Distressed Sales and the FHFA House Price Index

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Abstract

Trends in residential house values can be expressed by changes in House Price Indexes (HPIs). Since the recent housing crash, distressed sales have increased in numbers and have led to concerns about how they affect HPIs. This paper has three parts. First, FHFA's standard HPIs are compared to HPIs constructed without distressed sales. Second, FHFA's identification of distressed sales is validated against a public data source. Third, the distressed sale discount is shown to vary across time and place. The magnitude of the discount also depends on whether the current or prior recent sales are distressed.

Distressed sales (sales of REO and short sales) have comprised a significant share of real estate transactions since the start of the housing bust.[1] Distressed sales differ from traditional or arms-length transactions in several ways that affect asset valuations. For instance, they may come with significant discounts because of extra-motivated sellers. Distressed sales also are discounted, at times, because of quality-related problems (FHFA 2012c). Not surprisingly, in the context of tracking real estate values with price indexes, such sales can have a non-trivial effect on measured price changes. Removing such sales from the indexing sample and re-estimating a "distress-free" set of metrics can produce different estimates of short- and medium-run price changes than are reflected in the standard index where distressed sales are included but not identified. The gap between the measured price change estimates reflects the fact that: (a) the share of distressed sales varies over time and (b) the discount associated with distressed sales is large and not fixed.

This paper begins by comparing the Federal Housing Finance Agency's (FHFA) standard index against the newly released "distress-free" index approach (FHFA 2012a). The analysis shows sizeable deviations in recent periods. In short, distressed sales matter a great deal to index estimates. Next, the paper attempts to validate FHFA's current approach to identifying distressed sales. Identifying such sales is not a straightforward exercise and, while FHFA believes that its current approach is reasonable, no approach is perfect. Employing an outside data source from the Florida Department of Revenue (FDOR), the analysis studies the consistency with which FHFA's

approach aligns with distressed sales identifications made by county assessors. At least in Florida, there is strong evidence for the reliability of FHFA's current approach. Finally, the paper studies the discounts associated with real estate owned (REO) and short sales. A simple approach to measuring the impact of distressed sales on index valuations is discussed and we report the empirically estimated magnitudes of such discounts. A discussion and conclusion follow.

II Comparing Standard and Distress-Free Indexes

We celebrated recently the fiftieth anniversary of the seminal work where Bailey et al. (1963) define a statistical technique to measure house price changes in real estate markets. The estimation—dubbed a repeat sales method—requires limited data about sales transactions and avoids the need for actual characteristics or details of the properties. The methodology produces more stable and lower index estimates than the previously used chain method. Further studies have since refined and popularized the repeat sales method (see Case and Shiller 1987, 1989). Other classic works have tried to steer the literature away from repeat sales and toward hedonic approaches (Rosen 1974). This line of applied work questions whether benefits from property characteristics are internalized in house prices (Linneman 1980), considers how the marginal values of property characteristics differ across regions (Sirmans et al. 2006), and, more recently, even applies the hedonic approaches to create land price indexes (Sirmans and Slade 2012). Alternatives to the repeat sales approach certainly exist (Gatzlaff and Ling 1994; Noeth and Sengupta 2011); however, the simplicity and minimal data requirements have established it as a leading method for measuring housing market trends.

As part of its regulatory role in the housing finance system, the FHFA has been producing house price indexes (HPIs) using a repeat sales approach since March 1996.[2] Three versions of the HPI are published: the "purchase-only", "all-transactions", and "expanded-data" indexes. The sole distinction between the different versions is the underlying data samples used for index estimation.[3] Within the different versions of the HPI, separate indexes are calculated for various geographic

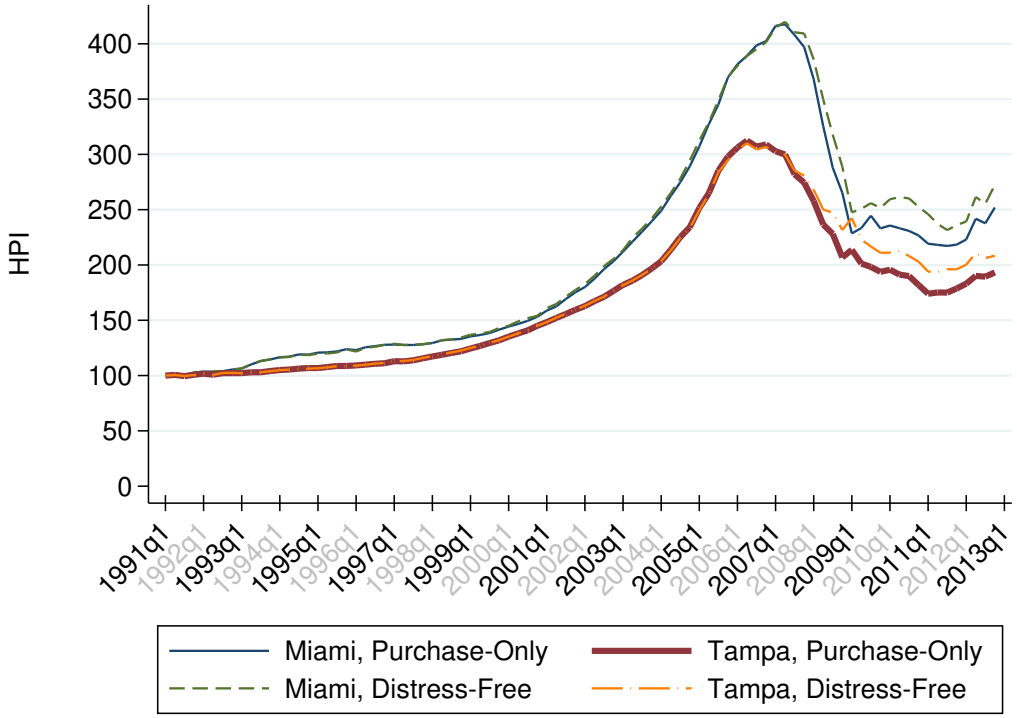
areas (nationwide, census divisions, states, and metropolitan areas). All of these HPIs and flavors employ a weighted, repeat sales methodology that measures average price changes in repeat transactions on the same properties (for statistical details, refer to Calhoun 1996).

Recently, FHFA has begun publishing a distress-free HPI as an offshoot of its purchase-only suite of indexes. The new index is estimated with a dataset that does not include distressed sales. To identify and remove distressed sales, FHFA uses mortgage performance data, deed data, and preforeclosure records. A transaction is considered "distressed" in cases where at least one of the three data sources indicates some type of distress.

