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HIGHLIGHTS

- Residential house prices have declined by substantial amounts in each of the counties and municipalities studied since reaching their peak values in 2005 and 2006.
- The results reveal striking differences between the methods used to estimate house price trends. The preferred method, weighted repeat sales indexes, shows considerably more decline than analysis based upon trends in the median sales prices.
- Regular and arm's-length sales transactions, the most useful data for estimating housing values, have declined substantially in recent years among the places studied. Limited sample sizes hamper local governments' ability to estimate market values accurately. These findings suggest that property assessments may be higher than market values, and total taxable values lower than official estimates, in many localities.
- The state's new Property Tax Cap offers only a partial remedy to the challenges associated with heavy reliance upon the property tax in New York State. While the cap may reduce effective tax rates over time for properties whose market values are rising, additional policy actions will be needed to avoid increases in such rates for properties with declining value.

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The Impact of the Great Recession on the Property Tax in New York

Measuring Declines in Residential Property Values and Sales Volumes in Selected Markets

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Executive Summary

The Great Recession and the ongoing crisis in the housing and mortgage markets affected the property tax in two important ways. First, they led to substantial declines in the price of residential property and the size of the property tax base in many parts of the country. Second, they led to substantial increases in the number of foreclosures and other types of distressed sales, which increase the difficulty of assigning accurate and updated valuations of the residential housing stock.

The main purpose of this paper is to estimate movements in residential property prices and the volume of residential housing sales in New York State using a variety of statistical processes. Results are provided for smaller areas than are considered in other widely used measures of price trends. Three main conclusions emerge:

- First, residential house prices have declined by substantial amounts in each of the counties and the municipalities studied since reaching their peak values in 2005 and 2006.
- Second, the results reveal striking differences between the methods used to estimate house price trends. The preferred method, weighted repeat sales indexes, shows considerably more decline than trends in commonly reported median sales prices such as those issued by the National Association of Realtors. A likely explanation for the difference is that the weighted repeat sales indexes do a superior job of controlling for changes in the quality and size mix of homes actually sold.
- Third, the results capture the substantial decline in the number of regular and arm's-length sales transactions in recent years among the places studied in this paper. This is a critical finding because limited sample sizes hamper local governments' ability to provide accurate estimates of the market value of housing, which is the keystone of a sound property tax system.

One implication of these results is that the recently enacted Property Tax Cap offers only a partial remedy to the challenges associated with heavy reliance upon the property tax in New York State. The results of this paper suggest that more work is needed to avoid increases in effective property tax rates and to assure equity in the distribution of property tax burdens.

Overview

The Great Recession and the turmoil in the housing market have two traits that are important to the property tax. First, and foremost, they have led to substantial declines in the price of residential property in many parts of the country. Such declines have the potential to substantially reduce the property tax base. Second, the mortgage crisis associated with this recession has increased foreclosures and other types of distressed sales and reduced the number and quality of regular and arm's-length sales needed to assign accurate and updated valuations of the residential housing stock.² The reduced number of these regular sales makes it harder to update assessed values to their current market values and heightens the potential of inaccuracies and inequities in the distribution of assessed values among properties within the property tax base.

Both the magnitudes of these two traits and their impacts on property taxes are expected to vary widely both *among* metropolitan areas and *within* metropolitan areas. Follain discusses and highlights these patterns in his recent paper entitled "A Study of Real Estate Markets in Declining Cities."³ The case of Stockton, California, is telling. Average house prices have declined by over 50 percent for the broader Stockton metropolitan area but some areas within this metropolitan area have seen even larger declines and some much less. Also, foreclosure and Real Estate Owned (REO) sales have been the dominant type of property sales transaction during the current and ongoing housing crisis. For example, foreclosure and REO sales comprised more than 80 percent of residential sales in some areas in many markets hit hardest by the crisis, e.g., Stockton, CA.

