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Foreclosures and Spillovers:

Externality or Supply Effect?*

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Abstract. This paper measures the effects of foreclosures on nearby property value. It offers a simple empirical framework for decomposing foreclosure effects on the prices of surrounding properties into real externality and market supply effects. Further, motivated by recent results indicating that households cluster geographically by credit quality, it also tests for tipping points in foreclosure price effects. Data from Orange County, Florida, reveal that nearby foreclosures reduce property prices by approximately 1.3 to 2.9 percent, of which 1.0 and 2.5 percent represent real negative externality effects. The externality effect is stronger the closer the affected properties and, while the marginal effect of additional foreclosures is nonlinear, there is no evidence of critical tipping points. The foreclosure externality on surrounding houses is weakest in low value market segments and strongest in higher value market segments, but does not vary significantly across neighborhoods of different densities.

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1. Introduction

The notion that foreclosures depress nearby property prices is widely accepted. Although estimates vary, recent reviews of empirical studies suggest that property prices tend to be anywhere between one to ten percent lower in neighborhoods with foreclosures (Clauretie and Daneshvary, 2009; Daneshvary et al., 2011). There are two mechanisms driving prices of properties surrounding foreclosures lower. One is the negative real externality of foreclosures arising from poorly maintained or vacant foreclosed property. The second mechanism is a purely pecuniary externality. Foreclosures increase the supply of housing for sale while removing the erstwhile owners as potential buyers from the market, the net effect of which is downward pressure on selling prices. While both effects lead to lower neighborhood property values and declining property tax bases, the source of distress to residents and local governments, only the first is inefficient.

Most studies identify the effect on surrounding non-distressed properties as the real externality effect identified above. The rationale underlying these studies is that foreclosures induce vacancy and underinvestment in maintenance, creating real externalities that reduce neighborhood attractiveness (Harding et al., 2009; Daneshvary and Clauretie, 2012) as well as external social costs in the form of reduced social interaction and community involvement (Harding et al, 2009) or increased crime (Immergluck and Smith, 2006). Potential buyers may also interpret the presence of foreclosures as a signal of a greater risk of neighborhood instability. All of these factors reduce the market value of surrounding non-distressed housing. What seems to be overlooked by most is that, at the same time, foreclosures increase the supply of units on the market, also leading to lower neighborhood property values—the second or pecuniary externality identified above. While not a source of inefficiency, ignoring or inadequately dealing with the supply effect leads to over-stated foreclosure externality effects. The extent to which foreclosure externality effects are over stated in the existing studies is not clear.

This paper contributes to the foreclosure effects literature in several ways. First, it offers a simple and direct method to sort the foreclosure price effects into an externality (the real externality) and a market supply (the pecuniary externality) component. While previous studies tend to focus on the negative real externality effect of foreclosures on surrounding non-distressed properties, the nature of the data used in those studies or their empirical approaches generally preclude direct controls for the total supply of housing on the market in each affected neighborhood so that their estimates of foreclosure spillovers are likely picking up both real externality and supply effects. In contrast, the approach taken here introduces comprehensive empirical measures of neighborhood supply of housing on the market to control for supply effects in the empirical model. The results reveal the relative importance of the bias likely present in previous estimates of externality spillover effects.

Second, this study also introduces neighborhood new construction into the empirical framework in order to further refine foreclosure externality estimates. To the extent that potential buyers interpret nearby foreclosures as a signal of neighborhood instability or future decline, foreclosures may prompt some to look for housing in other neighborhoods, thereby creating downward pressure on selling prices through yet another channel. In contrast, new construction may increase buyers' interest in the neighborhood if they interpret new construction as a signal of neighborhood stability, future growth or quality. In this case, the positive signal from new construction may offset negative signals from nearby foreclosures, providing a countervailing effect on selling prices as well. Including measures of new construction at the neighborhood level controls for this possible signaling effect bias on foreclosure effects estimates.

Third, regardless of the channel through which foreclosures influence prices of surrounding non-distressed properties, the geographic concentration of foreclosures in certain submarkets suggests that tipping points may be a real concern for some neighborhoods. It appears that even a few neighboring foreclosures relative to non-distressed sales have significant value effects on surrounding non-distressed transactions. But Hanson et al. (2012) show that households tend to spatially sort by credit quality, creating conditions ripe for spatial concentrations of foreclosures. The question remains whether the resultant concentrations of foreclosures in certain neighborhoods lead to the increasing marginal price effects, exhibiting deeper and more enduring neighborhood price effects than would otherwise be expected if foreclosures were evenly distributed throughout the entire market area. What is not yet known is if there is a critical point where a sufficiently large number of foreclosures relative to non-distressed sales transactions destabilizes neighborhood price dynamics—analogous to the tipping phenomenon identified in the neighborhood racial composition literature by Card et al. (2000) and others. Schuetz et al. (2008) and Harding et al. (2009) both find evidence of non-catastrophic tipping. In contrast with the samples used in those studies, our sample covers a period of intense foreclosure activity in one of the most active foreclosure markets in the US, which allows us to probe more deeply into how an unprecedented level of foreclosures affects neighborhood pricing. While Schuetz et al. (2008) and Harding et al. (2009) are only able to examine concentrations of three or more foreclosures, our data allow us to examine concentrations of 11 or more foreclosures.

The rest of this paper is organized as follows. Section 2 discusses key background literature. Section 3 provides the empirical framework for sorting out the channels through which foreclosures may influence surrounding property values. Section 4 describes the data and variables. Section 5 reports the empirical results and Section 6 concludes.

2. Background

Housing markets are search markets so we consider foreclosure effects from a search theoretic perspective drawing on Arnott (1998), Krainer (2001) and others. The property foreclosed or in the process of foreclosure arrives on the market and is being sold only after the foreclosure process has come to an end. So supply consists of foreclosures (REO) and what we label open market housing (non-real estate owned or non-REO transactions) including new construction. Hence, although the underlying reason for being placed on the market is different, foreclosures represent only one part of the supply of existing property to the market. As housing markets at the neighborhood level are thin, even a few foreclosures may significantly increase supply by pulling into the market properties that otherwise would not have appeared on the market. Introducing foreclosed properties onto the market can be expected to increase the variety of houses with different bundles of characteristics (Harding et al., 2011). If so, then a marginal increase in supply of foreclosed houses gives potential buyers a wider variety of housing characteristics to choose from and a better bargaining position, putting downward pressure on the prices of other properties as well (Van der Vlist et al., 2002a). This is the pecuniary externality of foreclosures, labeled the supply effect here; nearby foreclosures inflate the supply of houses for sale thereby lowering prices of competing nearby properties.

Foreclosed property may become the source of a negative externality to surrounding property when left vacant for extended periods or subject to deferred maintenance. Or potential buyers may interpret the presence of foreclosed property as a signal of greater risk of future neighborhood instability. Whether a source of real externality or neighborhood stigma, foreclosures reduce the attractiveness of neighborhoods to many buyers, the resultant reduction in demand putting additional downward pressure on prices. The stigma or neighborhood risk signal arising from foreclosures, however, will likely vary among neighborhoods and may be reinforced or offset by other changes in the neighborhood. In particular, the presence of new construction may signal other positive changes expected for the neighborhood in terms of evolving neighborhood quality or lower neighborhood risk.

