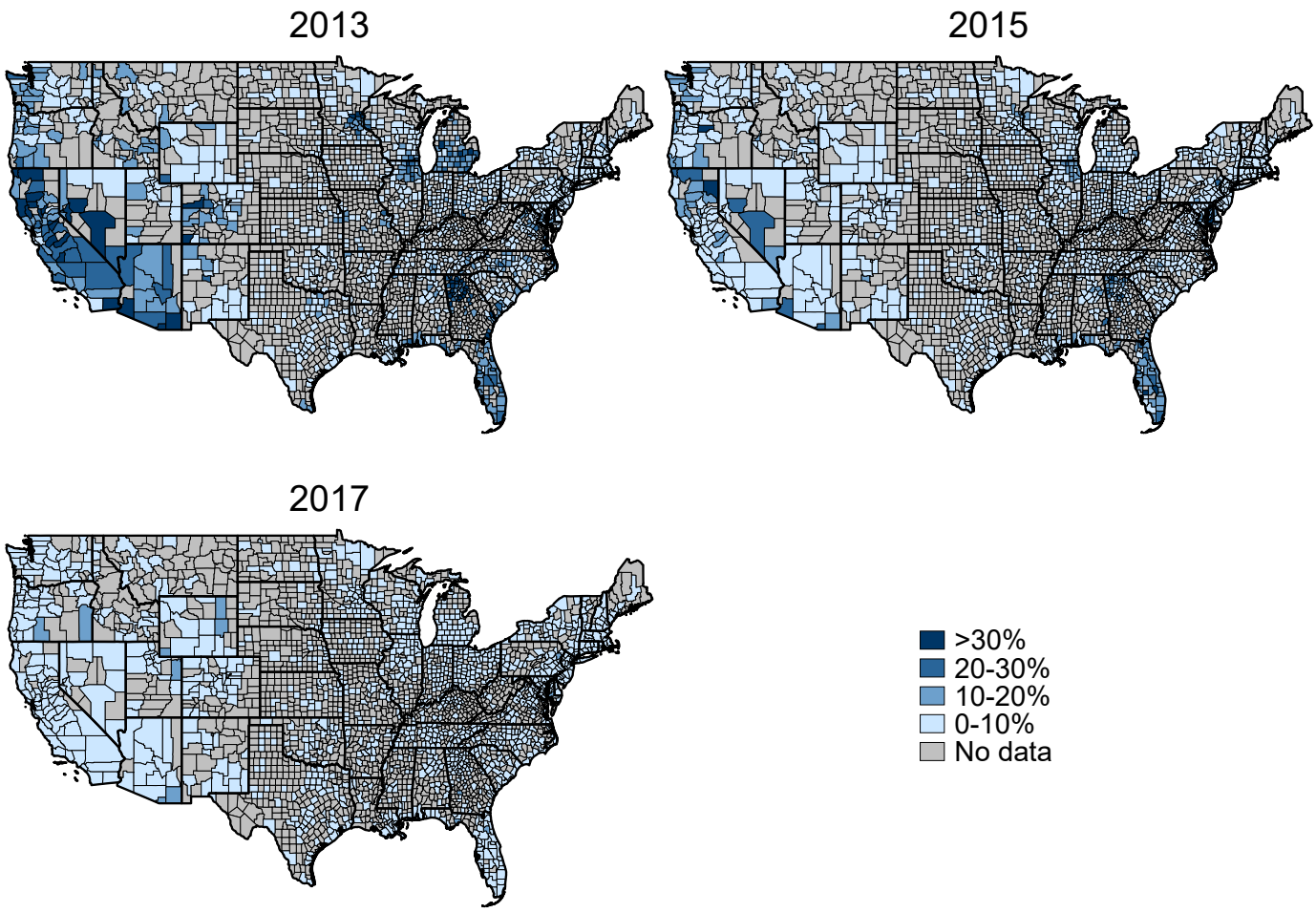


Figure 2. County Share of Appraisals with Distressed Comp

Table 1. Descriptive Statistics

| | No Distressed Comps | | | Distressed Comps | | |
|---|---|---|---|---|---|---|
| | N | Mean | Std. Dev. | N | Mean | Std. Dev. |
| Appraised Value | 6,403,458 | 307,806 | 172,440 | 434,686 | 243,243 | 147,290 |
| Contract Price | 6,403,458 | 304,819 | 171,617 | 434,686 | 240,973 | 146,903 |
| AVM Value | 6,403,458 | 308,014 | 174,408 | 434,686 | 253,544 | 152,236 |
| Appraisal Below Contract (d) | 6,403,458 | 0.08 | 0.27 | 434,686 | 0.11 | 0.31 |
| Price Renegotiated Down (d) | 2,630,122 | 0.06 | 0.23 | 177,952 | 0.07 | 0.26 |
| # Comps | 6,403,458 | 3.86 | 0.92 | 434,686 | 4.03 | 0.96 |
| Appraisal $>$ EW Value (d) | 6,403,458 | 0.28 | 0.45 | 434,686 | 0.31 | 0.46 |
| HPA (county/year) | 6,403,458 | 0.15 | 0.13 | 434,686 | 0.13 | 0.15 |
| Unemployment Rate (county) | 6,403,458 | 0.05 | 0.02 | 434,686 | 0.06 | 0.02 |
| Sqft | 6,403,458 | 1,958 | 766 | 434,686 | 1,828 | 760 |
| Age | 6,403,458 | 35 | 28 | 434,686 | 35 | 26 |
| Rooms | 6,403,458 | 6.90 | 1.60 | 434,686 | 6.64 | 1.58 |
| Bedrooms | 6,403,458 | 3.26 | 0.78 | 434,686 | 3.18 | 0.81 |