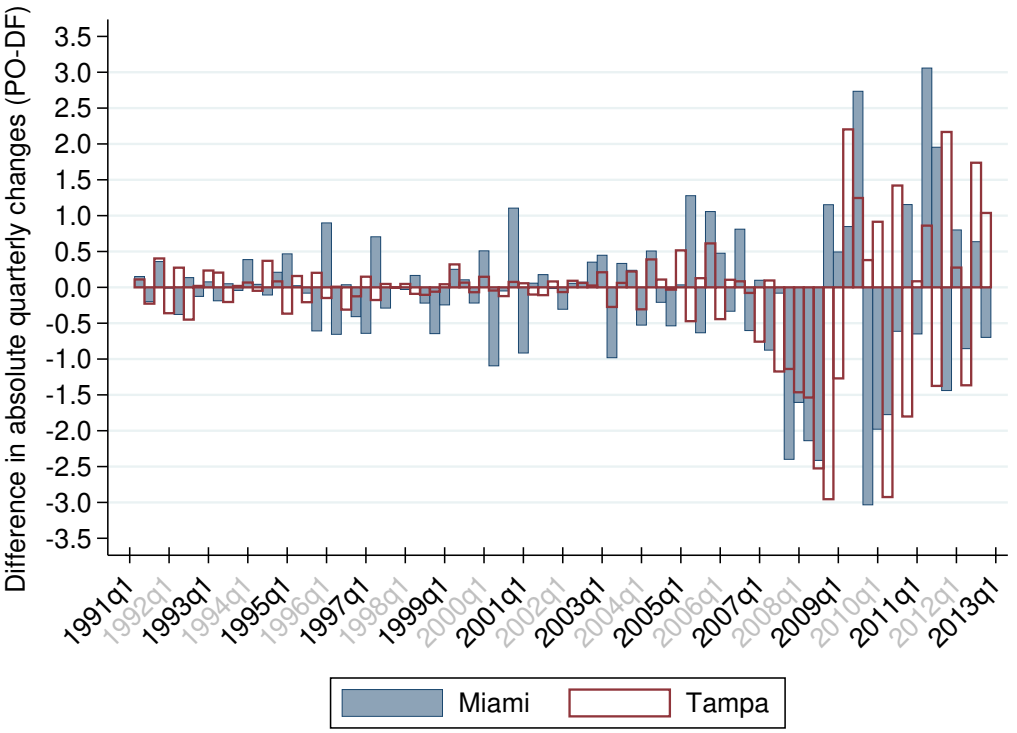
The first of the three data sources, mortgage performance data, includes information on the payment and delinquency status of loans guaranteed by Fannie Mae and Freddie Mac (hereafter called the "Enterprises") or endorsed by the Federal Housing Administration (FHA). A sales transaction is labeled as distressed if the Enterprise or FHA payment data indicate that the seller was delinquent by two or more months at some time in the preceding twelve months.[4] The second of the three data sources, deed data from county recorder offices, is licensed from DataQuick Information systems. A sales transaction is considered distressed if the deed data indicate that the bank or mortgagee took over the property during the preceding year. Such transfers are associated with the recording of certain deed types and other documents, including Trustee Deeds upon Sale, Foreclosure Deeds, Sheriff's Deed, and Certificates of Final Judgment. The third and final dataset used for identifying distressed sales entails preforeclosure data licensed from CoreLogic. These data, which are useful particularly where the seller does not have an Enterprise or FHA-endorsed mortgage (i.e., where mortgage performance data are unavailable to FHFA), include public notices of borrower distress. These records include Notices of Default and Lis Pendens filings. Such filings reflect the early stage of the foreclosure process and signal borrowers who have been late on their payments. To summarize, if any of the three datasets (mortgage performance data, deed data, and preforeclosure records) contains a flag then the property transaction is labeled with the distressed sale indicator.[5]

Exhibit 1: HPI Trends Over Time: Purchase-Only (PO) versus Distress-Free (DF)

(a) The PO and DF HPI index levels



(b) The difference in absolute quarterly changes, or abs(ΔPO) – abs(ΔDF)



Source: FHFA.

Using the various internal and external data sources to identify and remove distress sales, distress-free HPIs are created with the same repeat sales methodology as is used to estimate the standard purchase-only indexes. Exhibit 1 offers a visual comparison of the standard purchase-only and distress-free indexes (abbreviated as PO and DF, respectively, in the figure) for two metro areas in Florida. All of the data are computed quarterly and seasonally adjusted. The top panel (a) shows the HPI index levels (to show the levels and basic movements of the purchase-only and distress-free HPIs in each areas) while the bottom panel (b) presents the differences in the absolute values of the month-over-month changes between the purchase-only and distress-free HPIs (to show when the change in the purchase-only HPIs has a higher absolute magnitude than the change in the distress-free HPIs). The seasonally adjusted purchase-only HPI levels follow similar trends: they increase dramatically in the early 2000s, peak at the end of 2006 or start of 2007, and drop sharply until 2009. The HPI levels are relatively stagnant for several years until they begin to rise again at the start of 2012. For both metro areas, the distress-free index levels mimic the full-sample, purchase-only index levels until the housing market crash when the purchase-only index levels fall more than the distress-free index levels in panel (a). In Tampa, the purchase-only index level drops a further distance but the quarterly changes of both indexes appear relatively similar starting in 2009 (note the smaller heights of the transparent red bars in panel (b)). The story is not the same in Miami where the distress-free index level stabilizes for several quarters prior to 2009 than drops suddenly in the middle of that year (see how the solid blue bar areas are small and positive but then become negative and large before 2010 in panel (b), meaning that Miami's distress-free HPI has a much larger month-over-month change than its purchase-only HPI.). These graphical examples suggest that distressed transactions tend to depress index estimations and that appreciation/depreciation rates may vary over time and between geographic areas. Miami exhibits more volatility, as shown by the greater absolute heights of the blue area bars in panel (b), regardless if the differences are positive or negative. The small size of the red bar areas implies Tampa evaded the effects of distressed sales until the housing bust. Clearly, there is a visual difference between the two types of indexes after the financial crisis began. The next section addresses the validation of the distressed

sale flags.

III Validating How Distressed Sales Are Flagged

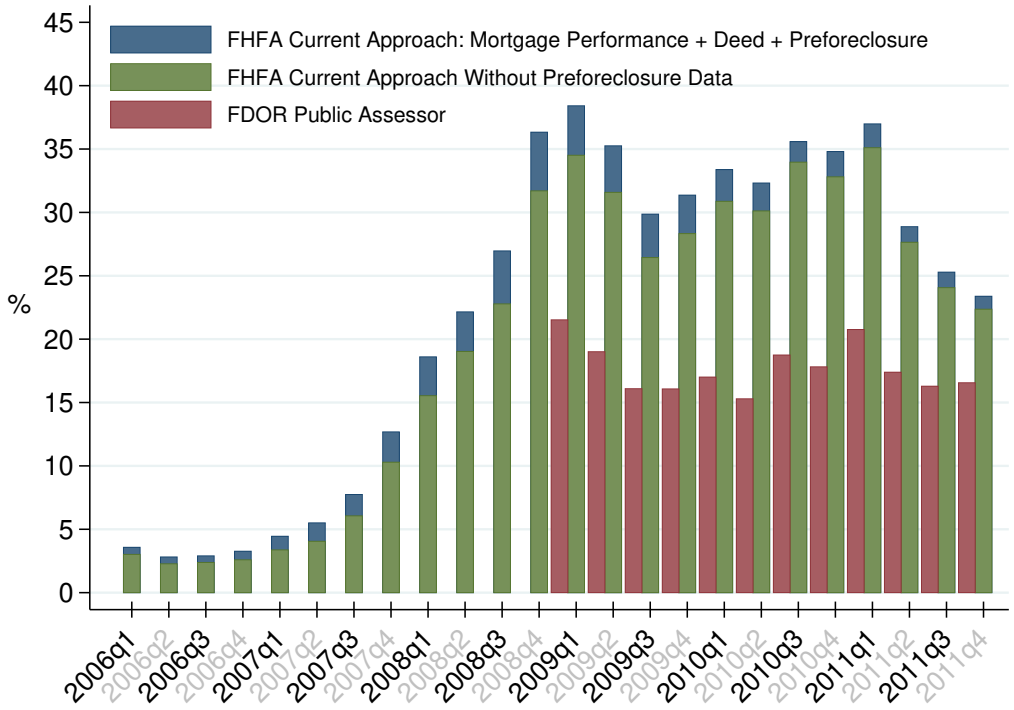
No collection of data sources—not even the combination of nationwide proprietary and supervisory data assembled by FHFA—will perfectly identify all distressed sales. Identifying such transactions is difficult because it requires property-level information about loan payment status and accurate mapping of court records to property databases.[6] An alternative approach to identifying distressed sales would be to use indicators from county assessor offices. In determining property values, county assessors use sales data and, in many places, are instructed to avoid using distressed sales in their determinations. Tax roll data—which in most places are public information—often report recent sales and, in some locations, indicate whether those recent sales were distressed. In this paper, we use transactions data from Florida.