The supply effect and the externality effect are both expected to drive property prices down. The size of the supply effect depends on the price elasticity of demand in a neighborhood and depends on local housing market conditions like the percentage of owner-occupiers, the vacancy rate, or the percentage of public housing in the area (Van der Vlist et al., 2002b). But it bears repeating that, regardless of its magnitude, the supply effect is not a source of market inefficiency. Pecuniary externalities like these simply reflect the price mechanism at work; prices rise with less net supply and fall with greater net supply.[1] On the other hand, the real externality effect of foreclosures is a source of inefficiency. Harding et al. (2012) conclude that the discount on foreclosed property by and large reflects curable deferred maintenance and transaction costs. External effects on the value of surrounding properties arising from deferred maintenance may be curable, hence temporary, but will nonetheless continue to be a source of inefficiency for as long as the property remains in poor condition.

Might real externalities become particularly acute once a critical concentration of poorly maintained foreclosed properties is attained, generating a tipping point for foreclosure effects on surrounding property values? This remains a possibility given the propensity of households to spatially sort by credit quality and the implication for foreclosure clusters in the market (Hanson et al., 2012). Existing studies find nonlinear marginal price effects, but the empirical evidence on the nature of the nonlinearity is mixed even for the pre-crisis period. Rogers and Winter (2009) find a negative effect on property prices of 1.5% over 2000-2007 and conclude that the marginal impact declines with a rising number of foreclosures. In

[1] Turnbull and Dombrow (2006) show that increases in net supply in the surrounding neighborhood may also create shopping externalities when clusters of similar houses for sale lower buyer transaction costs for the neighborhood. This is also part of the net supply effect identified in this paper, and also represents a pecuniary externality in search markets hence not a source of market inefficiency.

contrast, Harding et al. (2009) also examine the pre-crisis period 1989-2007 and find a negative albeit modest effect of 0.5% within 1/8th of a mile, but the effect is much stronger above a critical threshold. The cumulative foreclosure price effect on surrounding property increases from 0.5% to 3% when there are three or more foreclosed properties within 300 feet.

In sum, regardless of possible nonlinearities, the extent to which foreclosure effects on prices represent (efficient) supply effects or (inefficient) real externality effects remains an open empirical question. It is to this question that we now turn.

3. Empirical Framework

In order to separate supply and externality effects of foreclosures on other property sales, we identify the neighborhood supply of competing properties on the market at the same time as the subject property in terms of both substitutability and spatial proximity. Following Turnbull and Zahirovic-Herbert (2011) and others, houses that are on the market at the same time with living areas within 20% of the subject property are considered substitute properties. Of these, the properties within distance *d* indicate competing properties across space. Harding et al. (2009) use four distance rings with the inner-most ring up to 300 feet and outer-most ring extending to 2000 feet to allow for nonlinear effects across space. Daneshvary et al. (2011) use three mutually exclusive rings of 1/10th, ¼, and ½ mile. Turnbull and Zahirovic-Herbert (2011) use a continuous squared inverse distance weighting for competing houses within one mile. Other approaches use census tracts, zip code zones or similar geographic districts to try to identify surrounding houses in the neighborhood of the subject property (Gerardi et al., 2012). We use several measures of nearby properties, based on Daneshvary et al. (2011) mutually exclusive rings, with the outmost ring extending to one mile from the subject property, then extending the measurement system to allow for greater flexibility when testing for tipping points.

Since the tax assessor data used here does not provide any indication of how long each house is on the market before sale, to obtain an approximate measure of surrounding properties that are on the market the same time as the subject property, we identify all competing open market and foreclosure transactions within the timeframe [*t*-τ, *t*+τ] for each subject property sold at time *t.* Harding et al. (2009) identify foreclosures occurring within a window of 12 months before the transaction in a repeat sales context. Daneshvary et al. (2011) use a 3-month and a 6-month time frame. We allow for 6-month (τ = 90 days) and 12-month (τ = 180 days) time frames.

The underlying rationale for the real externality effects of nearby foreclosures assumes that foreclosures may be poorly maintained. This increases the data requirements when implementing the repeat sales approach, as it requires that the model include as separate variables the nearby foreclosures for both the earlier and later subject property transactions to control for changing neighborhood externalities over time. Therefore, this study uses the hedonic approach.

The hedonic price model specifies the log of price as a linear of function of property characteristics and neighborhood market conditions:

$$\ln P_{it} = \beta_X X_{it} + \beta_{FS} \sum_{d\in\delta} \sum_{t\epsilon\tau} FS_{idt} + \beta_{MS} \sum_{d\in\delta} \sum_{t\epsilon\tau} MS_{idt} + \beta_{NC} \sum_{d\in\delta} \sum_{t\epsilon\tau} NC_{idt} + \varepsilon_{it}$$

where *P* is the selling price; ***X*** the vector of relevant house characteristics, including location, year, and seasonal fixed effects; *FS* the number of sales of foreclosures, *MS* the number of market sales and *NC* is the number of new construction, all within distance *d* and timeframe τ of the subject property. Cast this way, the *FS, MS,* and *NC* variables are included as controls for the numbers of nearby foreclosed houses, open market houses, and new construction that are on the market at the same time as the subject property.

The difference in estimated coefficients for the local market conditions variables provides important information regarding the extent of pecuniary and real externalities from foreclosed properties. If the (negative) *FS* coefficient is less than the *MS* coefficient then increasing the number of foreclosures while holding neighborhood supply constant reduces the prices of surrounding properties. This is consistent with a negative real externality effect from neighboring foreclosures. If, on the other hand, the *FS* and *MS* coefficients are not significantly different, neighboring foreclosures have no real externality effect on surrounding properties. Finally, if the (negative) *MS* coefficient is less than the *FS* coefficient then increasing the number of foreclosures while holding neighborhood market supply constant increases the prices of surrounding properties. Although it may seem counter-intuitive at first blush, this outcome is nonetheless consistent with foreclosed properties generating a stronger shopping externality for the neighborhood than open market properties. In this case, the presence of nearby foreclosures for sale is a stronger draw for potential buyers than open market properties; the resultant increases in buyer arrival rates increase the probabilities of higher priced matches for nearby sellers, including sellers of open market properties.

The market sales variable includes newly constructed houses. Therefore, the coefficient on the new construction variable (*NC*) does not capture supply effects and instead solely picks up the neighborhood quality signaling or shopping externality effect arising from new construction.

4. Data

The data are drawn from tax records of Orange County, Florida, covering all of the 426,021 parcels in the county as of August 24, 2012. Orange County is part of the Orlando-Kissimmee-Sanford MSA and has been experiencing long term population growth from

896,344 (2000 Census) to 1,145,956 (2010 Census). Orange County is among the counties with the highest number of foreclosures in the nation.

Local tax records in Florida have been used as the primary data source in a number of studies and have several advantages (Ihlanfeldt and Mayock, 2012). One advantage of tax records over multiple listing service (MLS) data for broker-assisted transactions is that tax records provide information on the entire stock of existing properties, not only those that sell. Another is that MLS data do not cover all public transactions and, most important for the question addressed here, likely underreport foreclosed sales (Daneshvary and Clauretie, 2012, f.n. 10)—which may be more important in the most recent sample as more and more foreclosed properties in Orange County are apparently being sold directly to investment firms and other organized investors without being offered to individual buyers through traditional channels like the MLS. On the other hand, a disadvantage of tax records is that they provide no direct information about liquidity or time-on-the market for sold properties (although existing foreclosure studies using MLS data have not exploited liquidity data). Krainer (2001) shows that changes in buyer willingness-to-pay is reflected in both selling price and liquidity in search markets; recent empirical studies provide evidence of price-liquidity capitalization for both individual property and neighborhood characteristics (Turnbull et al., 2012; Turnbull and Zahirovic-Herbert, 2011; Waller et al., 2010). Therefore, the absence of marketing time measures in this study means that the price effects of foreclosures identified here, as well as the previous foreclosure literature, may reflect only one dimension of the possible capitalization effects.

