

Appendix III

The following information is provided by the LIED Institute for Real Estate Studies at UNLV.

The LIED Institute found that every HOA foreclosure reduces the sale price of every property in the HOA by 1.7%. Thus, LIED inferred that every property, even the ones that have not sold, has suffered this same value reduction. In order to understand the magnitude of this impact, LIED needed to figure out how many total properties are within HOAs.

1. The number of single family homes in Clark County:

The 2015 Census tells us there are 510,206.

2. The number of condos in Clark County:

There is no reliable Census count of condos for any geographic area. The Census only reports counts of multi-unit structures, and counts of owner vs. renter occupied. But many condos, particularly in Clark County, might be renter occupied. So LIED relied on their sample, which indicates that about 12% of single parcel transactions were for condos. Applying this to answer (1) indicates that there are approximately 69,000 condos in Clark County

3. The percentage and number of single family homes in Clark County that are in HOAs

The data tells us this is $53\% * 510,206 = 270,409$

4. The percentage and number of condos that are in HOAs

We assume this figure is $93\% * 69,000 = 64,170$

5. The average number of HOA foreclosures experienced by HOA members

In the sample as a whole, the average property experienced 0.34 HOA foreclosures, so the average number experienced by HOAs is $0.34 / .57 = .60$ foreclosures. Bear in mind, nevertheless that most houses exhibited no HOA foreclosures and so no loss in value.

6. The property loss in percentage terms

Is $.60 * .017 = .01$.

7. Which in dollar terms is, on average

1% of average sale price in Clark County. For single family homes this is $.01 * \$288,369 = \$2,884$.

For condos this is $.01 * \$93,935 = \939

8. So the aggregate impact on property values is:

$$2,884 * \$270,409 = \$779,859,556$$

+

$$939 * \$64,170 = \$60,255,360$$

For a total of **\$840,115,186**

Following similar steps for Washoe:

1. 111,758

2. The percentage of records that are condos is 18%, so the estimated number of condos is 27,939.

3. $52% * 111,758 = 58,114$

4. $75% * 27,939 = 20,954$

5. $.16 / .56 = .29$

6. $.28 * .033 = 1.0%$

7. For single family: $1.0% * \$342,175 = \$3,421$

For condos: $1.0% * \$197,030 = \$1,970$

8. For single family: $58,114 * \$3162 = \$198,807,994$

For condos: $27,939 * \$1970 = \$55,039,830$

Total: **\$253,847,824**

Regression Analysis

This section investigates the impact of HOA foreclosure on the transaction price of the foreclosed property and the prices of neighboring homes. In conducting such an investigation, it is not enough to simply compare those prices of HOA foreclosed and other homes. This is because housing is such a heterogeneous commodity: the characteristics of such homes may be different.

Foreclosed homes might be smaller, have fewer amenities, and be in less desirable neighborhoods than non-foreclosed homes, and all of these qualities will affect their average sale price, even though these differences have nothing to do, per se, with the foreclosure itself (though they may affect the probability of foreclosure). The comparison of transaction prices should be apples-to-apples. Given two identical homes, what will the difference in price be if one is subject to HOA foreclosure, or if one has a neighboring property undergoing HOA foreclosure?

We do this through the procedure of *hedonic regression*. Hedonic regression is a time-tested statistical procedure that uses the method of linear regression to isolate the effects of different housing, neighborhood and transaction characteristics on the sale price of the house. LIED formulated an equation of the form:

$$\log Price_i = b_0 + b_1 X_{1i} + \dots + b_k X_{ki}$$

where *Price* is the transaction price of the *i*th house in the database described in the above section. The notation *X_{1i}* through *X_{ki}* refers the *k* characteristics of the house, neighborhood and transaction that occur for that particular sale. Among these characteristics will include the important physical characteristics that contribute to the house price including interior square feet, lot size, number of bathrooms, etc. Also included are characteristics of the transaction, including whether the home was sold in a state of foreclosure, and, importantly, whether the home, or a neighbor's home was undergoing an HOA foreclosure.

The symbols *b₁* through *b_k* indicate the weight for each characteristic—that is, the contribution of each characteristic to the transaction price of the house, *holding all the other characteristics constant*. These weights are determined via the statistical technique of least squares. That is, an algorithm uses the database to determine the set of *b*'s that best explain the relationship between a home's price and its characteristics, jointly considered. LIED then used these weights to determine the impact of each characteristic on price, in an apples-to-apples framework.

