

## A Model of Price Setting in Response to New REO Listing

Here we present a stylized model to understand how the pricing pattern in Figure 1 emerges in equilibrium. Suppose there are two players  $i = 1, 2$  and two time periods  $t = 1, 2$ . Each player has a single house of identical quality to sell. The demand for house  $i$  can be summarized by the function

$$\gamma(p_{it}^L, p_{-it}^L, R_t) \quad (1)$$

where  $\gamma(\cdot)$  denotes the probability that player  $i$ 's house sells given each players' list price,  $p^L$ , and  $R$ , which is a dummy variable equal to one if there is an REO listing, exogenous to the model, to compete with. We assume that

1.  $\frac{\partial \gamma}{\partial p_i^L} < 0$
2.  $\frac{\partial \gamma}{\partial p_{-i}^L} > 0$
3.  $\gamma(p_i^L, p_{-i}^L, 1) < \gamma(p_i^L, p_{-i}^L, 0) \forall p_i^L, p_{-i}^L$

We assume that  $R_1 = 0$  and  $R_2 = 1$ .  $R_t$  is observable to both players at time  $t$ . We impose the following information asymmetry at  $t = 1$ : one of the players knows that  $R_2 = 1$  whereas the other player does not know  $R_2$ , but believes that  $R_2$  is Bernoulli. Otherwise, the two players are identical.

We assume that if a home sells, it sells at its list price. For simplicity we assume that the discount factor equals one. We write player  $i$ 's expected profit function in  $t = 1$  as

$$\Pi_i^1 = \gamma(p_{i1}^L, p_{-i1}^L, 0) * p_{i1}^L + (1 - \gamma(p_{i1}^L, p_{-i1}^L, 0)) * \Pi_i^2. \quad (2)$$

$\Pi_i^2$  takes a similar form, except if the home does not sell, the seller receives some exogenous terminal utility  $x$ . Consider the informed player's optimal choice of period 1 price in a pure-strategy Bayesian Nash equilibrium. He can pretend he is not informed about  $R_2$ , and price according to the equilibrium that would arise if both players are symmetrically uninformed about  $R_2$ . Alternatively, he could lower his price to increase his chances of selling in  $t = 1$  since he knows demand in  $t = 2$  will be low. It is straightforward to show that this is exactly what he would do if he were a monopolist. However, by lowering his price, the informed player signals to the uninformed player that demand will be low, which would cause the uninformed player to lower his period 1 price in equilibrium. Thus, some of the gains that the informed seller would get from lowering his price are competed away.

Whether the informed player prices low or high depends on the elasticity of  $\gamma(\cdot)$  with respect to price. For  $\gamma(\cdot)$  sufficiently inelastic, the informed player will not adjust his period 1 price for the impending REO listing. In period 2, both players will lower their prices once  $R_2 = 1$  becomes common knowledge. Under this parametrization, the equilibrium price pattern is just as it appears in Figure 1.

## **B Data Selection**

We began the project by investigating San Francisco only. We chose San Francisco because we had already purchased and cleaned the data for a different project. We subsequently decided to expand our sample to additional cities. Our budget allowed us to purchase data for three additional cities. To be a viable candidate for our analysis, the city must have transaction data in Dataquick and listing data in Altos Research. The latter criteria is more restrictive, since Altos Research does not have listing data for every MSA. We went down the list of most populous MSAs according to the Census in order until we obtained three cities that met our criteria. Chicago is the 3rd most populous MSA, Washington the 7th, and Phoenix the 14th. San Francisco ranks 11th. Los Angeles (2) and Riverside (12) were both viable candidates, but we chose not to consider them because they are both California markets and share similarities with San Francisco. Our estimation samples begin in 2007 because that is the earliest date that the listing data is available (the variation in start dates by MSA reflects variation in when Altos Research started collecting data for different cities). Our sample ends in 2009 because we do not have Dataquick data beyond that time period.

## **C Data Appendix**

### **C.1 San Francisco**

We first describe how we merge the listing data from Altos Research with the transaction data from Dataquick. The listing data contains separate variables for the street address, city, and zip code of each listing. The address variable contains the house number, the street name, and the street suffix in that order as a single string. We alter the street suffixes to make them consistent with the street suffixes in the transaction data (e.g. change “road” to “rd”, “avenue” to “ave”, etc). In some cases, the same house is listed under 2 slightly different addresses (e.g. “123 Main” and “123 Main St”) with the same MLSIDs. We combine listings where the address is different, but the city and zip are the same, the MLSIDs are the same, the difference in dates between the two listings is less than 3 weeks, and at least one of the following conditions applies:

1. The listings have the same year built and the ratio of the list prices is greater than 0.9 and less than 1.1.
2. The listings have the same square feet and the ratio of the list prices is greater than 0.9 and less than 1.1.
3. The listings have the same lotsize and the ratio of the list prices is greater than 0.9 and less than 1.1.
4. The first five characters of the address are the same.

The address variables in the transaction data are clean and standardized because they come from county assessor files. We merge the listing data and the transaction data together using the address. We classify a listing as a sale if there is a match and the difference in closing date (the date in the transaction data) and the agreement date (the date the property is deslisted from the MLS) is greater than zero and less than 365 days. If a listing merges with an observation in the transaction data that does not satisfy this timing criteria, we record the latitude and longitude coordinates of

the property but do not treat the listing as a sale. We drop all listings that do not match to at least 1 record in the transaction data because we do not have the latitude and longitude for these listings.<sup>1</sup> Listings do not match to a sales record for one of two reasons: a listing last sold prior to 1988 or there is a quirk in the way the address is recorded in the transaction or listing data. Before we do the merge, we flag properties that sold more than once during a 1.5 year span during our sample period. To avoid confusion during the merge that can arise from multiple sales occurring close together, we drop any listings that merge to one of these flagged properties (< 1 percent of listings). We also drop listings where the ratio of the minimum list price to the maximum list price is less than the first percentile.

For the list price specifications, we do not treat listings where the initial listing date is the first week in our dataset as a new listing. We do this because we do not know whether these listings truly began in the initial week of the sample, or whether they had been on the market previously. For the specifications that use sales prices and TOM as the dependent variable, we make the following restrictions to the estimation sample:

1. Drop sales with prices that are below the 1st and 99th percentiles, respectively. Drop sales with square feet equal to zero or greater than 5000.
2. Drop sales where the TOM is greater than 2 years (< 10 sales).

Furthermore, because we want to use the agreement date of a home sale to more precisely categorize homes sales into pre nearby foreclosure, post nearby foreclosure, etc. in Section 4, our estimation sample only uses home sales that match to a listing.

We spent a great deal of time familiarizing ourselves with the data to develop the following algorithm that we believe to be highly accurate in identifying REO listings. We classify a listing as an REO if it merges with a non-arms length sales record where the following conditions hold:

1. The buyer's name does not have a comma, which always separates a last name and a first name in our dataset. This suggests that the buyer is not an individual and perhaps is a bank.
2. The buyer's name does not contain the strings "ESTATE", "FAMILY", "LIVING", "RELOC".
3. The buyer's name contains strings that suggest it is a bank, mortgage servicing company, or GSE (e.g. "BANK", "MTG", "FANNIE").

These non-arms length transactions are the transfer of ownership when a foreclosure occurs. In most cases, an arms length transaction occurs within a couple years of this transfer where the seller is a non-individual. This subsequent sale is the REO. We use the transfer rather than the REO sale to identify REO listings because our transaction data is right-censored. We do, however, use the seller names for the REO sales that we observe to help generate a list of strings that we search for in the buyer's name in the algorithm described above.

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<sup>1</sup>This eliminates about 15 percent of listings. These dropped listings do not include REO listings because an observation appears in the transaction data at the foreclosure sale date.