The tax records yields detailed location information on property characteristics including addresses, the last five transaction prices, transaction dates, and deed type (which allows us to identify foreclosed properties). Figure 1 maps the Orange County parcel centroids over an area of approximately 48 by 30 miles. The transactions recorded in the tax assessor data correspond to the built-up areas of the county; the extreme northern most and eastern parts of the county are less developed than the central area. The single family detached houses (SFD) include 266,897 properties of which 82,429 properties sold at least once during the sample period January 1, 2007 through August 8, 2012. Figure 2 offers an overview of market conditions over the sample period. The number of transactions per month (upper curve in the left hand panel) fell dramatically during 2007 and have been slowly recovering since the nadir in early 2008. The number of foreclosure sales (lower curve in the left hand panel) picked up in early 2008 and remained stable until late 2010, after which foreclosure sales rose significantly. The right hand panel depicts the median price per square foot. The price rapidly declined from early 2007 through mid-2011, and has been modestly rising thereafter.

Table 1 reports the number of total SFD transactions including quit claims and other non-arm's length transactions and the number of sales of foreclosed properties. The pattern matches the information in Figure 2. Foreclosure related transactions account for a low of almost 4% of all transactions in 2007, rising to a peak of over 32% in 2010, falling to about 15% in 2011-12. Over the entire sample period, foreclosure related transactions account for 19.3% of total transactions.

The data include the transaction price, transaction date, and transaction type of the latest five transactions. Note that this study examines the price effects of completed foreclosures (the sale from real estate entity to market purchaser) on open market or arm-length transactions. The structure of the data source allows us to reliably reconstruct the transaction history over 2007-to mid-2012. This sample period captures the declining market over 2008-2010 and the weak recovery starting in early 2012. The dependent variable is the transaction price. The control variables measure property characteristics and location, time and seasonal fixed effects. The analysis focuses on single family detached houses (SFD).

Living area indicates the square feet of air-conditioned/heated area. Other property characteristics include the number of bedrooms, bathrooms, presence of a private swimming pool, house age, condition and type of exterior walls. Total land acreage is the measure of parcel size and includes both upland and any submerged area lying within the parcel legal boundary.

The data allows us to construct neighborhood housing market conditions indicators based on the number of transactions in the neighborhood within distance *d* taking place within time frame τ around transaction time *t* of each subject property. Foreclosures (*FS*) measures the number of sales of foreclosed houses in the surrounding area (1/10, ¼, ½, 1 mile) within at the given timeframe (180, 360 days around the transaction date) for each open market transaction. Market sales (*MS*) measures the number of SFD property sales in the area (1/10, ¼, ½, 1 mile) within the given timeframe (180, 360 days around the transaction date) for each market transaction in the estimation sample. New Construction (*NC*) measures the number of newly built single family properties in the area (1/10, ¼, ½, 1 mile) within the given timeframe (180, 360 days around the transaction date) of each subject property.

The estimating sample is based on transactions transferring warranty deeds and certificates of title and excludes all quit claim transactions. Following Daneshvary et al. (2011), we trim the lower and upper one percent of the distribution of price and living area to control for outliers. This eliminates 1,199 transactions. We also delete observations with structure age indicating the property is developed after the transaction date. All legal administrator's deed, tax deed and quit claim deeds (all for administrative non-arm's length transaction purposes) are removed, including all transactions for $100, the usual indicator of a non-market transfer of property interest. These filters remove 46,220 recorded transactions of which 25,829 appear to be unrelated and 21,764 related to foreclosure proceedings.

In this paper we define the maximum spatial extent of the surrounding neighborhood for each property as 1 mile, so while observations within 1 mile of the county boundary are used to construct instruments for total number of properties, market sales, new construction and foreclosed sales, they are not otherwise included in the price equation sample. Similarly, observations in the first 6-month time frame are excluded from the model estimation to construct our instruments. The number of observations in the sample is 44,611 of which 39,913 are open market transactions.

Table 2 reports the descriptive statistics for all sales, open market sales, and foreclosure sales. The table indicates a median price of $185,000 and a mean of almost $220,000 reflecting a distribution skewed to the right. We therefore use the natural logarithm of price in the empirical analysis. Structural property characteristics indicate the type of building construction material (63% have walls made of stucco covered concrete block versus wood frame construction), number of bedrooms (3.45 average), living area (2024 square feet average), number of bathrooms (2.30 average), presence of a private pool (26%), lot size (38,688 square feet average), structural quality (29% poor quality), and actual age of the house (22.8 years). Location controls include the quadratic distance to the Orlando CBD (8.98 miles linear distance average) and zip code fixed effects. Over 70 percent of the transactions lie within the City of Orlando, the largest and most populous municipality in Orange County.

The descriptive statistics report some differences in average property characteristics for market sales and foreclosure sales. According to Table 2, the average foreclosed property is smaller and older than the average market sale during the same time period. These differences account for at least some of the substantial difference in selling price observed for the two types of sales.

Table 3 gives summary statistics for the constructed variables measuring neighborhood market conditions including the number of foreclosures (*FS*), the number of market transactions (*MS*) and the number of newly constructed properties competing with the subject property (*NC*). The mean number of foreclosures in the surrounding neighborhood varies between 0.21 and 12.47 while the mean number of open market transactions varies between 1.46 and 66.74. Looking at the number of newly constructed properties within the indicated geographic area (1/10th mile, ¼th mile, ½ mile and 1 mile) and time frame (180 or 360 days around the subject property transaction date), the average new construction varies between 0.45 and 7.70 for the respective distance rings. These transactions can be interpreted relative to the density or mean total property which varies between 28.70 and 897.63 across the distance rings considered. Overall, the MS, FS, and NC measures of neighborhood market conditions all show substantial variation across the sample.

5. Empirical Results

Table 4 reports the estimated price effects of surrounding foreclosures on open market sales. The models indicate joint significance for all of the specifications. The first column gives the baseline model (1) without surrounding supply or foreclosure controls. The estimates are as expected. Property value decreases with distance to the CBD and the effect becomes less pronounced at greater distances. The structure quality and exterior construction matter. Lower quality structures sell for less than average or high quality structures. Also, property made from concrete block covered with stucco exhibit higher market values relative to wood frame construction. In addition, larger property in terms of number of bedrooms, living area, and number of bathrooms are associated with higher property values. A pool has a significant positive effect on property value in this market as does parcel size.

The models (2) - (4) include measures of neighborhood housing market conditions. Model (2) introduces the absolute number of surrounding foreclosures (*FS*), market sales

(*MS*) and new construction[2] (*NC*) for the indicated time frame and distance around the subject property.[3] The estimates reveal that foreclosures within ¼th mile and 180 days have a significantly negative effect of -0.013 on surrounding market sales. And the marginal effect of foreclosures is significantly stronger than that of market sales; the foreclosure coefficient is six times larger than market sales coefficient. This is evidence of a strong real neighborhood externality effect from foreclosures. Interestingly, the new construction coefficient is positive; by itself, this result indicates that new construction has a strong shopping externality effect on neighborhood housing, a result consistent with the notion that potential buyers regard new construction as a positive signal of neighborhood stability or growth.