Florida is a disclosure state that provides a wealth of longitudinal real estate data, including indications of whether property sales are distressed. Annual county tax rolls are collected and standardized by the FDOR for regulatory oversight.[7] After combining county tax rolls, any property across the state can be studied based on its location or permitted land use.[8] Additional details offer the price, date, and a "qualification code" for each property transaction. This qualification code identifies arms-length transactions and, importantly for this analysis, also flags distressed sales.[9]

To compare the distress indicators produced by FHFA and those reflected in the FDOR data, addresses are standardized and the two datasets are merged together.[10] Perfect matches are kept—where sales information and distressed sales indicators exist in both databases—and reflect 1.4 million single-family sales transactions from 1975 through 2012 across Florida. How do the distressed sales indicators compare between the datasets? Exhibit 2 splits the question into two parts by displaying the fraction of flagged sales and the overlaps between the datasets.

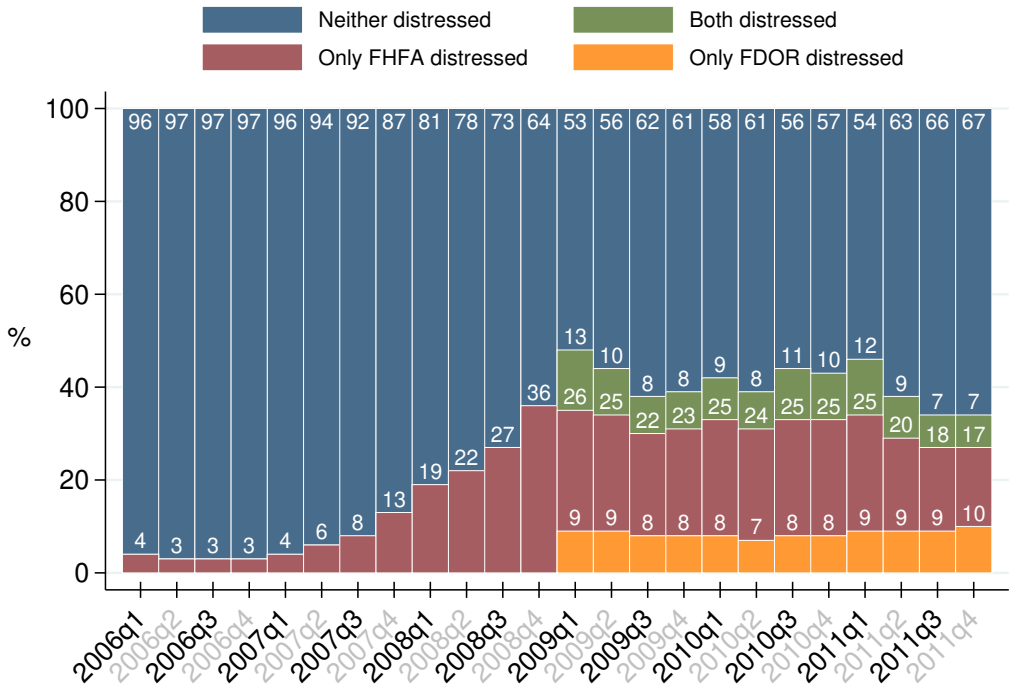
Exhibit 2: Comparing Distressed Sales in Florida

(a) Shares of the Datasets Indicating Distressed Sales



Sources: FHFA, DataQuick Information Systems, FHA, and CoreLogic.

(b) Concurrence of Distress Identifiers between Datasets



Sources: FHFA, DataQuick Information Systems, FHA, and CoreLogic.

Panel (a) shows the share of distressed sales (out of the full sample of residential transactions) began rising at the end of 2007 and reached a local peak in 2009. This is not a surprise given that asset prices were riskier and defaults higher at the end of the housing boom and leading into the bust period. As the legend conveys, the bars are split into three groups as the share of distressed sales from the FDOR's public assessor records, the FHFA proprietary data from the Enterprises, and the FHFA data combined with private datasets for mortgage performance, deeds, and preforeclosure flags. The FDOR dataset's bars do not begin until the first quarter of 2009 because that was the first year when the FDOR's qualification codes began identifying distressed sales. All three bars follow a similar pattern until the third quarter of 2009 when FHFA shows higher increases in distressed sales.

Two important takeaways emerge from this graph. First, the FHFA data indicate an average share of at least 11% more distressed sales than the FDOR public data. Second, the FHFA proprietary data flags are supplemented in material ways by the preforeclosure data licensed from CoreLogic. The preforeclosure data, which was first licensed in 2012, increases the estimated share of distressed sales by several percentage points in each quarter. Researchers with budget constraints may find this comparison useful when making data licensing decisions. We consider the CoreLogic data to provide valuable information that is not obtained from other sources.

Panel (b) illustrates the overlap of distressed sales observations between data sources—or how often the FHFA and FDOR datasets agree about whether individual transactions are distressed sales. There are four categories based on the respective sources' agreement ("concurrence"). Across all periods, by far the most common outcome is that both data sources suggest that a given transaction is nondistressed; that is neither the FHFA nor the FDOR approaches suggest that a sale is distressed. Given that the lion's share of transactions are nondistressed transactions, this overlap is not surprising.

The interesting information is contained in the disagreement categories. FHFA finds a large fraction of distressed sales on its own (approximately 17% of the time) while FDOR indicates a more meager share on its own (5%). The figure reveals that, for between 7% and 13% of transactions, the FDOR and FHFA approaches both agree on a sale being distressed. Another interpretation could condition the concurrence relative to being identified as a distressed sale. For example, in 2009q1, when 48% of sales are distressed, 27% of the identified distressed sales are flagged by both FHFA and FDOR, 54% are indicated only by FHFA, and 19% are picked up only by FDOR.

Why might the two sources disagree? The county tax rolls are static snapshots and the FDOR does not require assessors to update sales qualification codes on prior rolls. In addition, the quality checks for qualification codes are limited. Meanwhile, the FHFA dataset connects loan performance, county records, and preforeclosure information to prior sales. While assessors have access to some of these data, they do not have access to direct information about loan performance. Also, their data may not be updated.

Assuming that the FHFA-identified distressed sales are truly distressed sales, Panel (b) reveals that less than half of the total distressed sales are flagged by the public assessor tax rolls (i.e., the FDOR data). Given this relatively low rate of agreement, it seems that the assessment authorities might benefit from devoting more extensive resources to identifying distressed sales.

IV Quantifying the Magnitude of the Distressed Sale Discount

The impact of distressed sales on house price valuations is a relatively new but quickly developing topic among researchers. Studies have used hedonic, repeat sale, and propensity score matching methods to measure the negative impacts on prices. An often cited study, Immergluck and Smith (2006), finds a 10% house value decline during 1997 and 1998 in Chicago. Campbell et al. (2011) measures the foreclosure discount to be 27% in Massachusetts with data from 1987 to 2009. Both studies agree that foreclosures diminish the values of nearby houses. Concentrations of foreclo-

sures also increase the likelihood of other foreclosures leading up to or during the housing market crash (see Harding et al. (2009, 2012); Towe and Lawley (2013)). These studies, though, focus on the impact to individual asset prices and not the valuation for a group of assets, like captured by the HPI. Furthermore, the impact of distressed sales may be more pronounced after the market crash—a period not covered by the literature. The choice between a traditional purchase-only and distress-free HPI, thus, has grown more relevant as housing markets stabilize and recover.