## C.2 Chicago, Phoenix, Washington DC

As mention in Appendix A.2, we purchased the San Francisco data from Altos Research prior to purchasing the three other MSAs we consider in this paper. In between purchases, Altos Research made some improvements to their listing data<sup>2</sup>, which allowed us to circumvent a number of the steps described above to arrive at our final, merged sample for Chicago, Phoenix, and DC. In particular, the raw address for each listing is broken out into separate street number, street name, and zip code variables. This circumvented the need to clean the address variables in the ways described for San Francisco. Each listing also had a property id, which circumvented the need to manually combine listings with slightly different addresses, as described above. The final improvement to the data is that the latitude and longitude coordinates are reported for each listing in the listing data. Thus, for Chicago, Phoenix, and DC, we do not need to do a preliminary merge with Dataquick as we did for San Francisco, where we merged the listing with *any* sales record for that property in Dataquick to obtain the latitude and longitude coordinates.

## D Details on Analysis of Campbell/Inside Mortgage Finance Survey

This section describes how we use data from the Campbell survey to establish the following relationship: in census tracts where home prices are low and housing density is high, a larger share of REOs are likely to be damaged.

The Campbell Survey is a sample of over 150,000 home sales throughout the U.S. from July 2009-October 2012. The information for each sales record comes from the individual real estate agent involved in the transaction. The realtor reports several variables about the transaction, including whether the sale is REO, the condition of the home if the sale is REO (specifically, “damaged” or “Move-in-Ready” REO), the list price, the sales price, and the financing method of the buyer. We observe the state that the home is in, but not the exact address or even the city. In the data, we observe that a strong predictor of whether an REO is damaged or not is whether or not the buyer pays cash for the property. For example, 63 percent of damaged REOs are paid for in cash versus 27 percent for Move-in-Ready REOs. The unconditional cash average is 30 percent. The most likely reason for this empirical relationship is that investors, who are more likely to pay in cash, are more likely to buy damaged REOs.

We next look at the types of census tracts in our Dataquick data that have a large share of transactions where the buyer pays cash. We think that it is reasonable to expect that foreclosures in these census tracts are more likely to be damaged. We define a cash transaction in our dataset as a sale where the first, second, and third loan amounts equal zero. 37 percent of sales in our sample are cash sales. For each census tract, we calculate the share of all sales over our sample period that are cash sales. Then, we regress this share on the tract density<sup>3</sup> and the log of the median tract sales price relative to the log of the median MSA sales price, with MSA fixed effects.<sup>4</sup> A one standard deviation increase in tract density (price) increases (decreases) the cash share by .02 (-.03). The effects are statistically significant.

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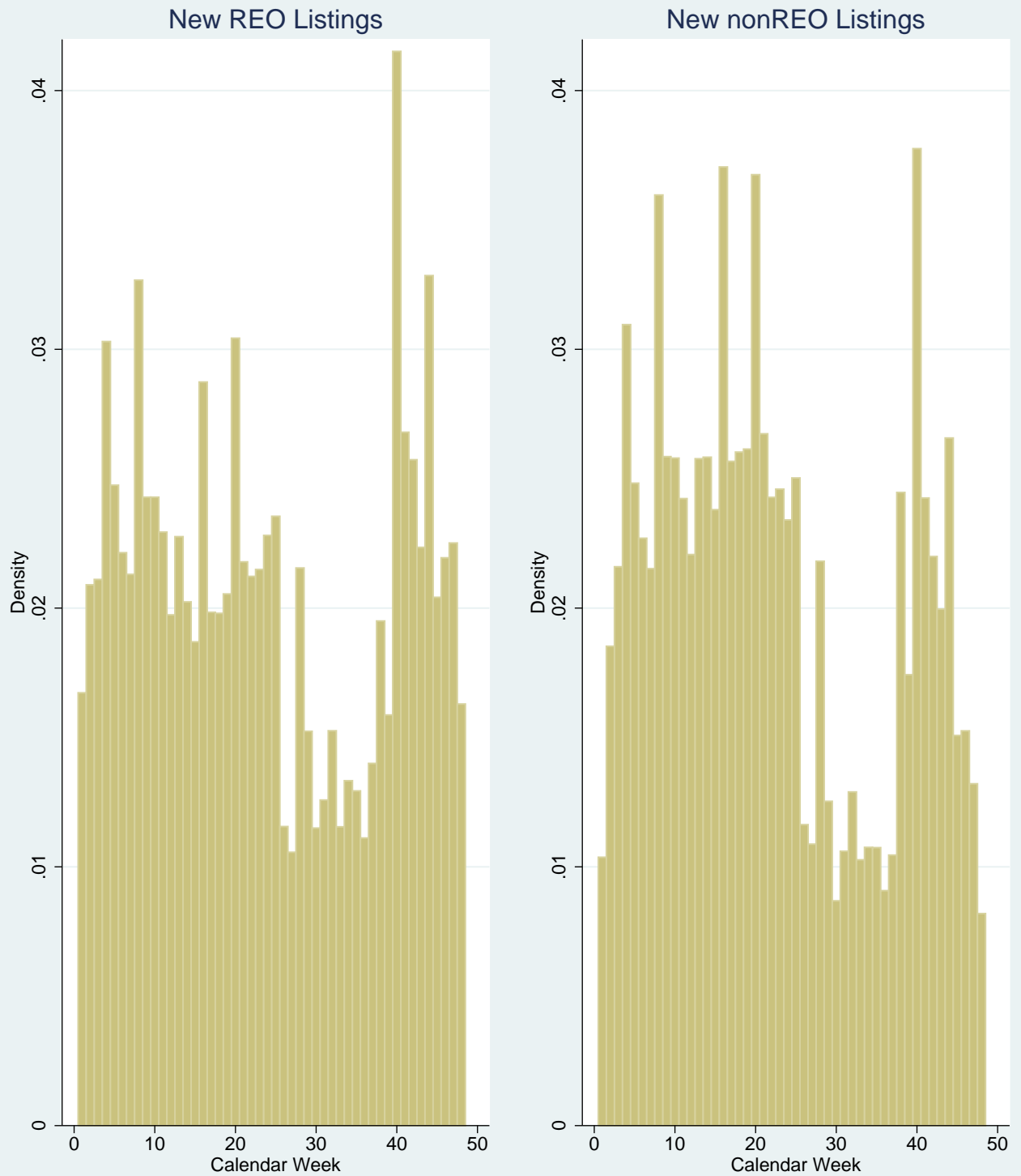
<sup>2</sup>The Dataquick data is formatted identically and contains the same information across all four MSAs.

<sup>3</sup>The source for the housing density data is the 2000 census.

<sup>4</sup>We exclude tracts with less than 100 observations during our sample period.