| Full Baths | 6,403,458 | 1.99 | 0.68 | 434,686 | 1.93 | 0.68 |
| Half Baths | 6,403,458 | 0.41 | 0.52 | 434,686 | 0.35 | 0.50 |
| Location | 6,403,458 | 1.12 | 0.41 | 434,686 | 1.15 | 0.47 |
| View (c) | 6,403,458 | 1.12 | 0.36 | 434,686 | 1.14 | 0.39 |
| Condition (c) | 6,403,458 | 3.04 | 0.74 | 434,686 | 2.77 | 0.63 |
| Quality (c) | 6,403,458 | 2.44 | 0.57 | 434,686 | 2.32 | 0.55 |
| Year | 6,403,458 | 2015 | 1.38 | 434,686 | 2014 | 1.32 |
| Ln(Population) | 6,403,458 | 8.56 | 0.46 | 434,686 | 8.57 | 0.45 |
| Ln(Median Tract Income) | 6,403,458 | 11.12 | 0.38 | 434,686 | 11.03 | 0.37 |
| Tract Gini Index of Income Inequality | 6,403,458 | 0.40 | 0.06 | 434,686 | 0.40 | 0.06 |
| Ln(Tract Housing Units) | 6,403,458 | 7.66 | 0.44 | 434,686 | 7.66 | 0.44 |
| Hispanic Share of Tract Population | 6,403,458 | 0.12 | 0.15 | 434,686 | 0.17 | 0.19 |
| Minority Share of Tract Population | 6,403,458 | 0.14 | 0.15 | 434,686 | 0.16 | 0.18 |
| Education | 6,403,458 | 0.23 | 0.10 | 434,686 | 0.20 | 0.09 |
| Share Vacant (tract) | 6,403,458 | 0.09 | 0.08 | 434,686 | 0.10 | 0.09 |

Note: Descriptive statistics for the sample of appraisals. (d) and (c) denote 0,1 indicator variables and categorical variables, respectively.