Model (3) extends the definition of neighborhood, including the wider spatial rings of ¼ - ½ mile and, ½ mile – 1 mile. The *FS* coefficients decline in absolute value with greater distance from the subject property; the total foreclosure effect diminishes with distance. The *MS* coefficients also generally decline with distance, but the nearest competing houses reduce price while houses within ¼ - ½ mile increase price. This pattern is consistent with stronger shopping externalities for houses on the market in the ¼ - ½ mile range than houses that are closer (Turnbull and Dombrow, 2006). The *MS* coefficient for the farthest ring is not significantly different from zero. Pulling the *FS* and *MS* coefficients together, foreclosures exhibit strong negative real externality effects on neighborhood properties up to ½ mile. Beyond that point, the *FS* and *MS* coefficients are not significantly different, indicating that foreclosures have no marginal price effects beyond the net supply effects observed for any house on the market at that distance from the subject property. New construction, on the other

[2] We also estimate the model without new construction. These results indicate a stronger effect of FS on nearby property. For example, for model (2) the relevant foreclosure and open market coefficient estimates become -0.015 and -0.001, respectively.

[3] We also estimate the model with relative measures in terms of surrounding sales divided by Q, the total number of houses in surrounding ring at the time of transaction, viz. FS/Q and MS/Q and NC/Q. The qualitative results do not change. For example, for model (2) the relevant foreclosure, open market, and new construction coefficient estimates are -1.26; -0.18 and 0.12, the same pattern observed in the version of model (2) reported in Table 3.

hand, exhibits the same shopping externality effect as in model (2) for units within ¼ mile. The coefficients for units farther away are not significant.

Model (4) further distinguishes between spatial delineations and time frames. The model includes *FS*, *MS* and *NC* variables constructed for house sales 90-180 days before and after the subject property sale date in order to ascertain whether or not the original 90 day before-and-after time frame adequately captures competing houses on the market at the same time as the subject property. The spatial pattern of the original time frame foreclosure, market sales and new construction effects on price are unaffected by including the expanded time frame variables. The expanded time frame variables exhibit the same but diminished pattern of price effects for foreclosures but significant positive effects for market sales. The first result suggests that while the method of capturing overlapping market exposures for foreclosures and the subject property may be better served by the broader time frame, distance effects remain important regardless of the specific timeframe used to construct these variables. The positive market sales effect for the extended time frame variables is puzzling in light of the original estimates for the shorter time frame variables. As a result, we are not confident that the broader time frame is an improvement over the shorter time frame when measuring the number of competing houses on the market at the same time as the subject property.

We now turn to the possibility that the main effect of foreclosures on prices might be nonlinear or exhibit tipping point instability. Table 5 reports the estimates of several models to examine these questions. Model (5) includes first and second-order effects for all measures of competing houses in the neighborhood. The first order effects are consistent with the basic models examined earlier. The quadratic terms reveal interesting nonlinear patterns for foreclosures and market sales. The negative marginal foreclosure effect on price weakens as the number of foreclosures rises while the negative supply effect of market sales on price strengthens as the number of market sales rises. The marginal foreclosure real externality (holding total number of competing houses in the neighborhood constant) is $(\beta_{FS} + 2\beta_{FS}{}^2 FS) - (\beta_{MS} + 2\beta_{MS}{}^2 MS)$. This is negative for the reported parameter estimates when evaluated at the sample means (see Table 3), indicating a negative real externality effect of foreclosures on surrounding houses. Increasing the mix of foreclosures in the neighborhood, however, eventually eliminates the marginal real externality effect of additional foreclosures (again, holding the total number of houses for sale constant) and the underlying shopping externality begins to assert itself. In any case, these estimates offer no evidence of a tipping point, a point at which the negative externality effect dramatically reduces prices of properties surrounding foreclosures.

Models (6) and (7) employ a series of foreclosures dummy variables as a more flexible structure to capture any nonlinear effects not adequately captured in the quadratic formulation. The coefficients on the foreclosures dummy variables reflect the cumulative effect of the indicated number of foreclosures on price; the marginal effect is the difference between two successive category coefficients. The estimated coefficients imply an aggregate negative foreclosure effect at all levels, but a negative marginal effect only for the first foreclosure. There appears to be no cumulative negative real externality from more foreclosures, or at least that any real externality is offset by an attendant shopping externality that rises with greater concentrations of foreclosures within a quarter mile. Model (7) yields similar conclusions, except that point estimate of the marginal foreclosure externality effect now peaks at 2 foreclosures. Both sets of estimates clearly show that there is no tipping point structure present in the data.

What we obtained thus far is an average effect of foreclosure on property prices. But foreclosure effects may vary across housing market segments (Gerardi et al, 2012). Two competing arguments can be given. First, foreclosures might compete with properties at lower price points but not necessarily with properties at higher price points in the housing market because foreclosures are typically smaller (Harding et al, 2012), as is the case in our data. On the other hand, the negative real externality of poorly maintained properties or the value risk associated arising from neighborhood instability may affect higher price points segments of the market more strongly than lower price point segments. We apply quantile regression to consider these possibilities. Table 7 reports the estimates for price quantiles of 0.25, 0.50 and 0.75. From the results one observes that the marginal effect of foreclosures varies between -0.013 for low price points to -0.029 for the upper end housing market. This indicates that the foreclosure externality is more keenly felt at higher price points. This is consistent with the notion that neighborhood quality is a normal good. In this case higher income households have stronger demand for neighborhood quality than lower income households, which translates into stronger foreclosure externality effects on higher value houses than on lower valued houses.

In a different vein, Schuetz et al. (2008) assume that the ultimate effect of foreclosure may depend on the urban morphology or structure. Presumably a foreclosure is more visible and represents a greater proportion of existing housing in low density neighborhoods than in high density neighborhoods. As a result, the stronger signal from foreclosures in low density environments yields stronger price responses. We test for this effect by examining foreclosure price effects for subsamples partitioned by density. Figure 3 graphs the distribution of the number of single family housing units per acre, *U*, for the sample of transactions, where neighborhood density is calculated based on the total number of existing SFD housing units within one mile of each transaction. We partition the data into low density (up to 2 units per acre) and high density (more than 4 units per acre) and re-estimate the basic model on the resultant three subsamples. Table 7 reports the estimates. The point estimates of the foreclosure externality effect, as measured by the difference in *FS* and *MS* coefficients, indicate a somewhat stronger impact in the lowest density subsample when compared with the other two subsamples. These marginal impacts, however, are not significantly different across subsamples. In this market there is no evidence of the foreclosure signaling/density relationship envisioned by Schuetz et al. (2008).

6. Conclusions

Foreclosures influence nearby property values through two channels; negative real externalities arising from poorly maintained or vacant houses and pecuniary externalities arising from increasing the supply of housing for sale while removing the erstwhile owners as potential buyers from the market. It is important to understand how much of the spillover effects of foreclosures on surrounding property values is a pecuniary externality and how much is a real externality. Both put downward pressure on prices and therefore are a source of concern to homeowners and local governments, but only real externalities engender a loss of economic efficiency. While uncomfortable for property owners and local governments alike, pecuniary externalities arising from the supply effect of foreclosures simply reflect the market at work balancing supply and demand and do not represent social cost.