Methodologically, the approach of the FHFA HPI is described by Calhoun (1996) where the natural log of a house's sale prices, P, can be written as

$$P_{it} = \beta_{it} + C_i + \eta_{it} + \varepsilon_{it} \tag{1}$$

where dimensions are confined by the $i = \{1,\ldots,N\}$ properties and $t = \{1,\ldots,T\}$ periods. The variables are represented by β as a market price index, C for time-invariant physical characteristics or location attributes of the house, η is a Gaussian random walk, and ε is remaining white noise. The difference between a house's current sale price and its prior sale price is

$$P_{it} - P_{is} = (\beta_{it} - \beta_{is}) + (\eta_{it} - \eta_{is}) + (\varepsilon_{it} - \varepsilon_{is}) \tag{2}$$

under the assumption that a house does not undergo changes to its physical characteristics or location attributes. The standard repeat sales regression model is expressed in linear notation as

$$\Delta P_i = \sum_{t=1}^{T} \ln(P_{it} D_{it}) = \sum_{t=1}^{T} (\beta_t D_{it}) + \sum_{t=1}^{T} (\eta_{it} + \varepsilon_{it}) D_{it} = \sum_{t=1}^{T} (\beta_t D_{it}) + \omega_i \tag{3}$$

for any time period i where $\omega_i = \sum_{t=1}^{T} (\eta_{it} + \varepsilon_{it}) D_{it}$ and D represents a dummy variable for the order of the sale, or it is $+1$ if the transaction is the most current sale in time t for property i, -1 if

it is the prior sale, and zero otherwise. In matrix notation, this becomes

$$\mathbf{P} = \mathbf{D}\beta + \eta + \varepsilon \tag{4}$$

where $\mathbf{D}$ is a $N \times T$ matrix of dummy values (of -1, 0, and 1), β is a $T \times N$ matrix of market price indexes, η is a $N \times T$ matrix of Gaussian random walk, and $\varepsilon \overset{iid}{\sim} N(0, \Omega)$ is a $N \times T$ matrix of white noise with common mean. Solving for the estimator produces a familiar econometric result where $E[\beta] = (\mathbf{D}'\mathbf{D})^{-1}\mathbf{D}'\mathbf{P}$ can be used to construct both a traditional or a distress-free HPI.[11]

A problem arises under the *a priori* expectation that distressed sales depress sales prices and their inclusion in the traditional HPI leads to lower rates of appreciation. Removing these observations to make a distress-free HPI does not solve the problem completely. The econometric violation is that $E[\mathbf{D}'\eta] \neq 0$ or $E[\eta_{it} - \eta_{is}] \neq 0$. In other words, the estimator is biased if there is a fixed or time-varying impact of a distressed sale discount or if the effect of that discount persists from one sale to the next. For an intuitive example, imagine a property sells at several times, x, y, and z. If the sale at time y is distressed then removing that observation results in $\hat{\beta}$ being computed with sales price levels from x to z instead of being computed between the nondistressed price levels at times y and z. In other words, the estimated market price index will not measure the true appreciation change when computed for a distress-free HPI (it computes the change from time x to z) and suffers from an omitted variable bias when computed for a traditional HPI (it computes the change from the distressed level at y to the non-distressed level at z). To resolve this problem, additional binary variables can be included to control for periods when a sale is distressed and to measure the discount effect.

Properly identifying a distressed sale is complicated. As shown in the last section, the FHFA and FDOR distressed sale indicators do not always concur. Although the FHFA indicators identify more transactions as being distressed, this does not mean necessarily that approach has better ac-

curacy. Because the literature finds that distressed properties sell consistently below prices for nondistressed properties, a reasonable comparison is between observed price trends where the two identification approaches disagree. For example, in cases where FHFA alone identifies a recent transaction as distressed, a pertinent question might be, "Is the observed appreciation for that property less than would be expected?" Since an actual distressed sale should exhibit lower-than-average price appreciation (or greater price depreciation), the relative appreciation provides indirect evidence about the accuracy of the identification methodology. A lower-than-average appreciation would provide confirmation that identified distressed sales are truly distressed sales.

Relating this notion back to the repeat sales regression methodology, the issue is whether the regression error systemically differs from zero. Recall that the regression error indicates how much the observed price change differs from the market appreciation for a given home over a specific interval. The regression error should be negative when the most recent transaction is a distressed sale. The extent to which it is negative provides information about (a) the accuracy of the identification methodology and (b) the magnitude of the distressed sale discount.

Exhibit 3 presents quarterly average regressions errors for Miami, Tampa, and all other areas in Florida during 2011 (a period when house prices began to rise). The columns provide an opportunity to contrast between the distressed sale indicators. The most recent transaction is the basis for the analysis; the different columns indicate whether there is agreement or disagreement as to whether the most recent transaction in a transaction pair is a distressed sale.[12] Consistent with expectations, the first column—where neither the FHFA nor FDOR indicate a distressed sale—has positive errors. This means that appreciation rates tend to be above average when the most recent transaction is clearly a nondistressed sale. The second column—where both sources concur that the recent sale is distressed—has negative regression errors (appreciation is lower than average). The last two columns are testaments to how well the FHFA and FDOR identification approaches stand on their own. The third column, with the FHFA indicators, has all negative signs and the

Exhibit 3: Average Regression Errors for Transactions with Disagreement in Distress Identifiers

	Assessor: Non-distressed FHFA: Non-distressed	Assessor: **Distressed** FHFA: **Distressed**	Assessor: Non-distressed FHFA: **Distressed**	Assessor: **Distressed** FHFA: Non-distressed
Miami				
2011q1	27.3%	-4.0%	-2.7%	30.3%
2011q2	22.6%	-6.0%	-2.1%	8.6%
2011q3	21.3%	-26.0%	-1.8%	-14.3%
2011q4	21.3%	-11.9%	-3.1%	-2.7%
Tampa				
2011q1	23.0%	-15.7%	-5.1%	-6.1%
2011q2	19.6%	-19.6%	-9.6%	10.6%
2011q3	13.1%	-5.4%	-18.0%	4.1%
2011q4	11.0%	-25.2%	-11.9%	1.5%
Other Areas in Florida				
2011q1	12.5%	-22.7%	-14.9%	-2.7%
2011q2	10.6%	-24.4%	-17.2%	-6.9%
2011q3	8.8%	-21.2%	-16.0%	-4.9%
2011q4	8.3%	-17.8%	-18.0%	-8.2%

Notes: Transactions data are available in both county recorder data licensed from DataQuick Information Systems as well as county assessment records. Both data sources have relatively complete data coverage (i.e., almost all transactions occurring in the state are reflected in the data), but there are cases where only one source reports a given transaction. Before statistics are computed, transactions that appeared in only one source are removed from the sample.

Sources: County recorder data licensed from DataQuick Information Systems, county assessment records from FDOR and DataQuick Information Systems, mortgage performance information for FHA-endorsed properties supplied by FHA, mortgage performance data for Enterprise-guaranteed loans from the Enterprises' "Historical Loan Performance" dataset, and pre-foreclosure data licensed from CoreLogic.

magnitudes are often half the size as listed in the second column (where both sources concur on the distressed nature). A surprising result appears in the last column. The assessor indicators in the fourth column elicit a mix of negative and positive values with wide fluctuations in absolute magnitudes. While they do have consistently negative values for all other areas in Florida, the absolute magnitudes are quite small compared to the second and third columns. The small magnitudes could be a sign that sales have been improperly assigned a distressed indicator.[13]

Based on this exhibit and the prior one, it seems that the FHFA dataset's distressed sales indicator captures more distressed sales than are identified in the FDOR data. The FDOR's distressed sales indicator performs fine when it concurs with the FHFA data but results are questionable, at best, when the indicator disagrees (the last column).[14] The results in the second column also conform

loosely with distressed sale discounts observed in prior literature.