Table 2. Counties with the highest share of distressed comp appraisals in 2013

| Rank | County Name | State | HPA | Appraisals | Distressed Comp Share |
|---|---|---|---|---|---|
| 1 | Santa Cruz County | AZ | -14% | 34 | 79% |
| 2 | Nye County | NV | 1% | 52 | 71% |
| 3 | Clayton County | GA | -15% | 129 | 60% |
| 4 | Imperial County | CA | 9% | 147 | 54% |
| 5 | Rockdale County | GA | -22% | 141 | 52% |
| 6 | Douglas County | GA | -14% | 240 | 50% |
| 7 | Lake County | CA | 0% | 150 | 49% |
| 8 | Walton County | GA | -11% | 209 | 49% |
| 9 | Barrow County | GA | -21% | 190 | 48% |
| 10 | Newton County | GA | -11% | 132 | 48% |

Note: The underlying sample includes all counties in 2013 that had at least 30 appraisals. The HPA and Appraisal columns report recent (prior 3 years) house price appreciation and number of appraisals in the county in 2013, respectively. The final column reports the share of appraisals that used a distressed comp in 2013.

Table 3. Likelihood of appraisal using a distressed comp

| | (1) | (2) | (3) |
|---|---|---|---|
| VARIABLES | Distressed Comp | Distressed Comp | Distressed Comp |
| HPA (county) | 0.043*** | -0.209*** | -0.214*** |
| | (0.001) | (0.002) | (0.002) |
| Unemployment Rate (county) | 1.601*** | 3.138*** | 3.213*** |
| | (0.009) | (0.023) | (0.023) |
| Ln(Population) | 0.050*** | 0.031*** | |
| | (0.001) | (0.001) | |
| Ln(Median Tract Income) | -0.001 | -0.001 | |
| | (0.000) | (0.001) | |
| Tract Gini Index of Income Inequality | -0.033*** | -0.012*** | |
| | (0.002) | (0.002) | |
| Ln(Tract Housing Units) | -0.050*** | -0.031*** | |
| | (0.001) | (0.001) | |
| Hispanic Share of Tract Population | 0.020*** | 0.020*** | |
| | (0.001) | (0.001) | |
| Minority Share of Tract Population | 0.047*** | 0.051*** | |
| | (0.001) | (0.001) | |
| Education | -0.118*** | -0.134*** | |
| | (0.001) | (0.002) | |
| Share Vacant (tract) | 0.153*** | 0.061*** | |
| | (0.002) | (0.002) | |
| Observations | 6,838,144 | 6,838,105 | 6,836,834 |
| Adjusted R-squared | 0.059 | 0.086 | 0.101 |
| House Characteristics | Y | Y | Y |
| County FE | N | Y | N |
| Tract FE | N | N | Y |
| Year/Qtr FE | Y | Y | Y |

Note: The dependent variable is a 0,1 indicator variable for whether any of the comps used for the appraisal were distressed sales. The sample includes all appraisals. House characteristics include square footage, square footage$^2$, age, age$^2$, number of rooms, number of bedrooms, and number of bathrooms. Heteroskedasticity-robust standard errors are in parentheses. $^{*}$ $p < 0.05$, $^{**}$ $p < 0.01$, $^{***}$ $p < 0.001$

Table 4. Regression of comp property characteristics using within-appraisal variation

| Panel A: Comp Characteristics | (1) Beds | (2) Baths | (3) Sqft | (4) Age | (5) Quality | (6) Condition | (7) Dist. to Subj. |
|---|---|---|---|---|---|---|---|
| Distressed Sale | 0.057*** | 0.081*** | 94.922*** | -1.900*** | -0.020*** | -0.303*** | -0.023*** |
| | (0.001) | (0.001) | (0.550) | (0.020) | (0.000) | (0.001) | (0.001) |
| Constant | 3.298*** | 2.252*** | 1,999.917*** | 33.977*** | 2.460*** | 3.051*** | 0.857*** |
| | (0.000) | (0.000) | (0.059) | (0.002) | (0.000) | (0.000) | (0.000) |
| Observations | 27,306,415 | 27,301,732 | 27,306,620 | 27,306,001 | 27,306,737 | 27,306,596 | 27,306,827 |
| Adjusted R-squared | 0.565 | 0.723 | 0.870 | 0.835 | 0.900 | 0.668 | 0.481 |
| Appraisal FE | YES | YES | YES | YES | YES | YES | YES |