Though average house price declines within New York were not as extreme as Stockton (and some other places within California, Arizona, Nevada, and Florida), residential property values have been severely impacted in many areas within New York. For example, the overall Case-Shiller house price index for properties in the large New York Metropolitan area declined by 22.5 percent since their peak in early 2006. The portion of the Case-Shiller index (CS) that measures house price movements in the lowest of three value tiers (or value categories) declined by even more; house prices in this tier are now 29 percent below their peak value, which was reached in October 2006. Adjusted for general inflation, the declines in real terms were in excess of 33 and 39 percent, respectively, over the past four years. Such declines eclipse any previous experience in the Case-Shiller index, which dates back to 1987, or the index compiled by the Federal Housing Finance Agency, which dates back to 1976. Some areas within this very large metropolitan area have surely seen even larger declines in value during the Great Recession.

This main purpose of this paper is to investigate recent patterns in the price of residential properties and the number of sales of residential properties at a much more geographically granular

level than is available with the publicly available indexes noted above. It does so by focusing upon the experiences of six counties in New York State. This is done using sales transaction data for six counties in New York State.⁴ Of interest is the variability in these patterns among these six counties and among some of the municipalities and school districts within each of these counties. A second purpose is to gauge the feasibility of applying the methods used in the paper to measure these patterns for many more areas within New York State using the transactions data. In fact, these data are available for all counties in New York State except New York City. If the results of this paper are deemed reasonable, then the processes used can be applied to many more places and, in so doing, obtain a much clearer view of the impact of the Great Recession on the New York State housing market. A focus is on the identification of those municipalities especially hard hit by the recession.

This paper is not designed to generate firm policy implications or definitive conclusions about the impact of the Great Recession on the property tax in New York State. It is best seen as one step in the process toward that ultimate goal. It rests upon the belief that sound policy implications and conclusions regarding the impact on property tax require a more geographically granular examination of residential property values than is currently available and applied in most discussions about property tax reform.

The analysis in this paper is divided into three major tasks. The first task seeks to develop house indexes for a variety of communities within New York State for the period 2002 through 2010, which are the years for which these data are available. Attention is focused upon four downstate counties in which the Great Recession appears to have had substantial impacts on house prices and foreclosure activity: Nassau, Orange, Suffolk, and Westchester. The other two are counties in the Capital Region: Albany and Schenectady. The indexes include measures of median sales prices and what is called a weighted repeat sales (WRS) index.

The second task is to examine the house price experiences of selected municipalities and school districts within each of the selected counties to gauge the degree of geographical granularity that can be obtained with these data. To do this, separate WRS price indexes are developed for three municipalities or school districts in each of the six counties.

The third task is to measure changes in the number of regular or arm's-length sales (RAR usable⁵) available to assist in the valuation of residential real estate for each county, municipality, and school district for which price indexes are developed. For each task, attention is focused on the largest class of real estate — single-family residential properties. Future work may investigate other classes of real estate.

The remainder of this paper consists of five sections. The next section offers a brief summary of some relevant and recent

literature that examines the impact of the Great Recession on the property tax. The third section provides background information about various types of publicly available house price indexes and what they indicate about house price declines in the recent past for parts of New York State. These are available for relatively large metropolitan areas, whereas our goal is to develop similar indexes for smaller areas within the state. The fourth section provides more information about the specific data and some assumptions we made to construct the indexes. The fifth section contains the main results of the paper and includes measures of movements in residential property values and the number of sales for six counties and 18 different municipalities and school districts within them. The final section summarizes the main conclusions of the paper and a number of ways in which the analysis can be extended. An appendix includes two tables and an extended discussion of the WRS estimation process.

Brief Literature Review About the Great Recession and the Property Tax

A number of recent papers have explored the impact of the Great Recession on the property tax. Several of these are contained in the proceedings of a recent conference entitled “What the Housing Crisis Means for State and Local Governments.” An article by Reuben and Lei summarizes many of the papers and some of the key themes of the conference.⁶ One important conclusion of the conference papers is captured in the final paragraph of their summary. “It seems quite unlikely for property tax collections to fall steeply in the next few years. The delay between the housing downturn and a drop in property taxes may give the national economy time to recover, making up for the loss of stimulus funds and property tax revenue through higher income and sales tax revenue. The forecast is not clear, but state and local governments should be prepared for what the conference participants agreed will be a slow economic recovery ahead.” Two papers from the conference are summarized here to highlight this theme and help position the contributions of this paper.