Table 6 provides the results of this exercise for Clark County. For each characteristic listed in the first column of the table, the second column lists the coefficient—the *b*-weight determined for that coefficient. Note that instead of price, LIED used the logarithm of price, as is largely the custom in housing price studies of this kind so that many of these *b*-weights may be thought of as percentage impacts on housing prices.

We briefly discuss the structural variables first. The coefficient of interior square feet is .03%, approximately. This implies that each square foot adds .03% to the transaction price of the house. On a \$200,000 house, this yields about \$62 per square foot. The effect of additional garage space is actually higher, at about .042% or \$84 per square foot. This actually is not that surprising, since the move from a 1-car to 2-car, or 2-car to 3-car garage is often seen as a major upgrade to a housing unit, more so perhaps than an additional bedroom.

Lot size (measured in acres) has a coefficient which suggests that the price of land is a little over \$2 per square foot, on average, in the developed areas of Las Vegas. One curiosity in the Las Vegas data base is the striking lack of additional value from the addition of bathrooms beyond about 3 full baths. LIED included a variable called *totalbaths*, which adds together the number of full baths plus half of the number of half baths. LIED also included the square of this number. The joint consideration of the weights on these two variables indicates that value increases for the first two and a half baths, but beyond that there is a relative decrement to price, other things equal. The age coefficient indicates a depreciation rate of about 0.7% per year.

We now consider indicator variables, ones where the characteristic is measured as either observed in the unit, or not. At this point the coefficient no longer accurately reflects a percentage impact, in and of itself. LIED adjusted the coefficient so that percentage impacts are calculated. A security system adds almost 8%, a fireplace about 5.5%, and a pool about 10.7% to the transaction price of housing units in Clark County. If the home is part of a Homeowners' Association, this has no effect on price, which indicates that the benefits of HOAs are precisely matched to cost of the dues payments.

We come now to the key variables in this analysis, those that describe foreclosures. First note that an "ordinary" foreclosure sale decreases sale price by about 5.26%. This is in line with, though slightly higher, than other studies done for earlier periods in Las Vegas. But it is very small compared to the discount which accrues to transaction prices for HOA foreclosures, which is 42%. Thus, the data conform to the journalistic characterization that HOA foreclosures were purchased at huge discounts during this period.

From this "foreclosure discount" estimate, LIED estimated the total value lost in the housing market. The data tells us that the average sale price of an HOA foreclosure is \$112,545. If each was subject to a 42% discount, the "normal" sale price would have been \$194,043. Therefore, across all 611 properties, LIED estimated that the total loss to sellers is \$49,795,341.

The regression results for Washoe County are contained in Table 7. The value of an interior square foot is identical to that in Clark. We do not observe the bathroom anomaly observed in Clark and can simply observe that bathrooms add about 9.5% and a half bath about 4%. The depreciation rate in Washoe County is about .24% per year. Garage square footage is valued at about \$50 per square foot, and land at about 1.4 cents per square foot. This is much smaller than in Clark County and testifies to the more rural character of the Washoe market. The average lot size is about four times as large. Being in an HOA has virtually no effect on

transaction price in Washoe County, as in Clark, although condos carry a 37% discount relative to single family structures.

Most importantly, note that HOA foreclosures in Washoe County are literally pennies on the dollar: the discount is 90%. The average sale price of the 71 HOA foreclosures was \$22,728. If each had sold at this same discount the average sale price would have been \$227,280, for a total loss in transacted value of \$14,523,192.

A perhaps more pertinent calculation is the loss to lenders from the extinguishment of their liens. This calculation is fraught with difficulty because we have only very limited information on the characteristics of their loan at the time of the previous transactions, and no information on their payment histories. For as many properties as LIED had sufficient information for, they trace the previous sale of that property in the MLS. The Clark County MLS contains information on the type of loan (if there was one) secured by the buyer. LIED did not have any information from Washoe County on the mortgage. There were a number of different types of mortgages, but the majority were either labeled Conventional or VA/FHA.

For these, LIED made the assumption that conventional loans were, on average, putting 20% down, while they assume the others put down 3.5%. LIED used the prior transaction price and assumed fixed payments on a 30 year term - with the standard mix of principal and interest - until six months prior to the HOA sale. (The maximum collectible amount for the HOA is nine months of dues arrears.) LIED then computed the remaining balance on each of these loans and found the average amount of principal remaining on the loan. This amount was \$156,495. Bearing in mind that each step of this calculation is subject to considerable error, the aggregate amount lost by lien holders over the 611 HOA foreclosures is estimated to be \$95,618,445 in Clark County alone.