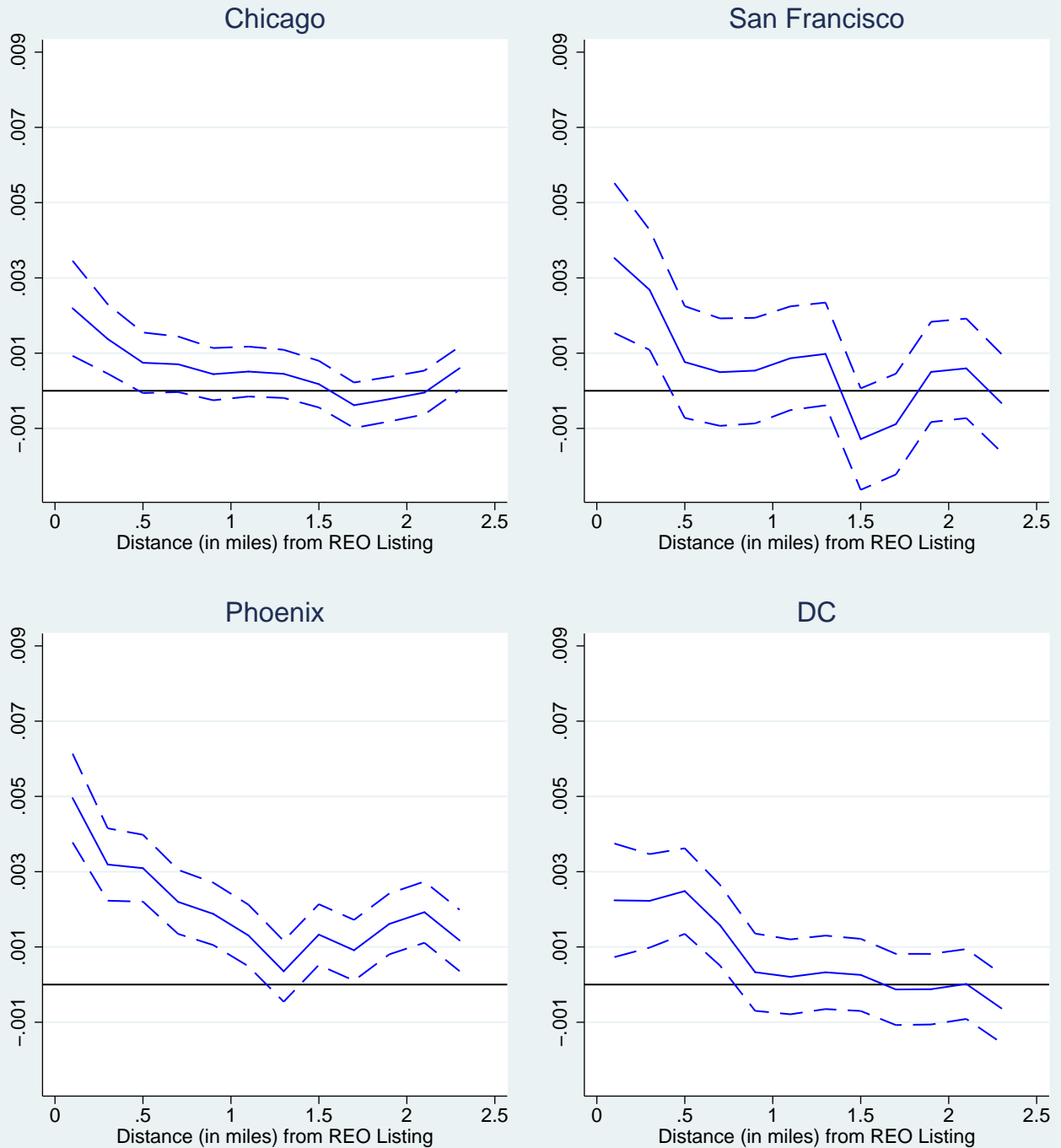
# Appendix Figure 1

## Distribution of Calendar Weeks of Initial Listing



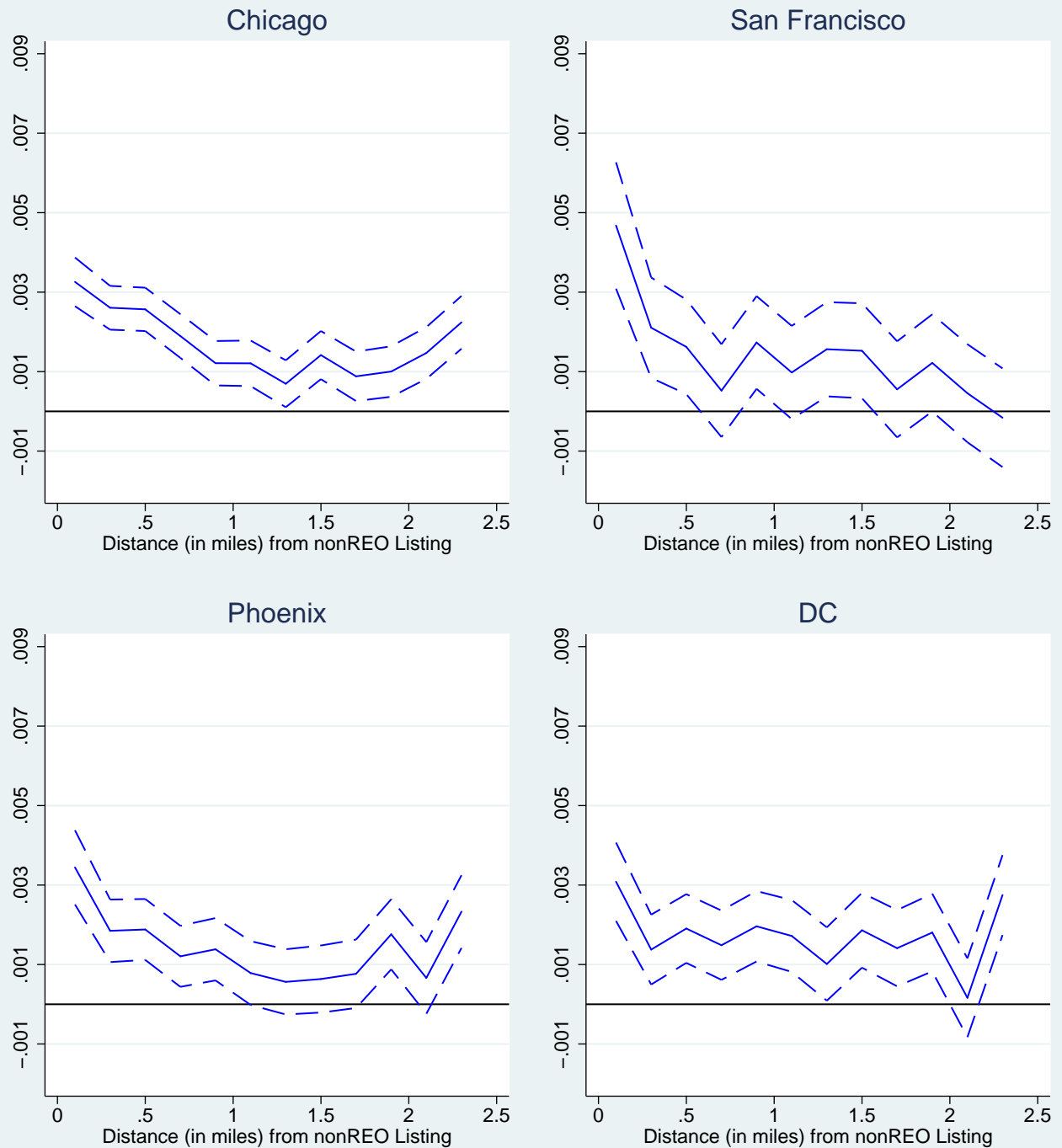
Note: Listing dates are divided into the 48 calendar weeks, where each month is assumed to have 4 weeks with 7 days per week, except for the 4th week of the month which includes all days in the month greater than 21.