The first of these papers is by Lutz, Molloy, and Shan, who are economists at the Federal Reserve Board.⁷ They offer evidence on the relationships among state property tax revenues, other sources of state revenue, and house price patterns. They identify five main channels through which the housing market affects state and local tax revenues: property tax revenues, transfer tax revenues, sales tax revenues (including a direct effect through construction materials and an indirect effect through the link between housing wealth and consumption), and personal income tax revenues. They conclude that “property tax revenues do not tend to decrease following house price declines.” The resilience of property tax receipts is due to significant lags between market values and assessed values of housing and the tendency of policy makers to offset declines in the tax base with higher tax rates. They further

conclude that the recent contraction in state and local tax revenues has been driven primarily by the general economic recession, rather than the housing market per-se, and that the property tax is likely to remain a strong revenue source for the immediate future. The authors also make the point that episodes in which to observe the impact of a steep house price decline on the property tax at the state level are relatively rare.

My own sense is that this latter conclusion is premature and masks the substantial and wide variation that is likely happening within states. This point is especially true for a period like the current one, which is noted by unprecedented declines in house prices and a severe recession in many parts of the country. This “double whammy” is uncommon in our economic history in the post-WW II era for large economic and geographic areas. In addition, the focus upon state revenues and state level house prices surely masks some of the substantial variation around state level totals.

By moving to smaller geographic areas such as the county and the school district, which is the centerpiece of this project, the research will reveal places in which the conclusions noted above will not hold and that, in fact, the property tax may be on the verge of a substantial albeit lagged decline. The cornerstone of this conjecture or hypothesis is the evidence offered by Follain (2011) and others about the wide variability of house prices among and within metropolitan areas. One pattern of this type is the variability of house prices among tiers of the housing market such as high, middle, and low. For example, Follain and Follain captured some of these variations and their impact on the property tax for two ZIP codes in downstate New York.⁸ Follain (2011) also discusses the possibility that severe declines in house prices may be especially likely in those areas in which low- and moderate-income home owning was buoyed by subprime lending and irrational exuberance about future demand. These may also be areas in which vacancy rates are high and the numbers of arm’s-length transactions to build accurate assessed values are low.

The second paper from the conference is by Doerner and Ihlanfeldt.⁹ They demonstrate the power of public record or parcel level data and how they can be used to study the impact of the Great Recession on the property tax. They begin with the development of weighted-repeat sales price indexes for 400 municipalities in Florida for the period 1994-2008. The estimated indexes are then used as explanatory variables in various equations designed to explain local government revenues per capita. Two key conclusions emerge. First, municipalities were not “awash” in revenues during the period of price appreciation as they tended to reduce tax rates. Second, the responses of revenues to a house price change tend to be asymmetric – they are less responsive to a positive price shock than they are to a negative shock.

The research presented in the following sections develops similar types of price indexes as developed by Doerner and

Ihlanfeldt. Like Doerner and Ihlanfeldt, the research also highlights the challenges associated with the development of these indexes when the number of regular sales is diminished. Attention is given to the asymmetry noted by the authors. Indeed, their conclusion regarding asymmetry is consistent with more general patterns discussed by Follain (2011) and others about the impact of population changes on house price growth. Some attention will be given in the broader research project to recent developments in this widely used methodology designed to increase the sample size.

Background on the Measurement of House Price Indexes and Recent Patterns in New York

A house price index is designed to measure changes in the value of a constant quality housing unit. Time-series indexes measure changes in the price or value of the housing unit over time. Cross-section indexes measure changes among markets at the same time. There are four basic approaches used to estimate house price indexes. The simplest and most straightforward is to track median sales prices over time. This is the approach used by, for example, the National Association of Realtors, which tracks the median value of homes sold by Realtors. These indexes are done over time for a wide variety of metropolitan areas.¹⁰ Though relatively straightforward to compute given appropriate data, a potential limitation is the limited degree to which this may control for variations in the quality or mix of houses sold in a period or market. For example, if the top end of the market is hot one year and not so in the next, changes in median values would be less accurate as a predictor of what a price index seeks to capture.¹¹