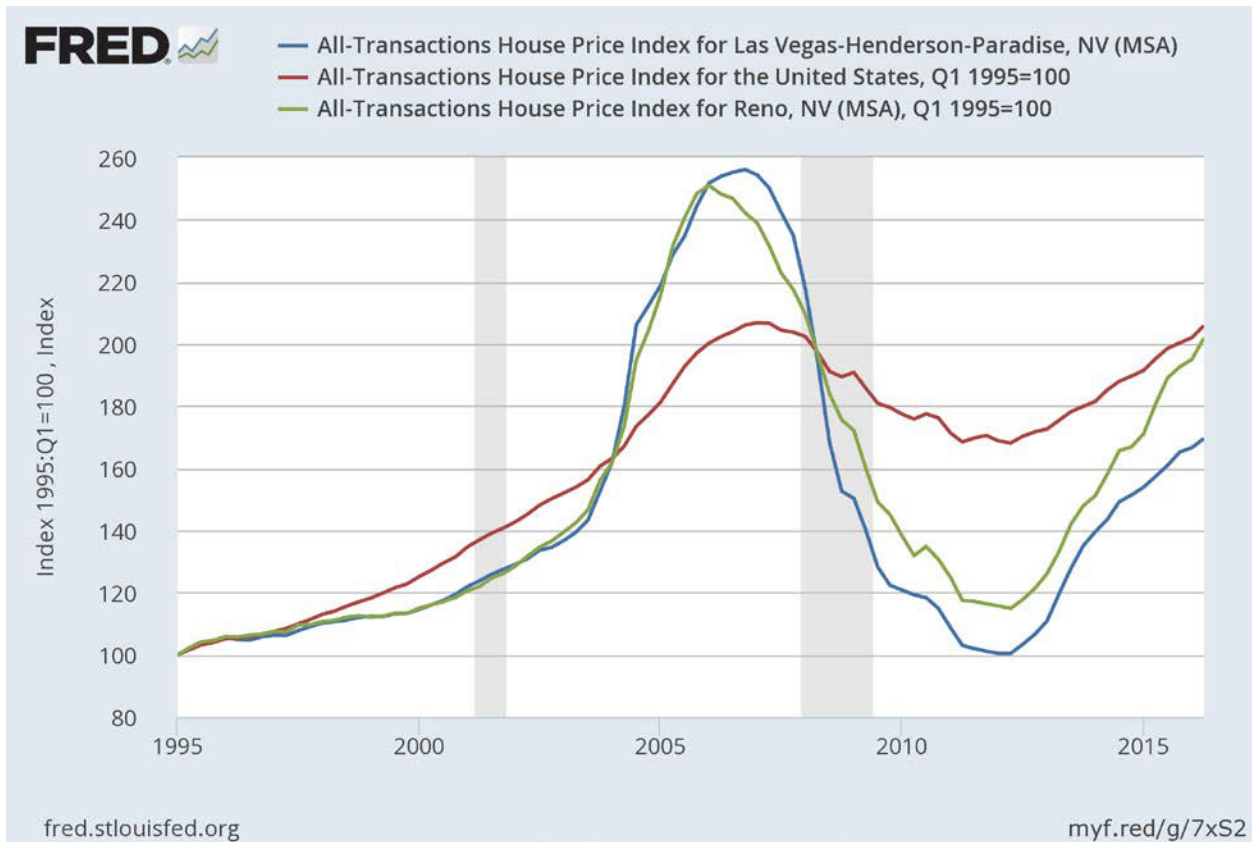
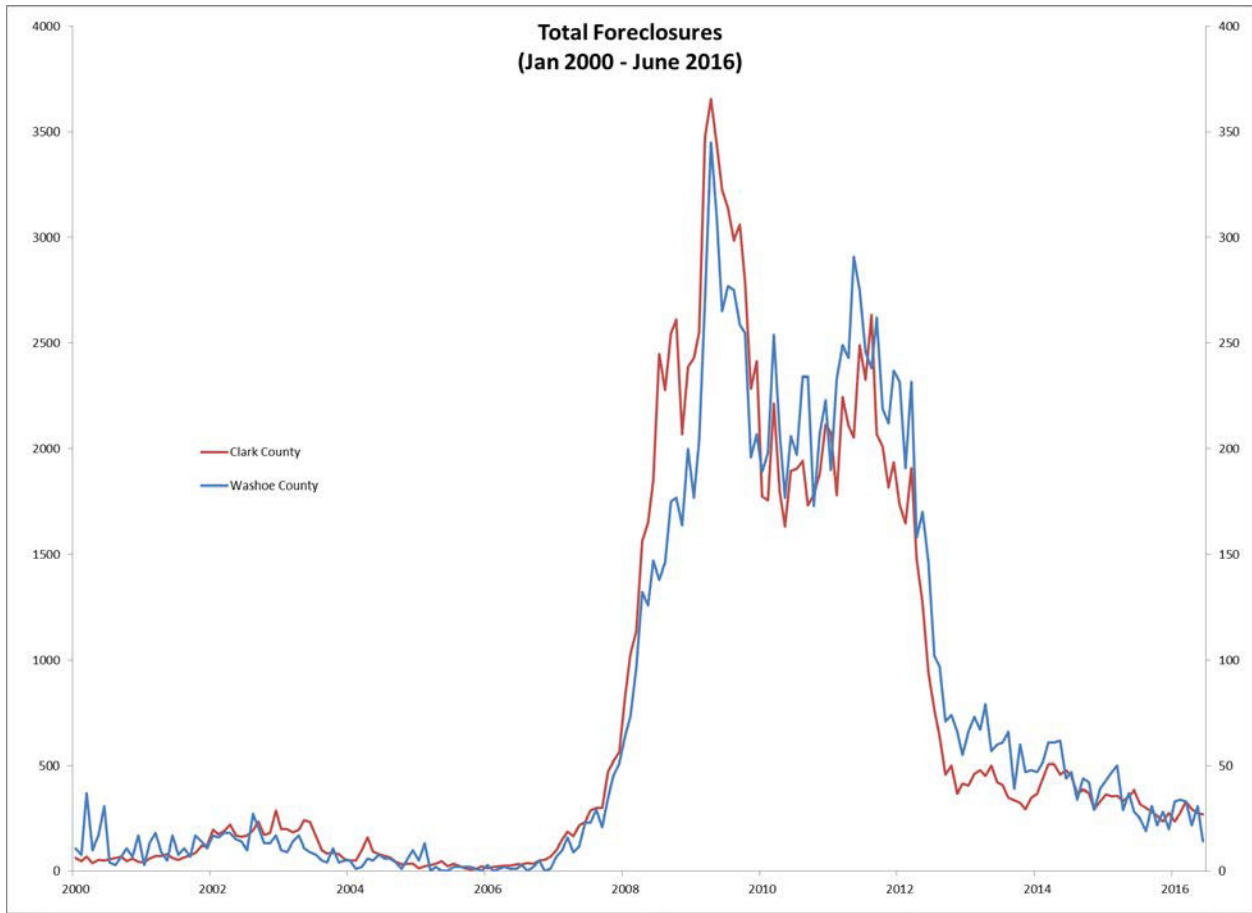