## Appendix Figure 2: Change in Probability of Adjusting List Price in Week of Additional New, Nearby REO Listing



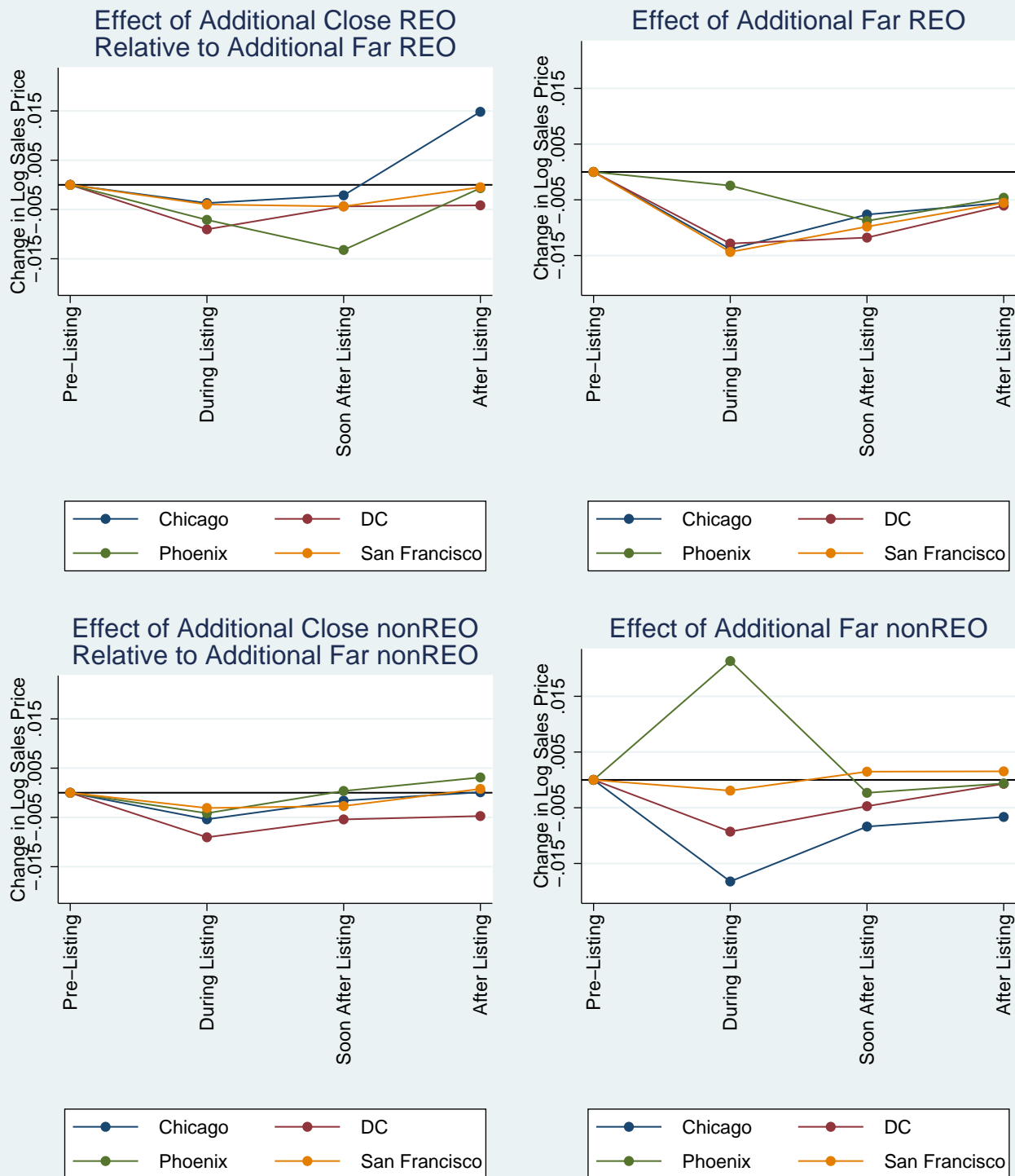
This figure shows results from a variant of the main specification where distance from the REO listing affects the probability of adjusting list price less parametrically. Each data point on the graph corresponds to a bin that is 0.2 miles wide. For each distance bin, we include three dummy variables that indicate whether there are one, two, or more than two new listings. The effects shown are for going from zero to one new listing. The dotted lines represent the 5th and 95th percentiles of the confidence interval.

### Appendix Figure 3: Change in Probability of Adjusting List Price in Week of Additional New, Nearby nonREO Listing



This figure shows results from a variant of the main specification where distance from the REO listing affects the probability of adjusting list price less parametrically. Each data point on the graph corresponds to a bin that is 0.2 miles wide. For each distance bin, we include three dummy variables that indicate whether there are one, two, or more than two new listings. The effects shown are for going from zero to one new listing. The dotted lines represent the 5th and 95th percentiles of the confidence interval.

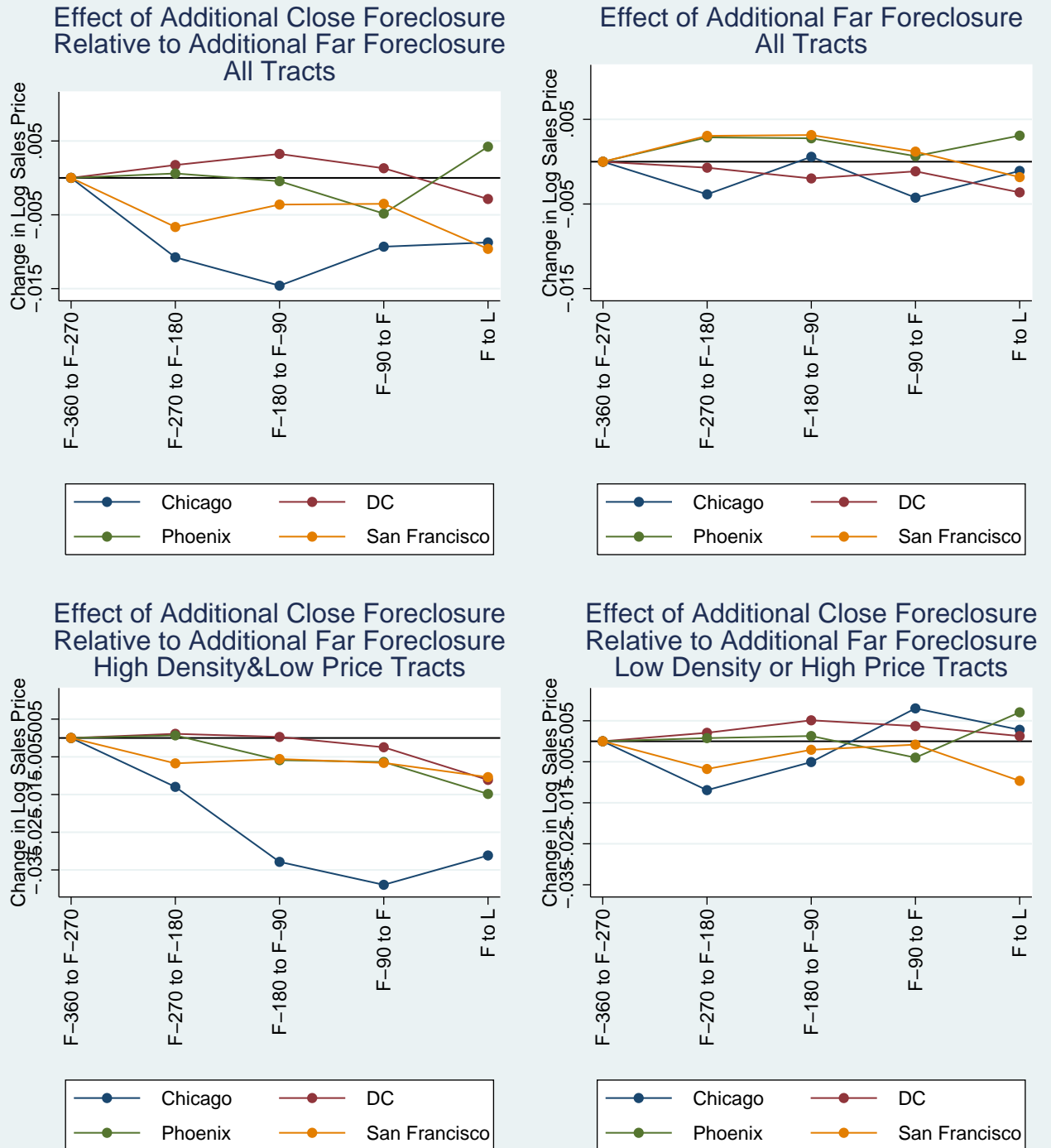
# Appendix Figure 4: Listing Effect on Sales Prices, by MSA



This figure shows how sales prices nearby a single REO/nonREO listing depend on the timing of the sale in relation to the listing date. Pre-listing is the 45 day interval immediately prior to listing. Soon After Listing is the 90 day interval immediately after sale or withdrawal. After Listing is the 90 day interval 3 to 6 months after sale or withdrawal. Close is defined as within 0.1 miles. Far is defined as between 0.1–0.33 miles. All estimates are indexed to the estimate for Pre-Listing, which is normalized to 0. The change in sales price is relative to a sale with zero nearby REOs. Estimates are also summarized in Table 4.