| Panel B: \|Diff from Subj.\| | (1) Beds | (2) Baths | (3) Sqft | (4) Age | (5) Quality | (6) Condition |
|---|---|---|---|---|---|---|
| Distressed Sale | 0.002** | 0.013*** | 3.933*** | 0.192*** | -0.008*** | 0.062*** |
| | (0.001) | (0.001) | (0.380) | (0.016) | (0.000) | (0.001) |
| Constant | 0.379*** | 0.306*** | 225.308*** | 7.561*** | 0.044*** | 0.207*** |
| | (0.000) | (0.000) | (0.040) | (0.002) | (0.000) | (0.000) |
| Observations | 27,306,387 | 27,296,175 | 27,306,587 | 27,305,709 | 27,305,606 | 27,306,026 |
| Adjusted R-squared | 0.259 | 0.320 | 0.323 | 0.479 | 0.243 | 0.221 |
| Appraisal FE | YES | YES | YES | YES | YES | YES |

Note: The dependent variables in panel A are characteristics of the comps used in appraisals. The dependent variables in Panel B are the absolute value of the difference between the comp's characteristics and the subject property's. The sample includes all comps. Distressed sale is a 0,1 indicator variable for whether the comp was sold in a short sale or as REO. Regressions include individual appraisal fixed effects. Heteroskedasticity-robust standard errors are in parentheses. $^{*}\ p < 0.05$, $^{**}\ p < 0.01$, $^{***}\ p < 0.001$

Table 5. Regression of subject property appraised value and sales price by year

| Panel A: Ln(Value) | (1) 2013 | (2) 2014 | (3) 2015 | (4) 2016 | (5) 2017 |
|---|---|---|---|---|---|
| Distressed sale used as comp | -0.084*** | -0.087*** | -0.092*** | -0.099*** | -0.103*** |
| | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) |
| Observations | 1,039,386 | 1,168,745 | 1,410,751 | 1,535,790 | 1,669,285 |
| Adjusted R-squared | 0.905 | 0.906 | 0.905 | 0.905 | 0.908 |
| House Characteristics | Y | Y | Y | Y | Y |
| Census Tract FE | Y | Y | Y | Y | Y |
| Year/Qtr FE | Y | Y | Y | Y | Y |

| Panel B: Ln(Sales Price) | (1) 2013 | (2) 2014 | (3) 2015 | (4) 2016 | (5) 2017 |
|---|---|---|---|---|---|
| Distressed sale used as comp | -0.084*** | -0.090*** | -0.096*** | -0.104*** | -0.110*** |
| | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) |
| Observations | 1,039,386 | 1,168,745 | 1,410,751 | 1,535,790 | 1,669,285 |
| Adjusted R-squared | 0.899 | 0.900 | 0.899 | 0.899 | 0.901 |
| House Characteristics | Y | Y | Y | Y | Y |
| Census Tract FE | Y | Y | Y | Y | Y |
| Year/Qtr FE | Y | Y | Y | Y | Y |

Note: The dependent variable in Panel A is the natural logarithm of the appraised value. The dependent variable in Panel B is the natural logarithm of the contract sales price. The sample in each column includes all appraisals in the given year. Heteroskedasticity-robust standard errors are in parentheses. $^{*}\ p < 0.05$, $^{**}\ p < 0.01$, $^{***}\ p < 0.001$

Table 6. Regression of below contract appraisal by year

| VARIABLES | (1)<br>2013 | (2)<br>2014 | (3)<br>2015 | (4)<br>2016 | (5)<br>2017 |
|---|---|---|---|---|---|
| Distressed sale used as comp | 0.013*** | -0.004*** | -0.008*** | -0.008*** | -0.014*** |
| | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) |
| Observations | 1,039,386 | 1,168,745 | 1,410,751 | 1,535,790 | 1,669,285 |
| Adjusted R-squared | 0.077 | 0.049 | 0.051 | 0.049 | 0.051 |
| House Characteristics | Y | Y | Y | Y | Y |
| Census Tract FE | Y | Y | Y | Y | Y |
| Year/Qtr FE | Y | Y | Y | Y | Y |