Although they provide some insights, average regression errors do not measure directly the size of the distressed sale discount. This can be achieved by placing indicator variables in the standard repeat sales regression model. The coefficients of such variables can be interpreted as the distressed sale discount.

A crude approach is to insert a single distress variable that takes a value of one when a property's current sale is flagged as distressed, a negative one when the prior sale is flagged as distressed, and a zero otherwise.[15] This variable acts as a fixed effect, adding or subtracting a calibrated discount where one of the two transactions in the transaction pair are distressed. The single-variable approach assumes that the distressed sale discount remains the same over time. To allow the distressed sale discount to vary over time, a more flexible variant of the crude approach is to interact the distressed sale controls with time dummy variables. The coefficients on these interactive terms then act as time-specific measures of the distressed sale discount.

While an improvement, the time-specific distress discounts still do not allow the discount to vary depending on whether the distressed sale is the current or the prior sale. Comparing two price pairs, one where a "normal" sale follows a distressed sale and one where a distressed sale follows a normal sale, one might wonder whether the distress discount should necessarily be the same in both cases. For example, if a "stigma" effect exists and appreciation rates are persistently lower when a home is sold previously in a distressed situation, then the discount associated with the prior sale might be lower than a current sale.[16] As with the crude approach, this complicated approach can measure the discount as a fixed effect or as time-specific. [17]

What are reasonable expectations for the distressed sales discount? Based on the regression errors in Exhibit 3, it would seem that the crude approach would likely yield a fixed effect between

-10% and -30%. The variation between the rows suggests that the distressed discounts should be allowed to vary over time in both the crude and complicated models; distressed discounts seem to have systematically changed as markets have recovered.

Exhibit 4 graphs the results from regression estimations that incorporate the distressed sale indicators.[18] The figure is split between the crude approaches in Panel (a) and the complicated approach in Panel (b). As mentioned, the crude approach offers measurements where the distressed sale discount is fixed (dotted line) and where it can change with time (solid line). Distressed sales bring a fixed 14.1% discount if a single control is used. In stark contrast, though, the flexible variation portrays a distressed discount that clearly varies over time. The discount fluctuates from -6% in early 1994, hovers between -5% and -15% for the next decade, and drops to -32% by 2010. The discount recovers in the latest periods and is somewhat closer to 25%.

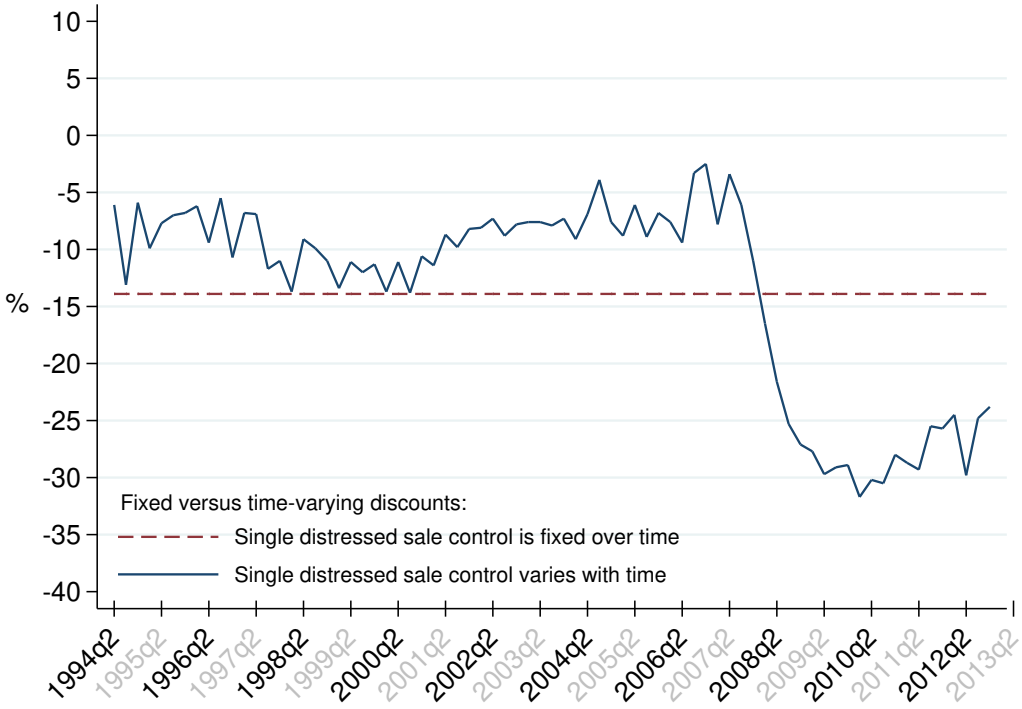
Panel (b) of Exhibit 3 presents the results of the "complicated" approach where the distress discount varies depending on whether the current or prior sale is distressed. The discounts associated with the current sale are shown as the solid line and the prior sale discounts are drawn with the dotted line. Since the time-varying discounts added explanatory power to the crude approach, Panel (b) focuses only on time-varying results for the current sale and prior sale discounts.

The findings indicate that, when the current sale is distressed, the time-specific discount mimics the standard repeat sales approach shown in Panel (a). A distressed prior sale, though, does not carry the same discount over time as a distressed current sale. The series for the prior sale discount does not start out statistically significant (prior to 1998) but it is relatively stable between -3% and -13%. The current sale discount is much more substantial; it falls below -25% for 15 of the last 20 quarters since 2007Q4.

The results shown in Exhibit 4—particularly that the prior sale discount has been relatively small—

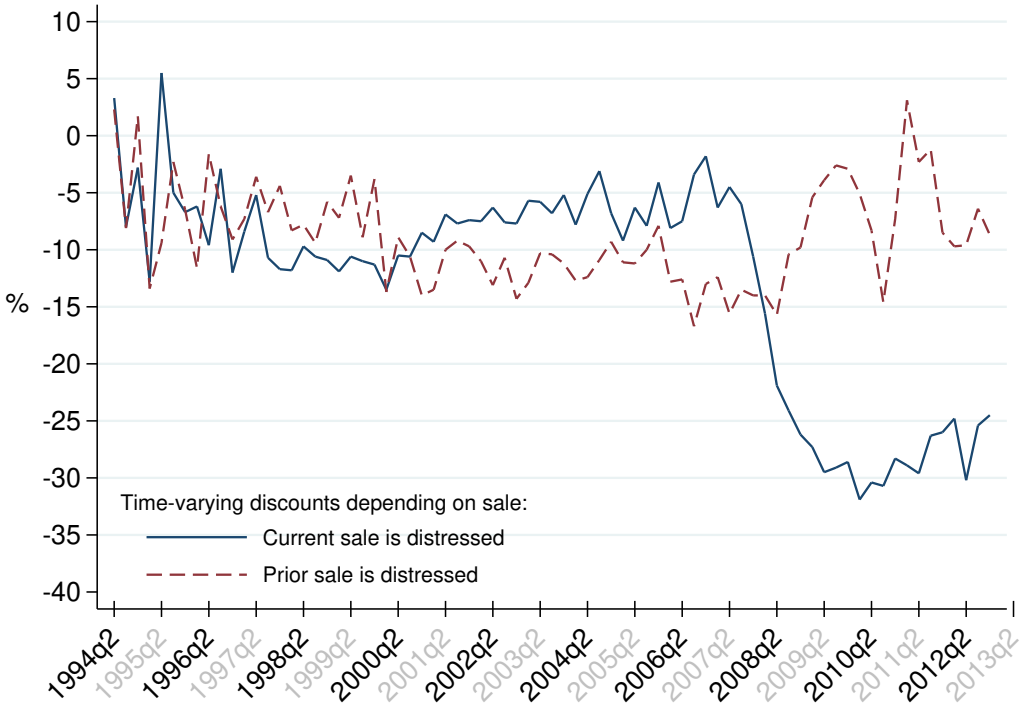
Exhibit 4: Distressed Sales Discounts in Florida using FHFA data

(a) Standard Repeat Sales Approach (Crude)



Sources: FHFA, DataQuick Information Systems, FHA, and CoreLogic.