More sophisticated statistical approaches are also used to generate house price indexes. One is called the hedonic price index approach. A regression equation is estimated to predict the value of a property as a function of its characteristics and location. The regression is used to predict the price of a type of house such as a three-bedroom, one-bath home of a certain square footage and quality in a specific neighborhood. A similar and third approach is called matched-pair analysis, which is basically a statistical search for properties that have comparable traits. Both can be applied, in principle, for many places and over time to generate house price indexes. However, they both require substantial information about properties that is typically not available on a recurring basis and for large numbers of places. The data available for this paper — transaction data — do not pass this test since they do not include much information about the housing units themselves.¹²

The fourth approach is called the weighted-repeat sales index. This approach seeks to control for variations in quality by focusing upon houses that have sold more than once. The notion is that two sale prices on the same house provide adequate controls for the quality of the house in most cases.^{13,14} Obviously, there are potential problems when substantial investments are made in a

house between sales. Despite this potential problem, the WRS index has become the method underlying the most widely known and used house price indexes. One set of these has been developed by the Federal Housing Finance Agency (FHFA).¹⁵ The data underlying its indexes come from mortgages purchased by the two large government sponsored enterprises (GSEs), Fannie Mae and Freddie Mac.

One version of its indexes is based upon either the purchase or the refinancing of a mortgage, i.e., the all transactions index. This is currently available for 385 metropolitan statistical areas (MSAs) and for more than 100 MSAs on a quarterly basis back to 1980. FHFA introduced an alternative for 25 large MSAs in the early 1990s that is based solely upon purchases, i.e., values based upon a mortgage refinance are not included. Probably the most well-known index in the popular press is the widely cited Case-Shiller (CS) weighted repeat sales index, which is available for 20 large metropolitan areas.¹⁶ The CS WRS Index uses data similar to what are used in this paper and includes a much wider range of house values than is captured by the FHFA index. One attractive aspect of the CS indexes is its development of subindexes for three tiers of the housing market: lowest-value tier; middle-value tier; and upper-value tier.

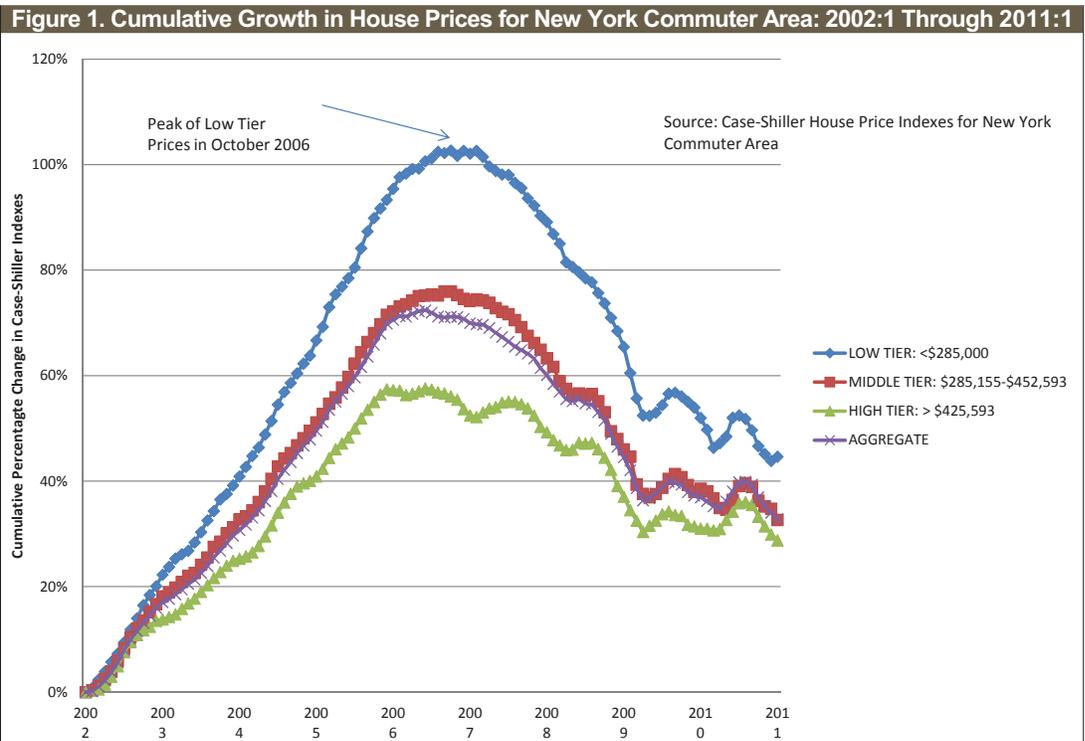
To provide a better sense of the weighted-repeat sales indexes and their performance relative to an index based upon median values, data were collected on these indexes for places in New York State. The specific data collected include the index values based upon the FHFA-All Transactions (AT) Index, the FHFA-Purchases only (PO) index, and the National Association of Realtors (NAR) Median Sales prices. The FHFA AT- and NAR-based index values are available for the Albany-Schenectady-Troy MSA and the Nassau-Suffolk MSA. The FHFA (PO) values are only available for the Nassau-Suffolk MSA. Index values are computed for 2002 through 2010 and are standardized to show changes over the same period available with the NY State data used in this paper: 2001:Q4-2010:Q4. These data are contained in Table 1.