This study offers a simple empirical approach to identifying the real externality of foreclosures, estimating the effects of additional foreclosures in the neighborhood while holding constant the surrounding supply of competing houses on the market. In addition, the introduction of neighborhood new construction into the empirical framework controls for possible shopping externality effects if buyers interpret new construction as a signal of neighborhood stability or future growth, removing these possibly confounding influences on the estimated foreclosure externality effects.

Data from Orange County, Florida, reveal that nearby foreclosures reduce property prices by approximately 1.3 to 2.9%. Removing the supply effect, these estimates imply real externality effects of 1.0 to 2.5%. The estimates reveal that most of the foreclosure spillover effect appears to be a real externality effect. While significant, the supply effect is much more modest. Not surprisingly, the externality is stronger for nearby foreclosures than for those farther away. And while marginal foreclosure effects appear to be nonlinear, we find no evidence of critical tipping points. Looking at the variety of outcomes across market segments, the foreclosure externality is weakest for neighborhoods with lower price points and strongest for higher value neighborhoods. The effect does not appear to vary significantly across neighborhoods of different densities.

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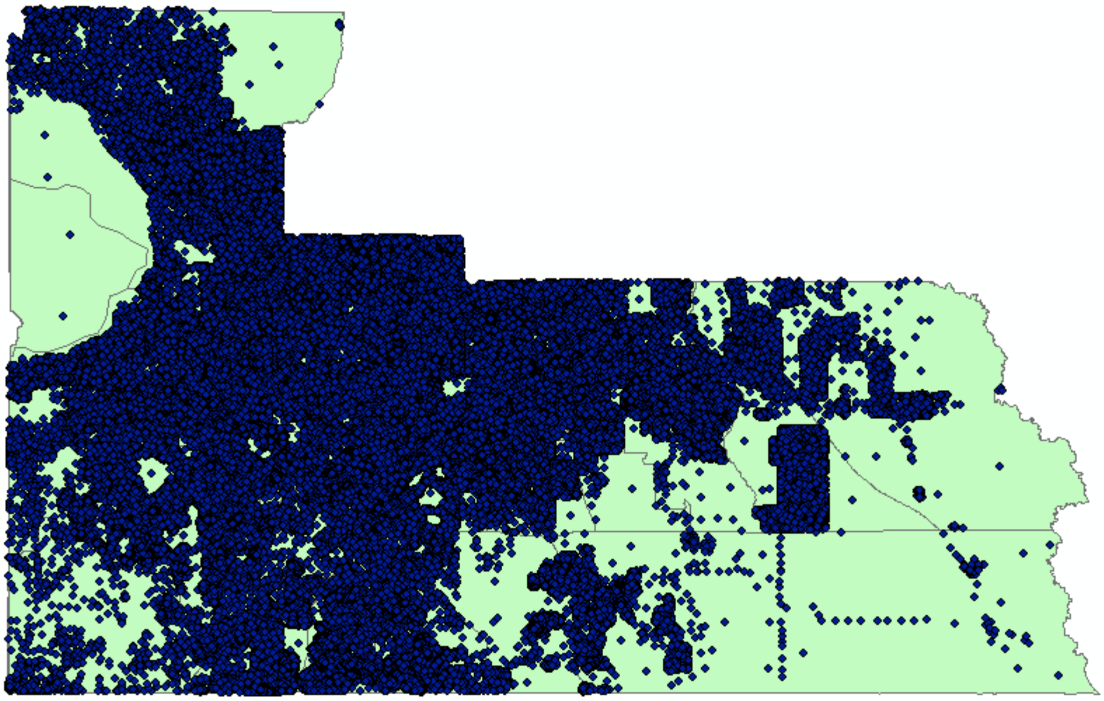
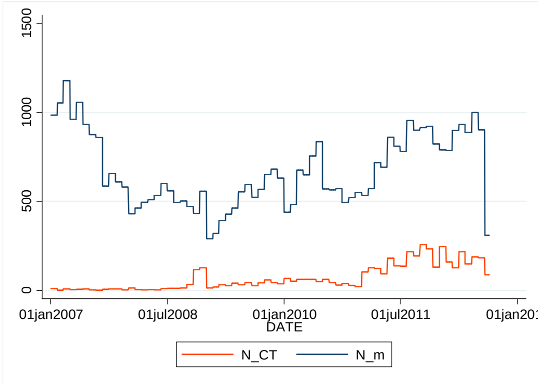
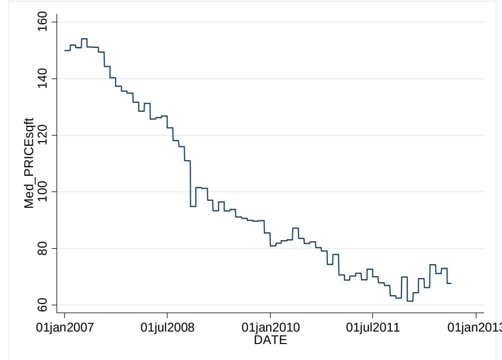


Figure 1. GIS information of parcel level data, Orange County FL 2012



Number of transactions per month (blue) and number of foreclosures (orange)



Median price per sq.ft per month

Figure 2. Number of Transactions (left panel) and Median Price per sq.ft (right panel)

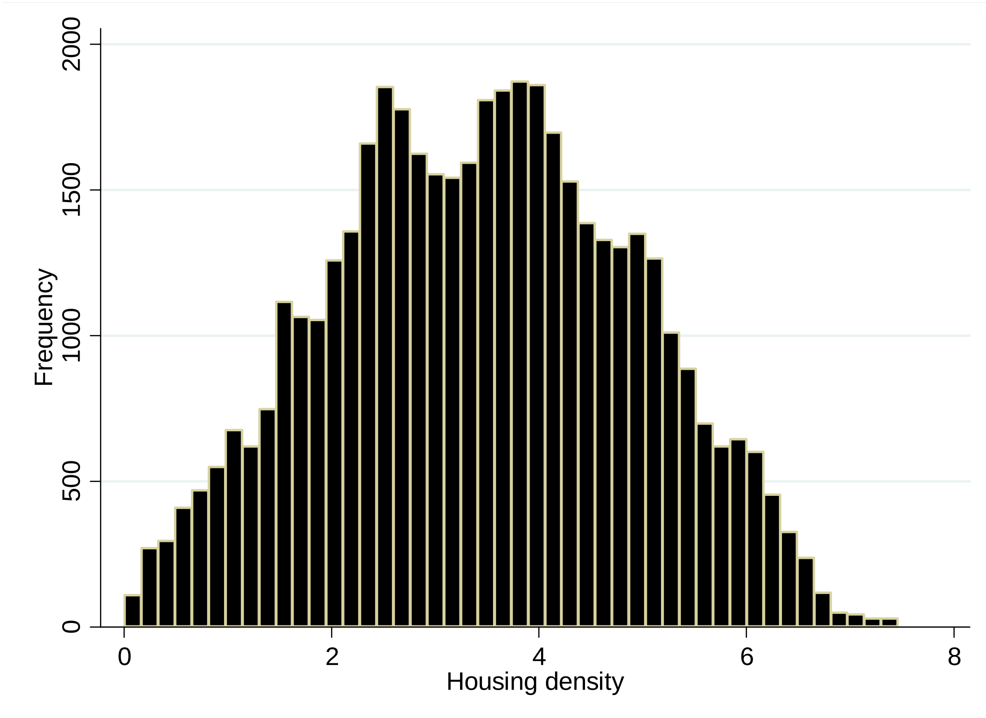


Figure 3. Single family housing density in units per acre

Table 1 Number of Orange County SFD transactions and foreclosures.