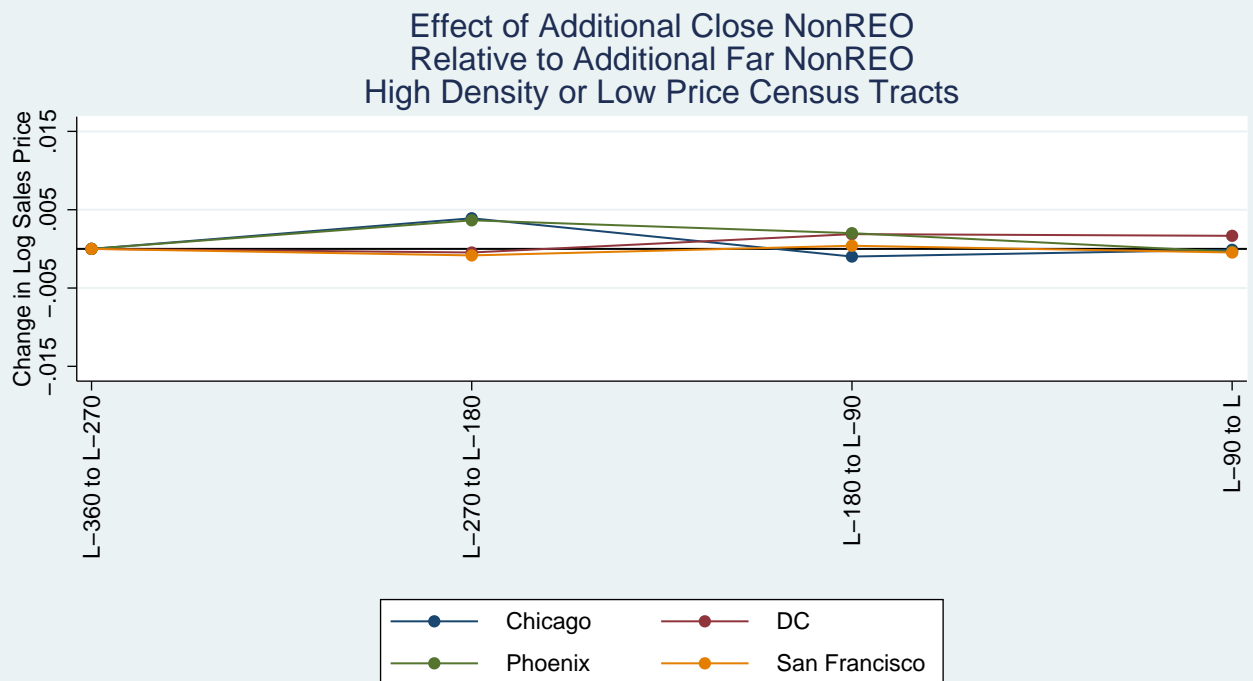
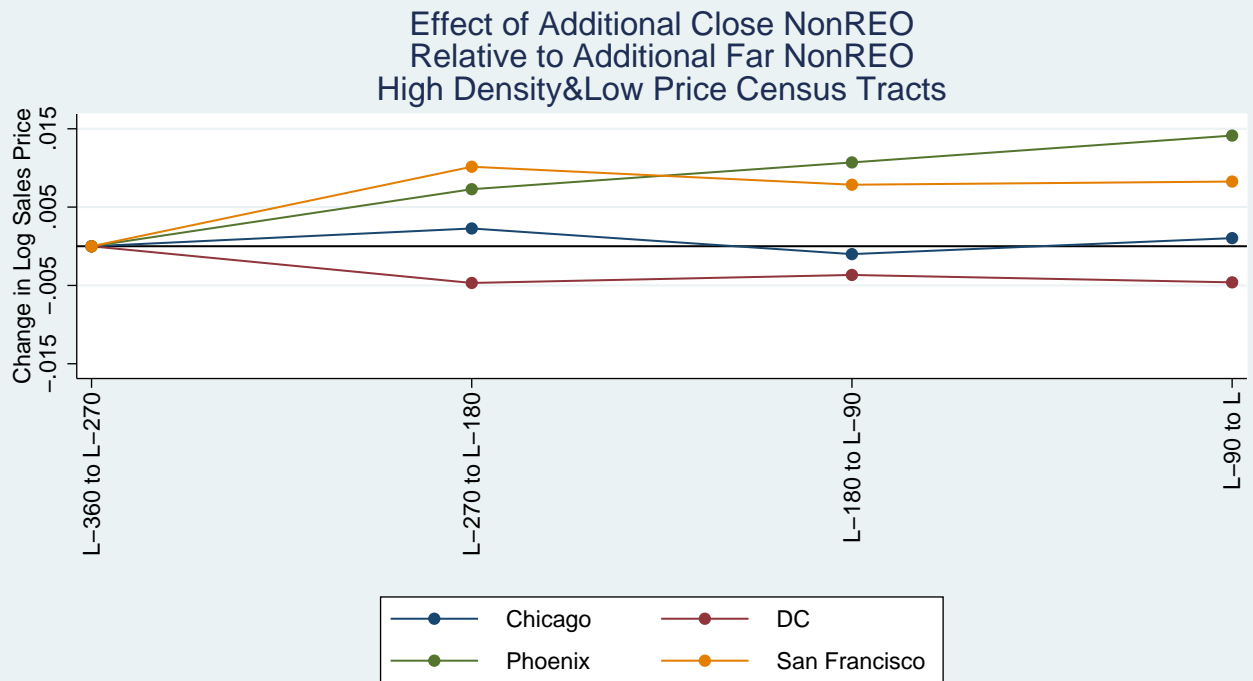


## Appendix Figure 5: Pre-Listing Effect of REOs on Sales Prices, by MSA



This figure shows how sales prices nearby an additional foreclosure depend on the timing of the sale in relation to the phase of the foreclosure process. F denotes the date of the foreclosure and L denotes the date of the REO listing. The numbers in the x-axis are in days. All sales between F-360 and L are also restricted to be before the REO is listed on the MLS. Close is defined as within 0.1 miles. Far is defined as between 0.1-0.33 miles. All estimates are indexed to the estimate for F-360 to F-270, which is normalized to 0. In the bottom panel, we test for differential effects by census tract type, as defined in the main text.

## Appendix Figure 6: Pre-Listing Effect of nonREOs on Sales Prices



This figure shows how sales prices nearby an additional nonREO listing depend on the timing of the sale in relation to the nonREO listing date. L denotes the date of the nonREO listing. The numbers in the x-axis are in days. Close is defined as within 0.1 miles. All estimates are indexed to the estimate for L-360 to L-270, which is normalized to 0. Census tracts are grouped into low density and high price tracts based on the definitions in the main text.

Appendix Table 1: Chicago Summary Statistics by Listing Category

		Sale Price (\$)	Square Feet (1000's)	Age	Time on Market (Weeks)	Closing Gap <sup>1</sup> (Days)	Sale/List Price (Ratio)	$I[\text{List Price}_t \neq \text{List Price}_{t-1}]^2$ (Fraction)	$\Delta$ List Price <sup>3</sup> (%)
REO, No Sale	Mean	.	1.754	55	23	.	.	0.09	-0.073
	p25	.	1.188	33	8	.	.	0	-0.105
	p50	.	1.508	52	17	.	.	0	-0.054
	p75	.	2.080	82	32	.	.	0	-0.028
REO, Sale	Mean	183,884	1.860	47	23	54	0.98	0.10	-0.077
	p25	102,000	1.288	22	8	14	0.90	0	-0.105
	p50	154,888	1.672	47	18	35	0.96	0	-0.055
	p75	219,275	2.183	65	33	67	1.00	0	-0.032
Non-REO, No Sale	Mean	.	1.790	39	24	.	.	0.06	-0.041
	p25	.	1.125	12	9	.	.	0	-0.056
	p50	.	1.533	34	19	.	.	0	-0.031
	p75	.	2.240	55	33	.	.	0	-0.015
Non-REO, Sale	Mean	312,108	1.958	40	22	36	0.94	0.08	-0.038
	p25	188,000	1.280	14	9	11	0.93	0	-0.051
	p50	260,000	1.764	36	17	19	0.95	0	-0.031
	p75	374,000	2.420	54	31	40	0.97	0	-0.017
Nearby REO <sup>4</sup> , Sale	Mean	241,339	1.733	47	21	46	0.96	0.08	-0.055
	p25	135,000	1.240	22	9	12	0.92	0	-0.073
	p50	195,000	1.568	44	17	26	0.96	0	-0.041
	p75	285,000	2.044	63	30	54	0.98	0	-0.022
Total	Mean	287,960	1.855	41	23	39	0.95	0.06	-0.045
	p25	167,000	1.204	14	9	11	0.92	0	-0.060
	p50	240,000	1.635	36	18	21	0.95	0	-0.033
	p75	350,000	2.292	56	33	46	0.98	0	-0.016