Consider, first, the FHFA all transactions index for the Albany MSA. The index values were adjusted for this paper by setting the index to 100 percent for 2001:Q4. The index rose substantially in the early part of the 2000s, peaked in 2007, and has declined by only 1.5 percent since that peak. Over the entire period house prices are 68 percent higher than they were at the end of 2001. The two FHFA indexes for the much larger Nassau-Suffolk MSA show a more rapid increase in values during the early 2000s. The all-transactions index peaked in 2005 and the purchase-only index in 2006. Unlike Albany, the two index values have declined markedly since then, -14.2 and -12.4 percent, respectively. House prices are about 50 percent higher than they were at the end of 2001. The last two columns utilize changes in median values for the Albany and the Nassau-Suffolk MSAs. The Albany values also show a rapid rise through 2007, dip substantially in 2008 and 2009, and

Year	Quarter	Albany-Schenectady-Troy, NY MSA	Nassau-Suffolk, NY (MSAD)	Nassau-Suffolk, NY (MSAD)	Albany-Schenectady-Troy, NY MSA	Nassau-Suffolk, NY (MSAD)
2001	4	100.0%	100.0%	100.0%	100.0%	100.0%
2002	4	108.3%	115.2%	118.6%	103.6%	126.0%
2003	4	120.1%	130.9%	135.8%	116.5%	146.7%
2004	4	137.7%	151.1%	155.7%	132.8%	166.5%
2005	4	157.1%	171.9%	172.5%	151.0%	187.3%
2006	4	166.6%	177.3%	170.2%	160.8%	191.1%
2007	4	170.6%	173.4%	168.4%	163.7%	192.1%
2008	4	169.3%	160.5%	157.1%	162.9%	175.4%
2009	4	167.1%	152.5%	151.6%	155.6%	154.3%
2010	4	168.1%	152.1%	151.0%	161.1%	155.8%
Peak		170.6%	177.3%	172.5%	163.7%	192.1%
Current to Peak		-1.5%	-14.2%	-12.4%	-1.6%	-18.9%
Sources:		FHFA: All Transactions	FHFA: All Transactions	FHFA: Purchases Only	NAR Median Sales Price	NAR Median Sales Price

then suggest that prices have risen recently and almost back to their peak values. The median value based index for Nassau-Suffolk peaks in 2007 at 192 percent of their values at the end of 2001 and has declined by almost 19 percent since then. The ending value is similar to those from the two FHFA indexes.