(b) Separation of the Distressed Flag (Complicated)



Sources FHFA, DataQuick Information Systems, FHA, and CoreLogic.

are consistent with the hypothesis that, at least since 2007, there may a stigma effect or some quality-related effects that have hindered outcomes for houses that previously sold in distress. For those properties, lower subsequent price gains are observed (i.e, the measured "prior sale" distress discounts are relatively small). The results in the panels are also consistent with an alternative hypothesis: that there is much greater uncertainty over a house's current value when it has not sold previously in distress. With a previously distressed property, the buyer may have a sense for the "downside risk" associated with purchasing that property and, thus, may not command as great of a discount than would otherwise be sought.

V Discussion and Conclusion

The intent of this paper is to break away from the prior research that focuses on individual house prices and to explore how distressed sales affect overall index levels. To that degree, several notable contributions are made. First, HPI trends have clear visual disparities when distressed sales are removed from full samples. Second, the source of data is crucial: the share of distressed sales is several times larger in recent years when public records are complemented with proprietary and private datasets. Third, empirical estimates convey that the distressed sale discount is not fixed—it varies across time and place. The discounts even change depending on whether properties currently or previously receive the distressed sale label. Finally, a method is provided to identify distressed sales and quantify their discounts.

These results should be interpreted with a couple of *caveats* in mind. First, the findings are contingent upon place. This exercise focuses entirely on Florida because public records are standardized and available for a substantial period. Other states and MSAs that experienced a less dramatic crash or fewer distressed sales could show different outcomes. Second, all distressed sales are grouped together to form the distress-free HPI but the price effect could depend on the type of distressed sale (like foreclosures versus short sales). An evolving literature has been studying the possible differences along with new techniques to identify distressed sales.[19] Third, as housing

markets begin to improve, it is not certain whether the paper's findings will hold in markets with consistent or rapidly increasing price appreciation. Fourth, as indicated earlier, comparisons between the FHFA and FDOR distress flags are not possible for periods earlier than 2009 (the FDOR data did not track distressed sales until that year). Although distressed sales occur infrequently farther back in time, it is theoretically possible that—if earlier data were available—some of the paper's findings might differ after incorporating additional data into the analysis.

Future studies of distressed sales could continue in several directions. For instance, this study does not fully address the mechanism by which the distressed sale indicator impacts property values and, by extension, the house price indexes. As suggested, distress might carry a negative stigma that affects values or, alternatively, poor property conditions may explain the discounts. The popular press has attributed both problems to the distressed sale discount. This study also leaves open the question of why the regression error is much smaller for the public record data (i.e., the distressed sales only identified by the FDOR data) and whether similar results might be found in other states.

Distressed sales are a sort of abnormality in a well-functioning housing market—they are not the typical arms-length transaction and they represent only a subset of non-qualified sales transactions. Prior studies on house prices had the flexibility of either dropping those observations or completely ignoring their presence. As a result of historically strong house price appreciation and a previously low frequency of distressed sales, the research literature has been silent on the effect of omitting (or not) such observations. In addition, little has been done to compare how distressed sales are identified across data sources. This study has bridged those gaps.

HPIs are used regularly by a variety of people (e.g. investors, realtors, homeowners, insurers, and reporters) who are concerned about real estate values. Indexes are one way to measure changes in the value of such assets and this study has shown that FHFA's purchase-only index HPI has been affected by discounts associated with distressed sales. As housing markets recover, the direction

and magnitude of the discounts will remain an important consideration for policy makers and researchers. Overall, this paper provides new insights into the consequences of distressed sales on HPIs and encourages interested persons to contemplate carefully which types of HPIs they select.

Endnotes

[1]The purpose of this paper is to validate a distress-free house price index and to analyze the distressed sale discount (both over time and after subsequent transactions). For that reason, all distressed sales are grouped together but it is plausible that there might be different price effects, like between foreclosures and short sales.

[2]FHFA was established in 2008 by combining the Federal Housing Finance Board (FHFB), the Office of Federal Housing Enterprise Oversight (OFHEO), and the government-sponsored enterprise mission office at the U.S. Department of Housing and Urban Development. Earlier reports were published under the OFHEO agency name.

[3]The purchase-only index uses sales price information from single-family, purchase-money mortgages acquired or guaranteed by Fannie Mae and Freddie Mac. The all-transactions index increases the sample by including appraisal values from refinance mortgages acquired or guaranteed by the Enterprises. The expanded-data index begins with the dataset used for estimating the purchase-only index and adds two additional data sources: sales price data for houses with mortgages endorsed by the Federal Housing Administration and real property county recorder data licensed from DataQuick.

[4]A property is not flagged if it sells at some point between the current sale date and the delinquency period.

[5]The purpose of this research is to control for distressed sales. The paper is not concerned with labeling the transactions by a sales type (like foreclosure, REO, or short sale). Although a clear rule is not established for separately flagging (and removing) short-sales, a quick analysis using a subset of data (using Enterprise-financed mortgages in Tampa and Miami) suggests that the current methodology is highly accurate (97 percent success) at classifying short sales as distressed sales. There may be cases where a transaction is flagged as "distressed" but the transaction was, in reality, neither a (conventionally defined) short sale nor an REO. Ultimately, however, the approach is highly successful at removing transactions where the homeowner is in clear financial difficulty.

[6]Two FHFA Quarterly Highlights Pieces have been devoted to the inherent challenges with creating a distress-free index (2012a; 2012b).

[7]Data are collected by their Property Tax Oversight Program and are posted annually on their website at ftp://sdrftp03.dor.state.fl.us/Tax%20Roll%20Data%20Files/. The DeVoe Moore Center at Florida State University has collected and preserved historical records beyond what is currently maintained by the FDOR.

[8]Forming this database is not a simple task. County tax rolls are available from 1995 to 2012 for the state's 67 counties, representing over 162 million property-year observations. Specific details can be provided upon request but, in short, the two most recent transactions are stacked across counties, appended over years, and observations are dropped where information is missing, duplicated, or updated later. The result is a statewide database of approximately 13.8 million sales from 1970 until 2012. Nearly three-fifths the sales are single-family residential properties.

[9]Before 2009, the FDOR sales qualification codes took on only four values with the lowest value representing a qualified sale but none of the codes indicated a distressed sale. In 2009 and 2010, the FDOR expanded the codes with greater detail. Distressed sales are sales with correc-

tive deeds, quit claims, or tax deeds; deeds to or from financial institutions; sales under extreme circumstances like a forced sale or duress sale; and a sale to prevent foreclosure. Specifically, the qualification code values are 11, 12, and 38 in 2010 onward and also include 39 in 2009. The code 12 might be used to identify REO sales because it is a combination of "Deeds to or from financial institutions" and "Deeds stating "In Lieu of Foreclosure" (including private lenders)" in 2010 onward. The 2009 definition split the two parts between codes 12 and 39, respectively. These codes represented the largest fraction (69%) of distressed sales as identified in the FDOR data.