1. Defined as closing date - agreement date.

2. Takes on the value 1 if the list price does not equal the list price in the week before.

3. Conditional on a price change occurring.

4. The sale is within 0.1 miles of an active REO listing.

Appendix Table 2: DC Summary Statistics by Listing Category

		Sale Price (\$)	Square Feet (1000's)	Age	Time on Market (Weeks)	Closing Gap <sup>1</sup> (Days)	Sale/List Price (Ratio)	$I[\text{List Price}_t \neq \text{List Price}_{t-1}]^2$ (Fraction)	$\Delta$ List Price <sup>3</sup> (%)
REO, No Sale	Mean	.	1.754	35	20	.	.	0.09	-0.073
	p25	.	1.188	16	6	.	.	0	-0.105
	p50	.	1.508	31	14	.	.	0	-0.057
	p75	.	2.080	49	28	.	.	0	-0.033
REO, Sale	Mean	260,324	1.860	27	21	47	0.98	0.10	-0.084
	p25	170,000	1.288	11	7	13	0.95	0	-0.108
	p50	236,000	1.672	24	16	32	1.00	0	-0.057
	p75	320,000	2.183	38	31	54	1.02	0	-0.032
Non-REO, No Sale	Mean	.	1.790	33	19	.	.	0.06	-0.061
	p25	.	1.125	14	7	.	.	0	-0.083
	p50	.	1.533	28	14	.	.	0	-0.047
	p75	.	2.240	47	26	.	.	0	-0.025
Non-REO, Sale	Mean	407,292	1.958	32	17	42	0.96	0.09	-0.055
	p25	267,000	1.280	13	6	12	0.94	0	-0.072
	p50	360,000	1.764	26	12	27	0.97	0	-0.042
	p75	500,000	2.420	45	24	47	1.00	0	-0.025
Nearby REO <sup>4</sup> , Sale	Mean	270,340	1.733	28	19	44	0.98	0.10	-0.082
	p25	176,000	1.240	11	7	11	0.95	0	-0.105
	p50	248,997	1.568	24	15	27	0.99	0	-0.055
	p75	335,000	2.044	39	28	48	1.01	0	-0.031
Total	Mean	356,965	1.855	32	19	44	0.97	0.08	-0.065
	p25	225,000	1.204	13	7	12	0.95	0	-0.087
	p50	315,000	1.635	27	14	28	0.98	0	-0.049
	p75	434,500	2.292	45	26	49	1.00	0	-0.027

1. Defined as closing date - agreement date.

2. Takes on the value 1 if the list price does not equal the list price in the week before.

3. Conditional on a price change occurring.

4. The sale is within 0.1 miles of an active REO listing.

Appendix Table 3: Phoenix Summary Statistics by Listing Category

		Sale Price (\$)	Square Feet (1000's)	Age	Time on Market (Weeks)	Closing Gap <sup>1</sup> (Days)	Sale/List Price (Ratio)	$I[\text{List Price}_t \neq \text{List Price}_{t-1}]^2$ (Fraction)	$\Delta$ List Price <sup>3</sup> (%)
REO, No Sale	Mean	.	1.754	19	20	.	.	0.09	-0.089
	p25	.	1.188	4	5	.	.	0	-0.118
	p50	.	1.508	10	14	.	.	0	-0.066
	p75	.	2.080	33	27	.	.	0	-0.037
REO, Sale	Mean	158,262	1.860	16	19	48	0.96	0.12	-0.098
	p25	90,000	1.288	4	5	22	0.93	0	-0.124
	p50	135,000	1.672	8	14	35	0.99	0	-0.067
	p75	192,000	2.183	27	28	50	1.01	0	-0.041
Non-REO, No Sale	Mean	.	1.790	19	21	.	.	0.07	-0.067
	p25	.	1.125	6	8	.	.	0	-0.087
	p50	.	1.533	13	17	.	.	0	-0.051
	p75	.	2.240	29	28	.	.	0	-0.028
Non-REO, Sale	Mean	261,925	1.958	17	18	46	0.94	0.10	-0.062
	p25	163,000	1.280	5	6	19	0.92	0	-0.080
	p50	222,000	1.764	12	14	29	0.96	0	-0.048
	p75	315,000	2.420	26	26	43	0.99	0	-0.027
Nearby REO <sup>4</sup> , Sale	Mean	173,123	1.733	15	18	47	0.96	0.12	-0.091
	p25	100,000	1.240	3	5	21	0.93	0	-0.114
	p50	146,900	1.568	7	14	34	0.98	0	-0.062
	p75	210,000	2.044	23	27	49	1.00	0	-0.037
Total	Mean	205,850	1.855	18	20	47	0.95	0.08	-0.077
	p25	116,000	1.204	4	6	21	0.92	0	-0.099
	p50	171,000	1.635	11	15	33	0.97	0	-0.055
	p75	250,000	2.292	28	27	48	1.00	0	-0.031

1. Defined as closing date - agreement date.

2. Takes on the value 1 if the list price does not equal the list price in the week before.

3. Conditional on a price change occurring.

4. The sale is within 0.1 miles of an active REO listing.

Appendix Table 4: San Francisco Summary Statistics by Listing Category

		Sale Price (\$)	Square Feet (1000's)	Age	Time on Market (Weeks)	Closing Gap <sup>1</sup> (Days)	Sale/List Price (Ratio)	$I[\text{List Price}_t \neq \text{List Price}_{t-1}]^2$ (Fraction)	$\Delta \text{List Price}^3$ (%)
REO, No Sale	Mean	.	1.754	45	19	.	.	0.09	-0.088
	p25	.	1.188	23	4	.	.	0	-0.111
	p50	.	1.508	48	12	.	.	0	-0.058
	p75	.	2.080	61	28	.	.	0	-0.032
REO, Sale	Mean	352,855	1.860	41	23	46	0.99	0.11	-0.094
	p25	215,500	1.288	18	4	24	0.95	0	-0.114
	p50	319,000	1.672	42	15	38	1.00	0	-0.059
	p75	440,000	2.183	57	37	54	1.03	0	-0.034
Non-REO, No Sale	Mean	.	1.790	42	18	.	.	0.07	-0.057
	p25	.	1.125	19	6	.	.	0	-0.074
	p50	.	1.533	43	13	.	.	0	-0.042
	p75	.	2.240	57	24	.	.	0	-0.023
Non-REO, Sale	Mean	798,734	1.958	45	12	38	0.97	0.09	-0.055
	p25	538,000	1.280	28	3	12	0.95	0	-0.069
	p50	720,000	1.764	47	7	26	0.98	0	-0.041
	p75	951,000	2.420	58	16	38	1.00	0	-0.024
Nearby REO <sup>4</sup> , Sale	Mean	374,722	1.733	41	21	52	0.97	0.10	-0.087
	p25	225,000	1.240	16	6	20	0.94	0	-0.106
	p50	330,000	1.568	43	15	35	0.99	0	-0.056
	p75	470,000	2.044	57	30	55	1.02	0	-0.031
Total	Mean	664,850	1.855	43	17	40	0.98	0.09	-0.070
	p25	370,000	1.204	22	4	14	0.95	0	-0.087
	p50	600,000	1.635	45	10	28	0.98	0	-0.049
	p75	844,500	2.292	58	23	42	1.01	0	-0.027

1. Defined as closing date - agreement date.

2. Takes on the value 1 if the list price does not equal the list price in the week before.

3. Conditional on a price change occurring.

4. The sale is within 0.1 miles of an active REO listing.

Appendix Table 5: Effects of REO and NonREO Listings on List Prices -- Distance Detail

Dependent Variable: I[Change List]