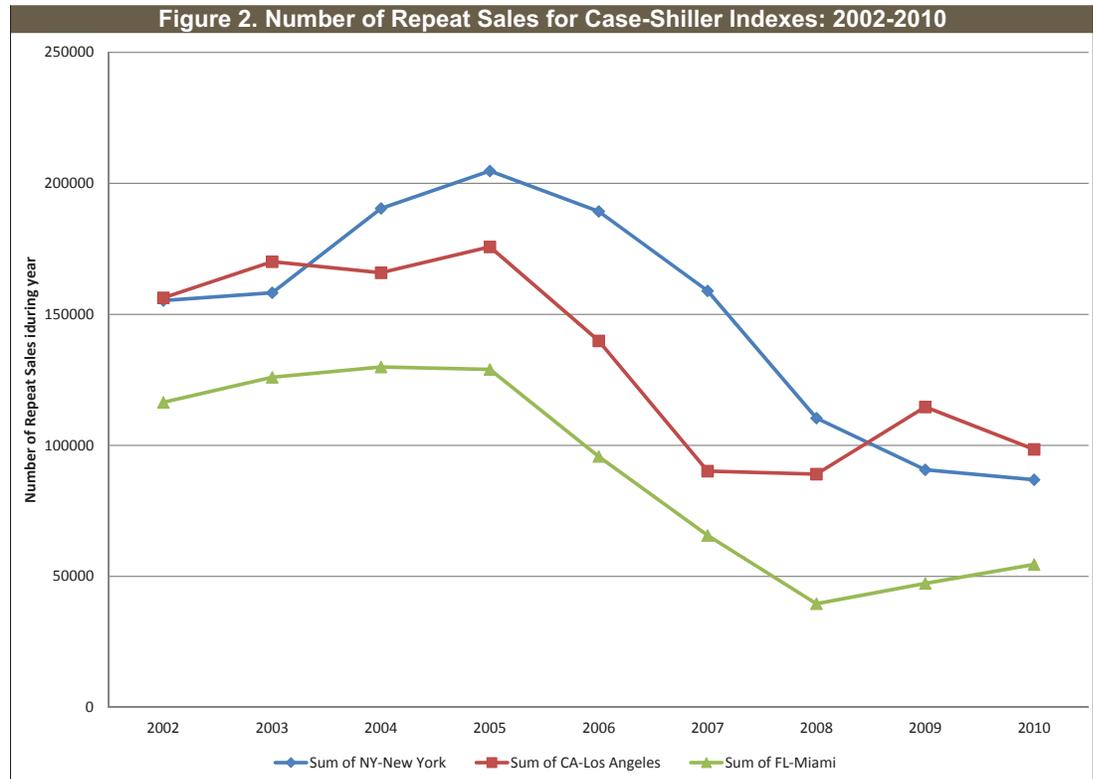
Data based upon the monthly values of the Case-Shiller indexes for what they call the New York Commuter area are contained in Figure 1 for a similar time period: January 2002 through January 2011.¹⁷ The four indexes include the overall index and the indexes for the low, middle, and high tiers of the market. These values in Figure 1 track the cumulative changes in these index values. They all depict similar patterns as the other indexes – rapid rise though the mid-2000s. For example, house values in the low tier (below \$285,000 as of January 2011) in October 2006 were double (100 percent cumulative change) their values in January 2002. The other three indexes showed a similar qualitative pattern though 2006; however, the magnitudes of the price increases varied greatly among the tiers. The low tier increased much more than the high tier. The patterns since the peak show substantial declines for each tier and the overall index. The overall index is higher by 66 percent in January 2011, which is higher than the index values in Table 1. The price decline since the peak in the overall index is about 23 percent, which is larger than the declines noted in Table 1 for this area. Some of this no doubt reflects differences in the geographic areas covered by the indexes in Table 1 and the broader range of transactions included in the Case-Shiller index. The main takeaway in terms of patterns of change is probably the wide variation among tiers. The low tier appreciated the most rapidly through the mid-2000s and has fallen by the largest amount though January 2011; nonetheless the cumulative



appreciation for this tier is still over 40 percent compared to January 2002 and exceeds that for the other tiers.