[10]A combination of merges are done based on the property's CBSA, physical address, sale year, sale month, and sale price with the FHFA database being the master dataset. The final match rate for merging onto the FHFA dataset is 87% across the state with 92% in Miami and 90% in the Tampa.

[11]The last step to create the index value at time t is to exponentiate the period's parameter estimate, or $\text{HPI}_t = 100 \cdot \exp(\hat{\beta}_t)$, which shows the cumulative percentage change.

[12]For ease of interpretation, the regression errors are taken from the first stage of the HPI estimation where the magnitude can be interpreted as the percentage change from the prior sale.

[13]Sometimes the court records for a sale are still being filed when a reassessment triggers a drive-by of a property. An erroneous classification by a field assessor might not be corrected until a few months later. If this date falls after the submission deadline for the annual tax rolls, then the mistake will not be corrected until the following year. Since the use of distressed flags is still new in Florida and there are limited quality checks of sales qualification codes beyond whether a sale is an arms-length transaction, occasional mislabeling might be expected but should diminish over time.

[14]The FDOR is required statutorily to perform random sample tests of sales qualification codes on transacted properties as part of its regulatory review of assessment rolls (*F.S.* 195.0995). Even so, the statute only charges that the code should have a documented reason for disqualifications and does not require the agency to verify the accuracy of other assessor codes, like those associated with distressed sales. As mentioned before, the limited oversight may be a reason why the fourth column does not return negative errors consistently.

[15]The value is also set to zero in the very rare cases where both the current and prior sale are distressed sales.

[16]Other than stigma, home quality related issues may also hamper price growth in such cases. Homeowners who have gone into financial distress may allow property condition to lag. Poor maintenance or other quality degradation that occurs in connection with the distress could have persistent effects on long-term price growth.

[17]The methods can be complicated further by distinguishing between properties that have a distressed flag in both the current and prior sale (or even more frequently). However, such advancements may not be a worthy pursuit for multiple reasons: less than 3% of paired transactions in any quarter fall into this category, many of the time-varying estimated coefficients are insignificant, and the results mimic what can already be shown with a simpler approach.

[18]Numerical coefficients and standard errors are provided in the supplementary Exhibits 5 and 6 at the end of this paper. Estimates for the time dummies are omitted. Note the exhibits are

presented as time-invariant and time-specific estimations while Exhibit 4 combines information from column (3) of Exhibit 5 with all the columns in Exhibit 6.

[19]A recent working paper by Depken et al. (2014) uses a proxy estimation to measure the discount from foreclosures and distressed sales in Las Vegas when distressed sale indicators are not available. Both that paper and another by Daneshvary et al. (2011) find different discounts between sale type (short sale, foreclosure, and REO) and, overall, that distressed sales carry discounts of 5% to 20%, which is consistent with the magnitudes shown in this current paper. Bourassa et al. (2013) have developed a way to possibly avoid the indicators altogether. Future comparisons with these approaches could provide insights about methodological tradeoffs as well as how well proxy estimations and robust estimations work in other markets.

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Exhibit 5: Estimations with Distressed Identifiers as Time-Invariant Dummy Variables (across Florida from 1994Q1 to 2012Q4)

	Standard Repeat Sales Approach (Crude)						Separation of the Distressed Flag (Complicated)					
Estimation	(1) Multiple Flags		(2) Single Flag		(3) Single FHFA Flag		(4) Multiple Flags		(5) Single Flag		(6) Single FHFA Flag	
	Coefficient	*S.E.*	Coefficient	*S.E.*	Coefficient	*S.E.*	Coefficient	*S.E.*	Coefficient	*S.E.*	Coefficient	*S.E.*
Either Sale is Distressed												
Assessor and FHFA	-0.304***	(0.005)										
Assessor	-0.090***	(0.006)										
FHFA	-0.133***	(0.002)			-0.141***	(0.002)						
Assessor, FHFA, or both			-0.141***	(0.002)								
Current Sale												
Assessor and FHFA							-0.308***	(0.005)				
Assessor							-0.093***	(0.006)				
FHFA							-0.143***	(0.002)			-0.153***	(0.002)
Assessor, FHFA, or both									-0.152***	(0.002)		
Prior Sale												
Assessor and FHFA							-0.266***	(0.034)				
FHFA							-0.103***	(0.037)			-0.109***	(0.003)
Assessor							-0.108***	(0.003)				
Assessor, FHFA, or both									-0.109***	(0.003)		
$\sqrt{MSE}$	0.250		0.251		0.251		0.250		0.251		0.251	
Adjusted R^2	0.796		0.795		0.795		0.796		0.795		0.795	

Note: Calculations are performed for the entire state of Florida using the FHFA and assessor (FDOR) distressed indicators on properties as indicated in the variable names. The base comparison for the "varying by flag" estimations is that neither source indicates distressed. The only level of statistical significance shown is *** for $p = 0.01$.

Sources: FHFA, DataQuick Information Systems, FHA, and CoreLogic.

Exhibit 6: Estimations with Distressed Identifiers as Time-Specific Dummy Variables (across Florida from 1994Q1 to 2012Q4)

		Standard Repeat Sales (Crude)		Separation of the Distressed Flag (Complicated)			
		(1) Either Sale is Distressed		(2) Current Sale		(3) Prior Sale	
Year	Quarter	Coefficient	*S.E.*	Coefficient	*S.E.*	Coefficient	*S.E.*
1994	1	—	—	—	—	—	—
1994	2	-0.061**	(0.024)	0.033	(0.049)	0.023	(0.113)
1994	3	-0.131***	(0.025)	-0.080	(0.057)	-0.081	(0.103)
1994	4	-0.059**	(0.026)	-0.028	(0.067)	0.017	(0.126)
1995	1	-0.099***	(0.024)	-0.128**	(0.050)	-0.134	(0.125)
1995	2	-0.077***	(0.022)	0.055	(0.043)	-0.094	(0.077)
1995	3	-0.070***	(0.022)	-0.050	(0.035)	-0.023	(0.061)
1995	4	-0.068***	(0.019)	-0.067**	(0.031)	-0.065	(0.069)
1996	1	-0.062***	(0.020)	-0.062**	(0.031)	-0.116	(0.075)
1996	2	-0.094***	(0.018)	-0.096***	(0.028)	-0.016	(0.052)
1996	3	-0.055***	(0.018)	-0.029	(0.027)	-0.062	(0.069)
1996	4	-0.107***	(0.019)	-0.120***	(0.028)	-0.091*	(0.051)
1997	1	-0.068***	(0.020)	-0.084***	(0.028)	-0.073	(0.061)
1997	2	-0.069***	(0.018)	-0.052**	(0.025)	-0.036	(0.053)
1997	3	-0.117***	(0.015)	-0.107***	(0.022)	-0.067	(0.053)
1997	4	-0.110***	(0.016)	-0.117***	(0.021)	-0.044	(0.041)
1998	1	-0.137***	(0.016)	-0.118***	(0.021)	-0.083*	(0.048)
1998	2	-0.091***	(0.014)	-0.097***	(0.020)	-0.078**	(0.038)
1998	3	-0.099***	(0.014)	-0.106***	(0.018)	-0.094***	(0.033)
1998	4	-0.110***	(0.013)	-0.109***	(0.016)	-0.058*	(0.032)
1999	1	-0.134***	(0.014)	-0.119***	(0.018)	-0.072**	(0.036)
1999	2	-0.111***	(0.013)	-0.106***	(0.017)	-0.035	(0.030)
1999	3	-0.120***	(0.013)	-0.110***	(0.017)	-0.089***	(0.033)
1999	4	-0.113***	(0.013)	-0.113***	(0.017)	-0.038	(0.032)
2000	1	-0.137***	(0.014)	-0.135***	(0.018)	-0.137***	(0.032)
2000	2	-0.111***	(0.013)	-0.105***	(0.016)	-0.089***	(0.026)
2000	3	-0.138***	(0.013)	-0.106***	(0.017)	-0.106***	(0.026)
2000	4	-0.106***	(0.012)	-0.085***	(0.015)	-0.140***	(0.025)
2001	1	-0.114***	(0.012)	-0.093***	(0.016)	-0.135***	(0.027)