Year	Transactions	Foreclosures	Foreclosure % of Total
2007	23,246	912	3.9
2008	16,167	3,424	21.2
2009	19,194	5,872	30.6
2010	20,945	6,716	32.1
2011	21,374	2,974	13.9
2012*	12,186	1,950	16.0
Cumulative	113,112	21,848	19.3

* January 1 through August 8, 2012.

Table 2 Descriptive statistics

	All Sales			Market Sales			Foreclosed Sales		
	Median	Mean	St.dev.	Median	Mean	St.dev.	Median	Mean	St.dev.
Price ($, current)	185,000	219,821	174,419	199,000	234,425	176,698	79,100	95,748	80,119
Distance CBD * (miles)		8.98	4.18		8.98	4.21		9.00	3.92
Walls Concrete Block Stucco		0.63			0.63			0.61	
Number of Bedrooms:		3.45	0.79		3.45	0.79		3.42	0.77
less than 3		0.08			0.08			0.08	
3 rooms		0.48			0.48			0.52	
more than 3		0.44			0.44			0.41	
Living Area (sq.ft)		2024	824		2040	830		1889	759
<1,500		0.31			0.31			0.38	
>= 1,500 & =<2,500		0.43			0.42			0.41	
> 2,500+		0.26			0.27			0.21	
Number of Bathrooms		2.30	0.78		2.32	0.79		2.20	0.71
1.00		0.09			0.09			0.10	
1.50		0.03			0.03			0.05	
2.00		0.51			0.51			0.55	
2.50		0.12			0.12			0.12	
3.00+		0.25			0.26			0.19	
Pool		0.26			0.27			0.21	
Parcel size (sq.ft)		38,688	38,412		40,079	39,637		26,872	22,527
Property quality									
below average		0.29			0.28			0.32	
average		0.35			0.35			0.40	
above average		0.36			0.37			0.28	
Age of property (years)	22.80	20.35			22.61	20.50		24.45	18.96

Table 2 continued

	All Sales			Market Sales			Foreclosed Sales		
	Median	Mean	St.dev.	Median	Mean	St.dev.	Median	Mean	St.dev.
Year of Transaction									
2007		0.23			0.25			0.01	
2008		0.13			0.14			0.07	
2009		0.13			0.14			0.09	
2010		0.16			0.16			0.12	
2011		0.21			0.18			0.41	
2012*		0.14			0.13			0.29	
Municipality									
Apoka		0.07			0.07			0.08	
Christmas		<0.01			<0.01			<0.01	
Gotha		<0.01			<0.01			<0.01	
Maitland		0.01			0.01			<0.01	
Mount Dora		0.01			0.01			<0.01	
Ocoee		0.04			0.04			0.04	
Orlando		0.73			0.73			0.78	
Windermere		0.04			0.04			0.03	
Winter Garden		0.06			0.06			0.05	
Winter Park		0.03			0.03			0.01	
Zellwood		<0.01			<0.01			<0.01	
N	44,611			39,913			4,698		

* CBD relates to the Intersection of Central Blvd and Orange Av. Orlando Fl. The calendar year 2012 relates to: 01.01.2012 – 08.24.2012.

Table 3 Number of Transactions of similar property by neighborhood distance definition and timeframe

	Spatial delineation	1/10 mile	¼ mile	½ mile	1 mile
Number of Foreclosures					
180 day Timeframe	Mean	0.21	0.85	2.26	6.27
	St.dev	(0.56)	(1.45)	(3.15)	(7.76)
	Min	0	0	0	0
	Max	7	15	36	72
360 day Timeframe	Mean	0.44	1.69	4.47	12.47
	St.dev	(0.90)	(2.52)	(5.73)	(14.66)
	Min	0	0	0	0
	Max	12	29	52	132
Number of open market transactions					
180 day Timeframe	Mean	1.46	4.99	12.53	34.10
	St.dev	(2.04)	(4.82)	(9.46)	(22.96)
	Min	0	0	0	0
	Max	33	77	98	197
360 day Timeframe	Mean	2.73	9.61	24.40	66.74
	St.dev	(3.23)	(8.38)	(17.56)	(44.25)
	Min	0	0	0	0
	Max	49	120	172	328
Number of newly constructed property					
180 day Timeframe	Mean	0.45	1.07	1.82	3.82
	St.dev	(2.03)	(4.36)	(6.12)	(9.81)
	Min	0	0	0	0
	Max	36	100	127	143
360 day Timeframe	Mean	0.81	2.06	3.60	7.70
	St.dev	(3.33)	(7.81)	(11.44)	(19.24)
	Min	0	0	0	0
	Max	52	123	169	290
Total property					
	Mean	28.70	114.46	313.80	897.63
	St.dev	(17.58)	(71.33)	(201.59)	(556.42)
	Min	1	1	1	1
	Max	136	504	1,290	2,988

*Figures indicate mean statistic. St.dev refers to standard deviation in parenthesis. Variables are constructed for estimating sample of 39,913.

Table 4 Estimation results for base hedonic models

	(1)			(2)			(3)			(4)		
Structural property characteristics												
Distance CBD * (miles)	-0.03	***	(0.01)	-0.02	***	(0.01)	-0.02	***	(0.005)	-0.02	***	(0.005)
Distance CBD squared	0.002	***	(0.0002)	0.002	***	(0.00)	0.002	***	(0.0002)	0.002	***	(0.0002)
Property quality below average	-0.02	***	(0.005)	-0.02	***	(0.01)	-0.02	***	(0.005)	-0.02	***	(0.005)
Property quality above average	0.001		(0.004)	-0.001		(0.004)	-0.001		(0.004)	-0.001		(0.004)
Walls Concrete Block Stucco	0.14	***	(0.005)	0.14	***	(0.005)	0.14	***	(0.005)	0.14	***	(0.005)
Number of Bedrooms: less than 3	-0.11	***	(0.008))	-0.11	***	(0.008)	-0.11	***	(0.008)	-0.11	***	(0.008)
Number of Bedrooms: more than 3	0.03	***	(0.005)	0.03	***	(0.004)	0.03	***	(0.005)	0.03	***	(0.005)
Living Area <1,500 sq.ft	-0.17	***	(0.005)	-0.17	***	(0.005)	-0.16	***	(0.005)	-0.16	***	(0.005)
Living Area > 2,500+ sq.ft	0.25	***	(0.006)	0.24	***	(0.006)	0.24	***	(0.006)	0.24	***	(0.006)
Number of Bathrooms: 1.00	-0.29	***	(0.008)	-0.29	***	(0.008)	-0.30	***	(0.008)	-0.30	***	(0.008)
Number of Bathrooms: 1.50	-0.19	***	(0.01)	-0.19	***	(0.01)	-0.19	***	(0.01)	-0.19	***	(0.01)
Number of Bathrooms: 2.50	0.06	***	(0.006)	0.06	***	(0.006)	0.06	***	(0.006)	0.06	***	(0.006)
Number of Bathrooms: 3.00+	0.16	***	(0.007)	0.16	***	(0.007)	0.16	***	(0.007)	0.16	***	(0.007)
Pool	0.14	***	(0.004)	0.14	***	(0.004)	0.14	***	(0.004)	0.14	***	(0.004)
Log Parcel size	0.36	***	(0.004)	0.35	***	(0.004)	0.35	***	(0.004)	0.35	***	(0.004)
Constant	7.86	***	(0.08)	7.95	***	(0.08)	7.98	***	(0.08)	7.77	***	(0.10)