	Baseline			
	Chicago	Phoenix	San Francisco	DC
Log(#REOs) coming on market in t+4 weeks	0.0008* (0.0005)	0.0006 (0.0004)	-0.0002 (0.0007)	0.0004 (0.0006)
Log(#REOs) coming on market in t+3 weeks	-0.0008* (0.0005)	0.0010** (0.0004)	-0.0007 (0.0007)	0.0005 (0.0006)
Log(#REOs) coming on market in t+2 weeks	-0.0007 (0.0005)	0.0003 (0.0004)	0.0010 (0.0007)	-0.0002 (0.0006)
Log(#REOs) coming on market in t+1 weeks	-0.0025*** (0.0005)	-0.0012*** (0.0004)	-0.0002 (0.0007)	-0.0010* (0.0006)
Log(#REOs) come on the market in week t	0.0059*** (0.0009)	0.0073*** (0.0007)	0.0107*** (0.0012)	0.0056*** (0.0009)
(Log(#REOs) come on the market in week t)*SqftDistance	-0.1200 (0.0833)	-0.0099 (0.0829)	0.1129 (0.1638)	-0.1375 (0.1019)
(Log(#REOs) come on the market in week t)*AgeDistance	-0.0807 (0.0738)	-0.1768*** (0.0685)	-0.1393 (0.1397)	-0.1799* (0.0961)
(Log(#REOs) come on the market in week t)*MilesDistance	-0.1676*** (0.0591)	-0.1241* (0.0649)	-0.4086*** (0.1015)	0.0337 (0.0754)
Log(#REOs) came on the market in week t-1	-0.0015*** (0.0005)	-0.0015*** (0.0004)	-0.0025*** (0.0007)	-0.0015*** (0.0006)
Log(#REOs) came on the market in week t-2	0.0001 (0.0005)	0.0008* (0.0004)	-0.0001 (0.0007)	-0.0012** (0.0006)
Log(#REOs) came on the market in week t-3	-0.0004 (0.0005)	0.0008* (0.0004)	0.0003 (0.0007)	0.0007 (0.0006)
Log(#REOs) came on the market in week t-4	0.0014*** (0.0005)	0.0006 (0.0004)	-0.0024*** (0.0007)	0.0008 (0.0006)
Log(#nonREOs) coming on market in t+4 weeks	0.0009*** (0.0002)	-0.0001 (0.0004)	-0.0006 (0.0006)	0.0008** (0.0004)
Log(#nonREOs) coming on market in t+3 weeks	0.0001 (0.0002)	0.0000 (0.0004)	0.0012** (0.0006)	-0.0006 (0.0004)
Log(#nonREOs) coming on market in t+2 weeks	0.0003 (0.0002)	0.0005 (0.0004)	0.0010* (0.0006)	-0.0002 (0.0004)
Log(#nonREOs) coming on market in t+1 weeks	-0.0015*** (0.0002)	-0.0018*** (0.0003)	-0.0006 (0.0006)	-0.0017*** (0.0004)
Log(#nonREOs) come on the market in week t	0.0075*** (0.0003)	0.0071*** (0.0006)	0.0118*** (0.0010)	0.0074*** (0.0006)
(Log(#nonREOs) come on the market in week t)*SqftDistance	-0.1316*** (0.0310)	-0.1246* (0.0674)	0.0715 (0.1257)	-0.1246* (0.0672)
(Log(#nonREOs) come on the market in week t)*AgeDistance	-0.0369 (0.0290)	-0.1953*** (0.0721)	-0.1945 (0.1337)	-0.0286 (0.0577)
(Log(#nonREOs) come on the market in week t)*MilesDistance	-0.1362*** (0.0234)	-0.2372*** (0.0512)	-0.3064*** (0.0833)	-0.1513*** (0.0467)
Log(#nonREOs) came on the market in week t-1	-0.0006*** (0.0002)	-0.0018*** (0.0003)	-0.0014** (0.0006)	-0.0003 (0.0004)
Log(#nonREOs) came on the market in week t-2	0.0005*** (0.0002)	-0.0000 (0.0004)	-0.0018*** (0.0006)	-0.0004 (0.0004)
Log(#nonREOs) came on the market in week t-3	0.0001 (0.0002)	-0.0003 (0.0004)	-0.0002 (0.0006)	0.0002 (0.0004)
Log(#nonREOs) came on the market in week t-4	-0.0001 (0.0002)	0.0001 (0.0004)	-0.0001 (0.0006)	-0.0003 (0.0004)
Weeks on Market	-0.0002*** (0.0000)	-0.0000*** (0.0000)	0.0005*** (0.0000)	-0.0001*** (0.0000)
REO Dummy	0.0410*** (0.0004)	0.0460*** (0.0004)	0.0359*** (0.0006)	0.0398*** (0.0005)
Single Family Dummy	0.0109*** (0.0004)	0.0150*** (0.0006)	0.0000 (0.0000)	0.0086*** (0.0005)
Square Feet	-0.0016*** (0.0002)	-0.0001 (0.0003)	-0.0022*** (0.0005)	-0.0019*** (0.0003)
Age	-0.0001*** (0.0000)	-0.0000** (0.0000)	0.0000* (0.0000)	-0.0000*** (0.0000)
Constant	0.0607*** (0.0007)	0.0719*** (0.0014)	0.0731*** (0.0019)	0.0821*** (0.0012)
Observations	5380609	3157740	1464888	2488385
Adjusted R-squared	0.009	0.012	0.011	0.009
Week + Tract x Quarter x Year Fixed Effects	x	x	x	x

Standard errors clustered at the census tract-by-quarter level are in parentheses.

\*\*\* p&lt;0.01, \*\* p&lt;0.05, \* p&lt;0.1

Notes: This is a slight variation of the regression presented in Table 3. SqftDistance, AgeDistance, MilesDistance measures the distance between the new listing and the nearby listing in square footage, age, and miles using the formula described in the main text.

Appendix Table 6: Effects of REO and NonREO Listings on List Prices -- Robustness