Note: The dependent variable is a 0,1 indicator variable for whether the appraised value is less than the contract price. The sample in each column includes all appraisals in the given year. Heteroskedasticity-robust standard errors are in parentheses. $^{*}$ $p < 0.05$, $^{**}$ $p < 0.01$, $^{***}$ $p < 0.001$

Table 7. Regression of percentage adjustments by year

| VARIABLES | (1)<br>2013 | (2)<br>2014 | (3)<br>2015 | (4)<br>2016 | (5)<br>2017 |
|---|---|---|---|---|---|
| Distressed Sale | 0.016*** | 0.018*** | 0.020*** | 0.023*** | 0.024*** |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.001) |
| Observations | 4,036,703 | 4,537,604 | 5,476,071 | 6,008,498 | 6,658,785 |
| Adjusted R-squared | 0.082 | 0.074 | 0.073 | 0.073 | 0.073 |
| Appraisal FE | Y | Y | Y | Y | Y |

Note: The dependent variable is the adjustments to the comp sale price as a percentage. The sample in each column includes all appraisals in the given year. Heteroskedasticity-robust standard errors are in parentheses. $^{*}\ p < 0.05$, $^{**}\ p < 0.01$, $^{***}\ p < 0.001$

Table 8. Regression of above equal weighted value by year

| VARIABLES | (1)<br>2013 | (2)<br>2014 | (3)<br>2015 | (4)<br>2016 | (5)<br>2017 |
|---|---|---|---|---|---|
| Distressed sale used as comp | 0.036***<br>(0.001) | 0.024***<br>(0.002) | 0.022***<br>(0.002) | 0.018***<br>(0.002) | 0.017***<br>(0.002) |
| Observations | 1,039,386 | 1,168,745 | 1,410,751 | 1,535,790 | 1,669,285 |
| Adjusted R-squared | 0.020 | 0.014 | 0.016 | 0.016 | 0.016 |
| House Characteristics | Y | Y | Y | Y | Y |
| Census Tract FE | Y | Y | Y | Y | Y |
| Year/Qtr FE | Y | Y | Y | Y | Y |

Note: The dependent variable is an 0,1 indicator if the appraised value is above the equal weighted final adjusted sales value of the comps. The sample in each column includes all appraisals in the given year. Heteroskedasticity-robust standard errors are in parentheses. $^{*}$ $p < 0.05$, $^{**}$ $p < 0.01$, $^{***}$ $p < 0.001$

Table 9. Regression of subject property appraised value controlling for tract foreclosure intensity

| VARIABLES | (1) 2013 | (2) 2013 | (3) 2014 | (4) 2014 | (5) 2015 | (6) 2015 |
|---|---|---|---|---|---|---|
| Foreclosure Intensity | -7.214*** | -6.895*** | -3.268*** | -3.174*** | -3.391*** | -3.292*** |
| | (0.861) | (0.822) | (0.582) | (0.574) | (0.959) | (0.933) |
| Distressed sale used as comp | | -0.105*** | | -0.108*** | | -0.109*** |
| | | (0.001) | | (0.001) | | (0.001) |
| Observations | 806,241 | 806,241 | 884,634 | 884,634 | 530,480 | 530,480 |
| Adjusted R-squared | 0.839 | 0.843 | 0.839 | 0.842 | 0.839 | 0.841 |
| House Characteristics | Y | Y | Y | Y | Y | Y |
| County FE | Y | Y | Y | Y | Y | Y |
| Census Tract FE | N | N | N | N | N | N |
| Census Tract Controls | Y | Y | Y | Y | Y | Y |
| Year/Qtr FE | Y | Y | Y | Y | Y | Y |