Table 4 continued

Table 4 continued	(1)	(2)			(3)			(4)		
Neighborhood housing market conditions										
Foreclosures (0 - 180, 0 - quart mile)		-0.013	***	(0.001)	-0.009	***	(0.002)	-0.008	***	(0.002)
Foreclosures (0 - 180, quart – half mile)					-0.005	***	(0.001)	-0.004	***	(0.001)
Foreclosures (0 - 180, half –mile)					-0.003	***	(0.0005)	-0.001	**	(0.0006)
Foreclosures (180 - 360 , 0 - quart mile)								-0.006	***	(0.002)
Foreclosures (180 - 360 , quart – half mile)								-0.004	**	(0.001)
Foreclosures (180 - 360 , half –mile)								-0.002	**	(0.0006)
Market Sales (180, 0 - quart mile)		-0.003	***	(0.001)	-0.003	***	(0.0005)	-0.003	***	(0.0006)
Market Sales (0 - 180, quart – half mile)					0.0008	**	(0.004)	0.000		(0.0005)
Market Sales (0 - 180, half –mile)					-0.0003		(0.0002)	-0.0005	**	(0.0003)
Market Sales (180 - 360 , 0 - quart mile)								0.002	***	(0.0006)
Market Sales (180 - 360 , quart – half mile)								0.002	***	(0.0005)
Market Sales (180 - 360 , half –mile)								0.0003		(0.0003)
New Construction (0 -180, quart mile)		0.003	***	(0.001)	0.004	***	(0.0057)	0.003	***	(0.0006)
New Construction (0 -180, quart – half mile)					-0.0007		(0.0007)	0.0004		(0.0009)
New Construction (0 -180, half –mile)					-0.0004		(0.0003)	-0.00002		(0.0009)
New Construction (180 - 360 , 0 - quart mile)								-0.003	***	(0.0008)
New Construction (180 - 360 , quart – half mile)								-0.001		(0.0005)
New Construction (180 - 360 , half –mile)								-0.0005		(0.0005)
R^2	78.6	78.7			78.7			78.8		
F-statistic	2,281	2,192			2,017			1800		
Root MSE	0.34	0.34			0.34			0.34		
N	39,913									

Note: Dependent variable is log of transaction price. The reference category include Number of Bedrooms equals 3, Living area of 1,500-2,500, Number of Bathrooms equals 2,00 and Average Property Quality. All models include fixed effects for year, quarter and location. Specification (1) includes the baseline specification. Specifications (2) – (4) vary in spatial delineations and timeframes. Standard errors are in parentheses with *** , **, * indicating significant at 1%, 5% and 10%, respectively.

Table 5 Estimation results for tipping point models

	(5)			(6)			(7)		
Distance CBD * (miles)	-0.02	***	(0.01)	-0.02	***	(0.01)	-0.02	***	(0.01)
Distance CBD squared	0.002	***	(0.0002)	0.002	***	(0.00)	0.002	***	(0.0002)
Property quality below average	-0.02	***	(0.005)	-0.02	***	(0.01)	-0.02	***	(0.01)
Property quality above average	-0.002		(0.004)	-0.002		(0.004)	-0.003		(0.004)
Walls Concrete Block Stucco	0.14	***	(0.005)	0.14	***	(0.005)	0.14	***	(0.005)
Number of Bedrooms: less than 3	-0.11	***	(0.008)	-0.11	***	(0.008)	-0.11	***	(0.008)
Number of Bedrooms: more than 3	0.03	***	(0.005)	0.03	***	(0.005)	0.03	***	(0.005)
Living Area < 1,500 sq.ft	-0.17	***	(0.005)	-0.17	***	(0.005)	-0.17	***	(0.005)
Living Area > 2,500+ sq.ft	0.24	***	(0.006)	0.24	***	(0.006)	0.24	***	(0.006)
Number of Bathrooms: 1.00	-0.29	***	(0.008)	-0.29	***	(0.008)	-0.29	***	(0.008)
Number of Bathrooms: 1.50	-0.19	***	(0.01)	-0.18	***	(0.01)	-0.18	***	(0.01)
Number of Bathrooms: 2.50	0.06	***	(0.006)	0.06	***	(0.006)	0.06	***	(0.006)
Number of Bathrooms: 3.00+	0.16	***	(0.007)	0.16	***	(0.007)	0.16	***	(0.007)
Pool	0.14	***	(0.004)	0.14	***	(0.004)	0.14	***	(0.004)
Log Parcel size	0.35	***	(0.004)	0.34	***	(0.004)	0.34	***	(0.004)
Constant	7.74	***	(0.095)	7.77	***	(0.095)	7.79	***	(0.095)

Table 5 continued

Table 5 continued	(5)			(6)			(7)		
Foreclosures (180, 0 - quart mile)	-0.021	***	(0.003)						
Foreclosures (180, 0 - quart mile) squared	0.001	***	(0.0004)						
Market Sales (180, 0 - quart mile)	-0.001	*	(0.0008)	-0.003	***	(0.0003)			
Market Sales (180, 0 - quart mile) squared	-0.00006	**	(0.00003)						
Market Sales (360, 0 - quart mile)							-0.001	***	(0.0002)
New Construction (180, 0 - quart mile)	0.005	***	(0.0008)	0.002	***	(0.0003)			
New Construction (180, 0 - quart mile) squared	-0.00001		(0.00002)						
New Construction (360, 0 - quart mile)							0.0009	***	(0.0002)
# Foreclosures (180, 0 - quart mile) = 1				-0.027	***	(0.005)			
# Foreclosures (180, 0 - quart mile) = 2				-0.019	***	(0.003)			
# Foreclosures (180, 0 - quart mile) = 3				-0.019	***	(0.003)			
# Foreclosures (180, 0 - quart mile) = 4				-0.011	***	(0.003)			
# Foreclosures (180, 0 - quart mile) = 5				-0.009	***	(0.003)			
# Foreclosures (180, 0 - quart mile) = 6				-0.016	***	(0.003)			
# Foreclosures (180, 0 - quart mile) = 7				-0.010	**	(0.004)			
# Foreclosures (180, 0 - quart mile) = 7 - 10				-0.011	***	(0.003)			
# Foreclosures (180, 0 - quart mile) = 10+				-0.008	**	(0.004)			
# Foreclosures (360, 0 - quart mile) = 1							-0.014	***	(0.0047)
# Foreclosures (360, 0 - quart mile) = 2							-0.016	***	(0.0029)
# Foreclosures (360, 0 - quart mile) = 3							-0.016	***	(0.0024)
# Foreclosures (360, 0 - quart mile) = 4							-0.014	***	(0.0022)
# Foreclosures (360, 0 - quart mile) = 5							-0.105	***	(0.0021)
# Foreclosures (360, 0 - quart mile) = 6							-0.013	***	(0.0020)
# Foreclosures (360, 0 - quart mile) = 7							-0.011	***	(0.0020)
# Foreclosures (360, 0 - quart mile) = 7 - 10							-0.009	***	(0.0014)
# Foreclosures (360, 0 - quart mile) = 10+							-0.007	***	(0.0011)
R^2	78.7			78.7			78.7		
F	2,100			1,960			1,961		
Root MSE	0.34			0.34			0.34		
N	39,913			39,913			39,913		

Note: the dependent variable is log transaction value. The reference category include Number of Bedrooms equals 3, Living area of 1,500-2,500, Number of Bathrooms equals 2,00 and Average Property

Quality. All models include fixed effect year and quarter dummies. Specification (5) relates to model (2) with second order effects. Standard errors are in parentheses with *** , **, * indicating significant at 1%, 5% and 10%, respectively.