Table 6

Regression estimates for Clark County. Also included in the regression model were month effects and town unit effects (not shown). All estimates are statistically significant with the exception of the coefficient of HOA.

Housing Characteristic	B-Weight
sqft	0.00031
Baths Total	0.20124
Baths Total 2	-0.03674
Age	-0.00726
Security	0.07595
Fireplace	0.05436
Garage sqft	0.00042
Lot Size	0.51773
Pool	0.10192
HOA	-0.00105
HOA Foreclosure	-0.53839
Previous HOA Foreclosure	-0.01580
Other Foreclosure	-0.05154
Previous Foreclosures	0.00031
Condo	-0.29301
Constant	10.68589

Table 7

Regression estimates for Washoe County. Also included in the regression model were month effects and town unit effects (not shown). All estimates are statistically significant with the exception of the coefficient of HOA.

Housing Characteristic	B-Weight
sqft	0.00031
Baths Full	0.09466
Baths Half	0.03875
Age	-0.00237
Fireplace	0.07018
Garage sqft	0.00025
Lot Size	0.00345
Pool	0.16934
HOA	0.00958
HOA Foreclosure	-2.31177
Previous HOA Foreclosure	-0.03346
Other Foreclosure	-0.19789
Previous Foreclosures	-0.00169
Condo	-0.43555
Constant	12.14231