Note: The dependent variable is the natural logarithm of the contract sales price. Foreclosure intensity is measured quarterly at the Census tract level as the number of properties in foreclosure divided by the total number of properties in the tract in the RealtyTrac data. The sample in each column includes all appraisals in the given year. Heteroskedasticity-robust standard errors are in parentheses. $^{*}$ $p < 0.05$, $^{**}$ $p < 0.01$, $^{***}$ $p < 0.001$

# A.1. Appendix

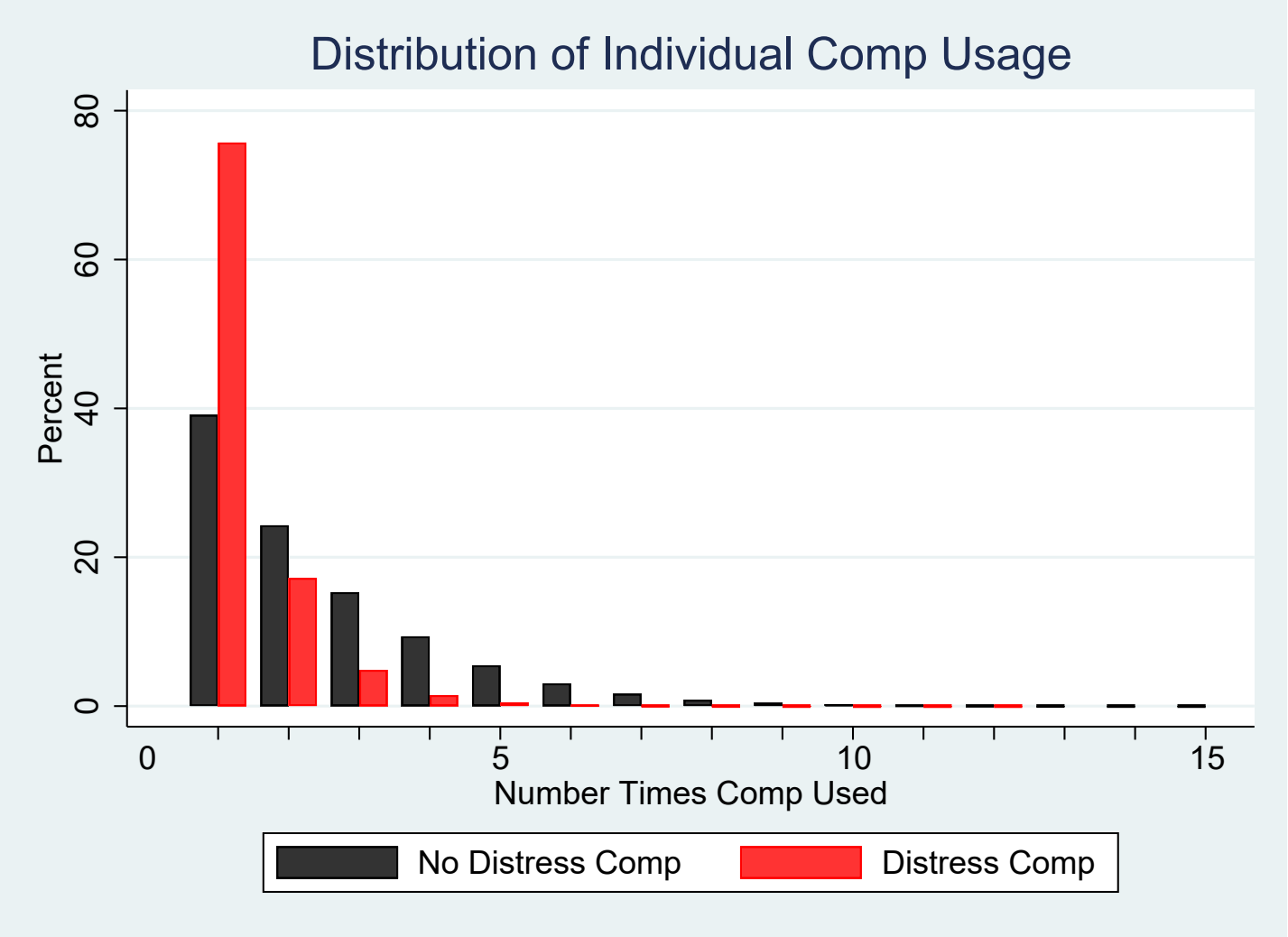


Figure A.1 . Distribution of Individual Comp Sale Frequency of Usage

Table A.1. Varibable Names

| Variable Name | Description |
|---|---|
| Appraised Value | Natural logarithm of the appraised value |
| Contract Price | Natural logarithm of the sales price |
| AVM Value | Natural logarithm of the AVM value |
| Appraisal Below Contract (d) | 0,1 indicator for whether the appraised value is below the contract sales price |
| Price Renegotiated Down (d) | 0,1 indicator for whether the final sales price is below the initial contract price |
| # Comps | Number of comps used in the appraisal |
| Appraisal $>$ EW Value (d) | 0,1 indicator for whether the appraised value is greater than the equally weighted adjusted value |
| HPA (county/year) | County house price appreciation over the last three years |
| Unemployment Rate (county) | Annual unemployment rate at the county level |
| Sqft | Square footage (gross living area) of the subject property |
| $\text{Sqft}^2$ | Square footage squared |
| Age | Age of the subject property in years |
| $\text{Age}^2$ | Age squared |
| Rooms | Number of rooms (subject property) |
| Bedrooms | Number of bedrooms (subject property) |
| Full Baths | Number of full bathrooms (subject property) |
| Half Baths | Number of half bathrooms (subject property) |
| Location (c) | Categorical variable defining location (subject property) |
| View (c) | Categorical variable defining view (subject property) |
| Condition (c) | Categorical variable defining condition (subject property) |