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Year	Quarter	Either Sale is Distressed		Current Sale		Prior Sale	
2001	2	-0.087***	(0.011)	-0.069***	(0.015)	-0.100***	(0.021)
2001	3	-0.098***	(0.011)	-0.077***	(0.014)	-0.092***	(0.021)
2001	4	-0.082***	(0.011)	-0.074***	(0.014)	-0.097***	(0.021)
2002	1	-0.081***	(0.012)	-0.075***	(0.014)	-0.110***	(0.022)
2002	2	-0.073***	(0.010)	-0.063***	(0.013)	-0.131***	(0.018)
2002	3	-0.088***	(0.010)	-0.076***	(0.014)	-0.107***	(0.019)
2002	4	-0.078***	(0.010)	-0.077***	(0.012)	-0.143***	(0.017)
2003	1	-0.076***	(0.011)	-0.057***	(0.013)	-0.129***	(0.019)
2003	2	-0.076***	(0.010)	-0.058***	(0.013)	-0.103***	(0.016)
2003	3	-0.079***	(0.010)	-0.068***	(0.012)	-0.104***	(0.016)
2003	4	-0.073***	(0.011)	-0.052***	(0.013)	-0.112***	(0.017)
2004	1	-0.091***	(0.012)	-0.078***	(0.014)	-0.127***	(0.017)
2004	2	-0.069***	(0.012)	-0.051***	(0.014)	-0.124***	(0.015)
2004	3	-0.039***	(0.012)	-0.031**	(0.014)	-0.109***	(0.017)
2004	4	-0.076***	(0.013)	-0.068***	(0.015)	-0.093***	(0.018)
2005	1	-0.088***	(0.014)	-0.092***	(0.016)	-0.111***	(0.018)
2005	2	-0.061***	(0.014)	-0.063***	(0.016)	-0.112***	(0.015)
2005	3	-0.089***	(0.015)	-0.079***	(0.017)	-0.100***	(0.016)
2005	4	-0.068***	(0.017)	-0.041**	(0.019)	-0.079***	(0.019)
2006	1	-0.076***	(0.019)	-0.081***	(0.021)	-0.128***	(0.020)
2006	2	-0.094***	(0.017)	-0.075***	(0.020)	-0.126***	(0.017)
2006	3	-0.033*	(0.019)	-0.034	(0.021)	-0.167***	(0.021)
2006	4	-0.025	(0.019)	-0.018	(0.021)	-0.130***	(0.021)
2007	1	-0.078***	(0.017)	-0.063***	(0.019)	-0.124***	(0.020)
2007	2	-0.034**	(0.014)	-0.045***	(0.014)	-0.156***	(0.017)
2007	3	-0.061***	(0.013)	-0.060***	(0.013)	-0.135***	(0.018)
2007	4	-0.110***	(0.011)	-0.106***	(0.012)	-0.140***	(0.019)
2008	1	-0.165***	(0.012)	-0.156***	(0.012)	-0.140***	(0.023)
2008	2	-0.216***	(0.011)	-0.219***	(0.011)	-0.157***	(0.023)
2008	3	-0.253***	(0.011)	-0.241***	(0.012)	-0.104***	(0.025)
2008	4	-0.271***	(0.012)	-0.262***	(0.012)	-0.098***	(0.030)
2009	1	-0.277***	(0.013)	-0.273***	(0.013)	-0.054	(0.034)
2009	2	-0.297***	(0.012)	-0.295***	(0.012)	-0.039	(0.029)
2009	3	-0.291***	(0.012)	-0.291***	(0.012)	-0.026	(0.030)
2009	4	-0.289***	(0.012)	-0.286***	(0.012)	-0.029	(0.028)
2010	1	-0.317***	(0.014)	-0.319***	(0.014)	-0.051	(0.037)

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Year	Quarter	Either Sale is Distressed		Current Sale		Prior Sale	
2010	2	-0.302***	(0.012)	-0.304***	(0.012)	-0.083***	(0.028)
2010	3	-0.305***	(0.013)	-0.307***	(0.013)	-0.146***	(0.031)
2010	4	-0.280***	(0.013)	-0.283***	(0.013)	-0.073**	(0.030)
2011	1	-0.287***	(0.013)	-0.289***	(0.013)	0.031	(0.030)
2011	2	-0.293***	(0.012)	-0.296***	(0.012)	-0.023	(0.029)
2011	3	-0.255***	(0.012)	-0.263***	(0.012)	-0.012	(0.026)
2011	4	-0.257***	(0.013)	-0.260***	(0.013)	-0.085***	(0.028)
2012	1	-0.245***	(0.014)	-0.248***	(0.014)	-0.097***	(0.033)
2012	2	-0.298***	(0.013)	-0.302***	(0.013)	-0.096***	(0.026)
2012	3	-0.248***	(0.012)	-0.254***	(0.012)	-0.064***	(0.025)
2012	4	-0.238***	(0.014)	-0.245***	(0.014)	-0.087***	(0.026)
$\sqrt{MSE}$		0.249		0.249			
Adjusted R^2		0.798		0.798			

Note: Calculations are performed for the entire state of Florida using only the FHFA distressed indicators on properties. To conserve space, the variables used in each regression estimation are presented as separate columns. Unique estimations are indicated in the subtitles that merge across columns. The levels of statistical significance are defined as * for $p = .10$, ** for $p = .05$, and *** for $p = 0.01$.
Sources: FHFA, DataQuick Information Systems, FHA, and CoreLogic.

Non-Technical Summary

Since the beginning of the housing bust, a significant share of real estate transactions across the country have been "distressed" sales. Homes sold in distress tend to sell at significant discounts relative to other transactions. Given this discount, it would be reasonable to assume that such sales would have a significant impact on house price trends. By comparing standard house price indexes (HPIs)—which incorporate sales price data from short sales and REO transactions—with "distress-free" indexes (which remove such sales from the underlying data sample)—this paper confirms that distressed sales have had a significant effect. The presence of distressed sales has had a depressing effect on measured price changes. In more recent periods, when distressed sales have comprised a shrinking percentage of real estate transactions, the results reveal the opposite effect.

This paper then sets out to evaluate whether a particular approach to identifying distressed sales is reasonable. Testing the reliability is important because it is, generally, not possible to know with certainty whether a given real estate transaction is a distressed sale. County assessor data from the state of Florida provide a large set of historical property transactions to benchmark the approach. In a significant proportion of cases, a sale was identified as "distressed" or "nondistressed" by the approach and public data sources. Even amid the disagreements, strong evidence suggests this paper's approach provides a reliable indication of distress.

The paper also evaluates how distressed sale discounts have varied over time in Florida. Using a minor adjustment to a traditional house price model, it is possible to estimate the average size of the discount and whether it changes during specific time periods. Across the roughly 20 years between 1994 and 2013, the paper estimates that the average price discount was about 14 percent, but the discount varied significantly across years. As the housing boom accelerated, the discount shrank significantly to between 5 and 10 percent. However, during the early part of the housing bust (roughly 2007 to 2010), the discount rose sharply to nearly 30 percent. The onset of the recovery and rising home prices have led to more modest discounts.