Table 6 Quantile regression model estimation results

	25th percentile			50th percentile			75th percentile		
Distance CBD * (miles)	-0.014	***	(0.0035)	-0.006	**	(0.03)	-0.03	***	(0.0025)
Distance CBD squared	0.00004	***	(0.0002)	0.0008	***	(0.0001)	0.002	***	(0.0001)
Property quality below average	-0.05	***	(0.005)	0.002	***	(0.004)	0.06	***	(0.006)
Property quality above average	-0.028	***	(0.004)	-0.020	***	(0.003)	-0.008	*	(0.0045)
Walls Concrete Block Stucco	0.16	***	(0.007)	0.12	***	(0.004)	0.10	***	(0.003)
Number of Bedrooms: less than 3	-0.10	***	(0.012)	-0.10	***	(0.009)	-0.10	***	(0.008)
Number of Bedrooms: more than 3	0.03	***	(0.006)	0.03	***	(0.004)	0.03	***	(0.004)
Living Area <1,500 sq.ft	-0.17	***	(0.005)	-0.15	***	(0.004)	-0.15	***	(0.004)
Living Area > 2,500 sq.ft	0.20	***	(0.005)	0.22	***	(0.005)	0.26	***	(0.005
Number of Bathrooms: 1.00	-0.38	***	(0.013)	-0.27	***	(0.011)	-0.19	***	(0.009)
Number of Bathrooms: Bath 1.50	-0.28	***	(0.021)	-0.21	***	(0.011)	-0.14	***	(0.014)
Number of Bathrooms: Bath 2.50	0.09	***	(0.005)	0.07	***	(0.005)	0.06	***	(0.006)
Number of Bathrooms: Bath 3.00+	0.16	***	(0.007)	0.17	***	(0.005)	0.18	***	(0.004)
Pool	0.11	***	(0.004)	0.12	***	(0.003)	0.12	***	(0.003)
Log Parcel size	0.44	***	(0.004)	0.39	***	(0.004)	0.35	***	(0.004)
Constant	7.13	***	(0.052)	7.88	***	(0.046)	8.55	***	(0.040)
Neighborhood housing market conditions									
Foreclosures (180, 0 - quart mile)	-0.013	***	(0.0023)	-0.020	***	(0.0025)	-0.029	***	(0.0027)
Foreclosures (180, 0 - quart mile) squared	0.001	***	(0.0002)	0.001	***	(0.0002)	0.002	***	(0.0004)
Market Sales (180, 0 - quart mile)	-0.002	***	(0.0007)	-0.003	***	(0.0006)	-0.004	***	(0.0006)
Market Sales (180, 0 - quart mile) squared	-0.00005	***	(0.00001)	-0.00002		(0.00002)	0.00003		(0.0003)
New Construction (180, 0 - quart mile)	0.007	***	(0.0007)	0.0071	***	(0.0006)	0.008	***	(0.0006)
New Construction (180, 0 - quart mile) squared	-0.00004	***	(0.00001)	-0.00007	***	(0.00001)	-0.0001	***	(0.00002)
R2	58.0			57.3			57.7		
N = 39,913									

Note: the dependent variable is log transaction value. The reference category include Number of Bedrooms equals 3, Living area of 1,500-2,500, Number of Bathrooms: equals 2,00 and Average Property Quality. All models include fixed effect year and quarter dummies. Specification (5) relates to model (2) with second order effects. Standard errors are in parentheses with *** , **, * indicating significant at 1%, 5% and 10%, respectively.

Table 7 Robustness results for model (2) by housing density

	<= 2.00 U			2 .00 U < D < 4.00 U			D>=4.00 U		
Structural property characteristics									
Distance CBD * (miles)	-0.03	***	(0.01)	-0.01	***	(0.008)	-0.08	***	(0.01)
Distance CBD squared	0.002	***	(0.0002)	0.001	***	(0.0003)	0.005	***	(0.0007)
Property quality below average	0.03	***	(0.005)	-0.06	***	(0.007)	-0.013		(0.009)
Property quality above average	0.02		(0.004)	-0.01		(0.007)	0.03	***	(0.008)
Walls Concrete Block Stucco	0.21	***	(0.005)	0.14	***	(0.007)	0.11	***	(0.008)
Number of Bedrooms: less than 3	-0.22	***	(0.008))	-0.11	***	(0.011)	-0.09	***	(0.012)
Number of Bedrooms: more than 3	0.02	***	(0.005)	0.03	***	(0.006)	0.04	***	(0.008)
Living Area < 1,500 sq.ft	-0.17	***	(0.005)	-0.18	***	(0.008)	-0.15	***	(0.008)
Living Area > 2,500+ sq.ft	0.22	***	(0.006)	0.25	***	(0.008)	0.24	***	(0.013)
Number of Bathrooms: 1.00	-0.30	***	(0.008)	-0.33	***	(0.01)	-0.27	***	(0.011)
Number of Bathrooms: 1.50	-0.30	***	(0.01)	-0.17	***	(0.02)	-0.19	***	(0.014)
Number of Bathrooms: 2.50	0.05	***	(0.006)	0.06	***	(0.009)	0.08	***	(0.011)
Number of Bathrooms: 3.00+	0.15	***	(0.007)	0.16	***	(0.009)	0.15	***	(0.013)
Pool	0.18	***	(0.004)	0.14	***	(0.007)	0.12	***	(0.008)
Log Parcel size	0.40	***	(0.004)	0.34	***	(0.006)	0.29	***	(0.009)
Constant	8.03	***	(0.08)	8.56	***	(0.08)	9.09	***	(0.15)
Neighborhood housing market conditions									
Foreclosures (0 - 180, 0 - quart mile)	-0.015	***	(0.03)	-0.011	***	(0.002)	-0.012	***	(0.002)
Market Sales (180, 0 - quart mile)	-0.002	**	(0.001)	-0.0009		(0.0007)	-0.004	***	(0.0009)
New Construction (0 -180, 0 - quart mile)	0.001		(0.0009)	0.004	***	(0.0008)	0.006	***	(0.0018)
R2	81.2			78.4			75.2		
F	506			1,042			775		
Root MSE	0.31			0.33			0.35		
N	7,068			18,462			14,382		

Note: the dependent variable is log transaction value. The reference category include Number of Bedrooms equals 3, Living space of 1,500-2,500, Number of Bathrooms equals 2,00 and Average Property. Quality. All models include fixed effect year, quarter and ZIP location dummies. *U* represents the single family housing Density (D) defined as the number of units per acre. Standard errors are in parentheses with *** , **, * indicating significant at 1%, 5% and 10%, respectively.