| Quality (c) | Categorical variable defining quality (subject property) |
| Year | Year of the appraisal |
| Ln(Population) | Natural logarithm of the Census Tract population |
| Ln(Median Tract Income) | Natural logarithm of the Census Tract median household income |
| Tract Gini Index of Income Inequality | Gini Index of the Census Tract |
| Ln(Tract Housing Units) | Natural logarithm of the number of housing units in the Census Tract |
| Hispanic Share of Tract Population | Hispanic Share of the Census Tract population |
| Minority Share of Tract Population (not | Minority Share of the Census Tract population |
| Education | Share of Census Tract's population (age 25+) with a bachelor's degree |
| Share Vacant (tract) | Share of Census Tract's housing units that are vacant |

Note: Variable names and descriptions. (d) denotes an indicator variable while (c) denotes a categorical variable that will enter regressions as a series of indicator variables.

Table A.2. Quarterly Tract-Level Foreclosure Intensty

| Panel A: Summary Stats | | | |
|---|---|---|---|
| | (1) | (2) | (3) |
| VARIABLES | 2013 | 2014 | 2015 |
| Foreclosure Intensity | | | |
| Mean | 0.0020 | 0.0019 | 0.0016 |
| Standard Deviation | 0.0028 | 0.0035 | 0.0029 |

| Panel B: Regressions | | | |
|---|---|---|---|
| | (1) | (2) | (3) |
| VARIABLES | 2013 | 2014 | 2015 |
| Constant | 0.002*** | 0.002*** | 0.002*** |
| | (0.000) | (0.000) | (0.000) |
| Observations | 125,889 | 125,702 | 53,705 |
| Adjusted R-squared | 0.763 | 0.916 | 0.649 |
| Census Tract FE | Y | Y | Y |

Note: Panel A presents summary statistics forforeclosure intensity, measured quarterly at the Census tract level as the number of properties in foreclosure divided by the total number of properties in the tract in the RealtyTrac data. Foreclosure intensity is the dependent variable in Panel B. Heteroskedasticity-robust standard errors are in parentheses. $^{*}$ $p < 0.05$, $^{**}$ $p < 0.01$, $^{***}$ $p < 0.001$