	Dependent Variable: I[Change List]				Dependent Variable: ListPrice <sub>t</sub> - ListPrice <sub>t-1</sub>			
	Chicago	Phoenix	San Francisco	DC	Chicago	Phoenix	San Francisco	DC
Log(#REOs) coming on market in t+4 weeks	0.0007 (0.0005)	0.0002 (0.0005)	-0.0001 (0.0008)	0.0017*** (0.0006)	0.0001 (0.0006)	-0.0005 (0.0005)	-0.0007 (0.0009)	-0.0017** (0.0008)
Log(#REOs) coming on market in t+3 weeks	-0.0008* (0.0005)	0.0006 (0.0005)	-0.0004 (0.0008)	0.0017*** (0.0006)	-0.0005 (0.0006)	-0.0010** (0.0005)	-0.0019** (0.0009)	-0.0020*** (0.0008)
Log(#REOs) coming on market in t+2 weeks	-0.0009* (0.0005)	-0.0001 (0.0005)	0.0015* (0.0008)	0.0008 (0.0006)	-0.0004 (0.0006)	-0.0018*** (0.0005)	-0.0016** (0.0008)	-0.0023*** (0.0007)
Log(#REOs) coming on market in t+1 weeks	-0.0027*** (0.0005)	-0.0016*** (0.0005)	-0.0001 (0.0008)	0.0003 (0.0006)	-0.0002 (0.0006)	-0.0009* (0.0005)	-0.0011 (0.0009)	-0.0011 (0.0007)
Log(#REOs) come on the market in week t	0.0032*** (0.0005)	0.0055*** (0.0005)	0.0070*** (0.0008)	0.0061*** (0.0006)	-0.0009 (0.0006)	-0.0015*** (0.0005)	-0.0029*** (0.0008)	-0.0032*** (0.0007)
(Log(#REOs) come on the market in week t)*Distance	-0.0012*** (0.0005)	-0.0006 (0.0004)	-0.0019*** (0.0007)	-0.0009* (0.0005)	0.0007 (0.0006)	0.0008* (0.0004)	0.0015** (0.0006)	0.0024*** (0.0006)
Log(#REOs) came on the market in week t-1	-0.0015*** (0.0005)	-0.0019*** (0.0005)	-0.0027*** (0.0008)	-0.0006 (0.0006)	-0.0007 (0.0006)	-0.0011** (0.0005)	-0.0009 (0.0008)	-0.0019*** (0.0007)
Log(#REOs) came on the market in week t-2	0.0001 (0.0005)	0.0004 (0.0005)	-0.0002 (0.0008)	-0.0005 (0.0006)	-0.0011* (0.0006)	-0.0018*** (0.0005)	-0.0008 (0.0009)	-0.0024*** (0.0008)
Log(#REOs) came on the market in week t-3	-0.0004 (0.0005)	0.0003 (0.0005)	0.0001 (0.0008)	0.0012** (0.0006)	-0.0005 (0.0006)	-0.0016*** (0.0005)	-0.0006 (0.0008)	-0.0014** (0.0007)
Log(#REOs) came on the market in week t-4	0.0014*** (0.0005)	0.0001 (0.0005)	-0.0027*** (0.0008)	0.0014** (0.0006)	-0.0008 (0.0006)	-0.0005 (0.0005)	-0.0014 (0.0008)	-0.0015* (0.0008)
Log(#nonREOs) coming on market in t+4 weeks	0.0008*** (0.0002)	-0.0000 (0.0004)	-0.0004 (0.0006)	0.0009** (0.0004)	0.0003 (0.0003)	0.0004 (0.0004)	-0.0003 (0.0006)	0.0001 (0.0005)
Log(#nonREOs) coming on market in t+3 weeks	0.0000 (0.0002)	0.0001 (0.0004)	0.0016** (0.0006)	-0.0004 (0.0004)	0.0006** (0.0003)	0.0007* (0.0004)	0.0003 (0.0006)	-0.0002 (0.0005)
Log(#nonREOs) coming on market in t+2 weeks	0.0001 (0.0002)	0.0006* (0.0004)	0.0015** (0.0006)	0.0000 (0.0004)	0.0005* (0.0003)	0.0003 (0.0004)	0.0004 (0.0006)	0.0001 (0.0005)
Log(#nonREOs) coming on market in t+1 weeks	-0.0017*** (0.0002)	-0.0017*** (0.0004)	-0.0002 (0.0006)	-0.0015*** (0.0004)	0.0004 (0.0003)	0.0009** (0.0004)	0.0010* (0.0006)	-0.0002 (0.0005)
Log(#nonREOs) come on the market in week t	0.0054*** (0.0002)	0.0047*** (0.0004)	0.0090*** (0.0006)	0.0058*** (0.0004)	0.0007*** (0.0003)	0.0007* (0.0004)	0.0000 (0.0006)	0.0001 (0.0004)
(Log(#nonREOs) come on the market in week t)*Distance	-0.0005*** (0.0002)	-0.0014*** (0.0003)	-0.0015*** (0.0005)	-0.0009*** (0.0003)	-0.0004** (0.0001)	-0.0007** (0.0003)	-0.0001 (0.0004)	-0.0004 (0.0003)
Log(#nonREOs) came on the market in week t-1	-0.0008*** (0.0002)	-0.0016*** (0.0004)	-0.0013** (0.0006)	-0.0002 (0.0004)	0.0003 (0.0003)	0.0012*** (0.0004)	0.0013** (0.0006)	0.0002 (0.0005)
Log(#nonREOs) came on the market in week t-2	0.0004 (0.0002)	0.0002 (0.0004)	-0.0020*** (0.0006)	-0.0004 (0.0004)	-0.0001 (0.0003)	0.0014*** (0.0004)	0.0009* (0.0006)	0.0003 (0.0004)
Log(#nonREOs) came on the market in week t-3	-0.0000 (0.0002)	-0.0000 (0.0004)	-0.0001 (0.0006)	0.0002 (0.0004)	0.0003 (0.0003)	0.0010*** (0.0004)	0.0012** (0.0006)	0.0009* (0.0005)
Log(#nonREOs) came on the market in week t-4	-0.0003 (0.0002)	0.0004 (0.0004)	0.0000 (0.0006)	-0.0002 (0.0004)	0.0002 (0.0003)	0.0007* (0.0004)	0.0001 (0.0006)	-0.0002 (0.0005)
Weeks on Market	0.0002*** (0.0000)	0.0001** (0.0000)	0.0006*** (0.0000)	-0.0005*** (0.0000)	-0.0000* (0.0000)	-0.0005*** (0.0000)	-0.0005*** (0.0000)	-0.0002*** (0.0000)
REO Dummy					-0.0227*** (0.0007)	-0.0153*** (0.0005)	-0.0075*** (0.0007)	-0.0084*** (0.0006)
Single Family					0.0004 (0.0004)	0.0116*** (0.0009)		0.0039*** (0.0008)
Square Feet					0.0013*** (0.0002)	0.0011*** (0.0004)	0.0027*** (0.0005)	0.0028*** (0.0003)
Age					-0.0001*** (0.0000)	-0.0005*** (0.0000)	-0.0002*** (0.0000)	-0.0003*** (0.0000)
Constant	0.0704*** (0.0010)	0.0760*** (0.0014)	0.0587*** (0.0033)	0.0955*** (0.0017)	-0.0436*** (0.0009)	-0.0619*** (0.0015)	-0.0502*** (0.0020)	-0.0533*** (0.0015)
Observations	5380609	3157740	1464888	2488385	383925	304062	151947	216056
Adjusted R-squared	0.007	0.008	0.009	0.007	0.107	0.089	0.116	0.070
Week + House Fixed Effects	x	x	x	x				
Week + Tract x Quarter x Year Fixed Effects					x	x	x	x

Clustered standard errors are in parentheses.

\*\*\* p&lt;0.01, \*\* p&lt;0.05, \* p&lt;0.1

Notes: Distance measures how distant in physical and characteristic space each listing is to the nearby REO and nonREO listings. Distance is standardized so that the mean value of distance is zero and the standard deviation is one. In the right panel, the change in list price, which is the dependent variable, is conditional on a change actually occurring.



Appendix Table 7: Effects of REO and NonREO Listings on Sales Prices -- Robustness

Diff-in-Diffs of Interest	Baseline (see Table 4)					Alternative Defn. of Similar All MSAs
	Far Group = 0.25 miles		Far Group = 0.33 miles		City Fixed Effects	
	All MSAs	All MSAs	All MSAs	All MSAs	All MSAs	
During REO Listing Relative to Before Listing, Close	-0.005 <i>0.006</i>	-0.006 <i>0.003</i>	-0.006 <i>0.001</i>	-0.010 <i>0.000</i>	-0.003 <i>0.157</i>	
During nonREO Listing Relative to Before Listing, Close	-0.005 <i>0.001</i>	-0.005 <i>0.000</i>	-0.006 <i>0.000</i>	-0.008 <i>0.007</i>	-0.002 <i>0.256</i>	
Additional Effect when Similar to REO, Close					-0.004 <i>0.002</i>	
Additional Effect when Similar to nonREO, Close					-0.008 <i>0.001</i>	
During REO Listing Relative to Before Listing, Far	-0.007 <i>0.000</i>	-0.008 <i>0.000</i>	-0.003 <i>0.223</i>	-0.013 <i>0.002</i>	-0.009 <i>0.000</i>	
During nonREO Listing Relative to Before Listing, Far	0.000 <i>0.779</i>	0.002 <i>0.160</i>	0.010 <i>0.003</i>	0.003 <i>0.597</i>	0.003 <i>0.121</i>	
During REO Listing Relative to Before Listing, Medium			-0.007 <i>0.000</i>			
During nonREO Listing Relative to Before Listing, Medium			0.002 <i>0.293</i>			
(F to L) - (F-360 to F-270), Close, Low Density or High Value	0.006 <i>0.006</i>	0.005 <i>0.009</i>	0.006 <i>0.003</i>			
(F to L) - (F-360 to F-270), Close, High Density and Low Value	-0.015 <i>0.000</i>	-0.015 <i>0.000</i>	-0.014 <i>0.000</i>			

p-values in italics.

Notes: "During listing relative to before listing, Close" is the additional effect (relative to the Far group) of one listing (relative to 0 listings) Close to the home sale. "During listing relative to before listing, Far" is the effect of one listing (relative to 0 listings) further from the home sale relative to a home sale with zero listings. Close is within 0.1 miles, Far varies by specification. In the fourth column, we also include a medium distance group, which is 0.1-0.5 miles. In the third column, we estimate the baseline specification with city by quarter fixed effects instead of city by census tract fixed effects. Similar is a dummy variable equal to one when the sale is similar in observables to the listing. We are more stringent in our similarity criteria relative to the baseline specification in Table 4. The bottom two rows present estimates of interest when we test for a pre REO listing effect. The estimates capture the change in sales price in the interval between foreclosure and listing relative to the 90 day interval 9-12 months prior to the foreclosure. Low density and low value refer to the categorization of census tracts, as described in the main text.