The Case-Shiller data also offer an insight into the impact of the Great Recession upon the number of sales available to estimate weighted-repeat sale indexes. The number of repeat sales transactions available to estimate the Case-Shiller indexes is contained in Figure 2 for the New York commuter area Los Angeles and, Miami. The number of these transactions in the New York area peaked above 200,000 in 2005 but has fallen to under 100,000 in 2010, which is more than a 50 percent decline. The number of these transactions peaked above 150,000 in Los Angeles in 2005 and declined more abruptly than in New York over the next few years, but by less than the percentage decline in New York. The largest percentage decline among these three areas occurred in the Miami metropolitan area.

In sum, these various approaches and index values reveal some similarities and some differences. They all show rapid increases in house values through the mid-2000s for the downstate areas and then a substantial decline. Values are still above where they began the period by substantial amounts. The index values also show substantial variation among areas or tiers. Albany showed much less decline than the downstate areas. Especially noteworthy is the substantially higher rise and decline in the low tier of the market for the larger New York Commuter area. Additionally, these data capture the substantial declines in the number of residential housing sales. A goal of this paper is to search for more geographically granular indicators of house prices and the number of housing sales for six counties in New York State.



Data

The core data for this study are obtained from the New York State Office of Real Property Tax Services. The data consist of transaction information about real estate parcels between 2000 and 2010. These data provide information about each real estate transaction and some key elements of the transaction such as the sales price, assessed value, date of sale, property class, and criteria to determine whether it is a regular or “arm’s-length” transaction suitable for use to develop market valuation estimates. Data from each county outside of New York City area are available; the total database comprises several million records. These data will be the centerpiece of the development of the weighted-repeat sales indexes in this paper.

A number of assumptions underlie the final sample. The process begins by focusing upon the largest class of properties — single-family and year-round residences.¹⁸ As noted above, attention is focused in this paper upon regular and arm’s-length sales. This class of properties is restricted to arm’s-length transactions that are free of any unusual circumstances in the transaction that might reduce its applicability as an indicator of market value. This produced a sample of 296,871 sales for the six counties. The distribution of these sales is contained in the top row of Table 2. Suffolk had the largest number of sales transactions of this type (131,919) and Albany was the county with the fewest sales transactions (18,102).

Table 2. Total Number RAR Usable Residential Sales by County From 2002 Through 2010

	Albany	Nassau	Orange	Schenectady	Suffolk	Westchester	Total
Total Sales	18,102	73,063	21,394	11,093	131,919	41,300	296,871
Duplicate Sales	5,992	18,943	6,029	3,619	29,825	8,523	72,931
Percentage Duplicates	33%	26%	28%	33%	23%	21%	25%

Property Class = 210: Year Round Single Family Residences
 RAR Usable: Generally includes arms length transactions with no special circumstances surrounding the sale.

Each sale is tracked to determine whether it was sold one or more times during the sample period. Indeed, some properties sold multiple times. A number of judgments were made to filter this sample. In particular, only properties that sold two or three times are included; my concern is that four or more may reflect unusual circumstances such as massive improvements that reduce the ability to control for quality. Properties in which prices more than doubled or declined by more than half are also eliminated from the sample. Lastly, only transactions at least one year apart are included. Some sensitivity analysis was performed to justify these assumptions but much more could be done, but my sense is that these are plausible for this case study.

These assumptions generated a final sample of repeat sales transactions that were typically about one third of the total number of sales transactions. Repeat sales transactions of 72,391 satisfied these criteria for the six counties. The distribution of the repeat sales transactions are contained in the second row of Table 2. The bottom row shows the fraction of total sales that were repeat transactions. Repeat sales transactions range from 25 to 33 percent of total sales. The overwhelming bulk of the repeat sales transactions are properties that sold twice.

As noted, the focus at this point is upon RAR usable sales. This decision and focus omits foreclosure sales. Indeed, the treatment of foreclosure sales is a highly debated topic. Some choose to include some foreclosure sales, but this raises doubts in the minds of some who view the sale price of a foreclosed property as revealing something different than the true market value of the property. Instead the price obtained at a foreclosure sale may suffer from a stigma discount or other concerns about the state of repair of the property.¹⁹ It would be interesting to explore this issue in future research along with some thoughts about how to do so with these data are discussed in the final section and possible next steps for this work.

Initial Results for Six Counties

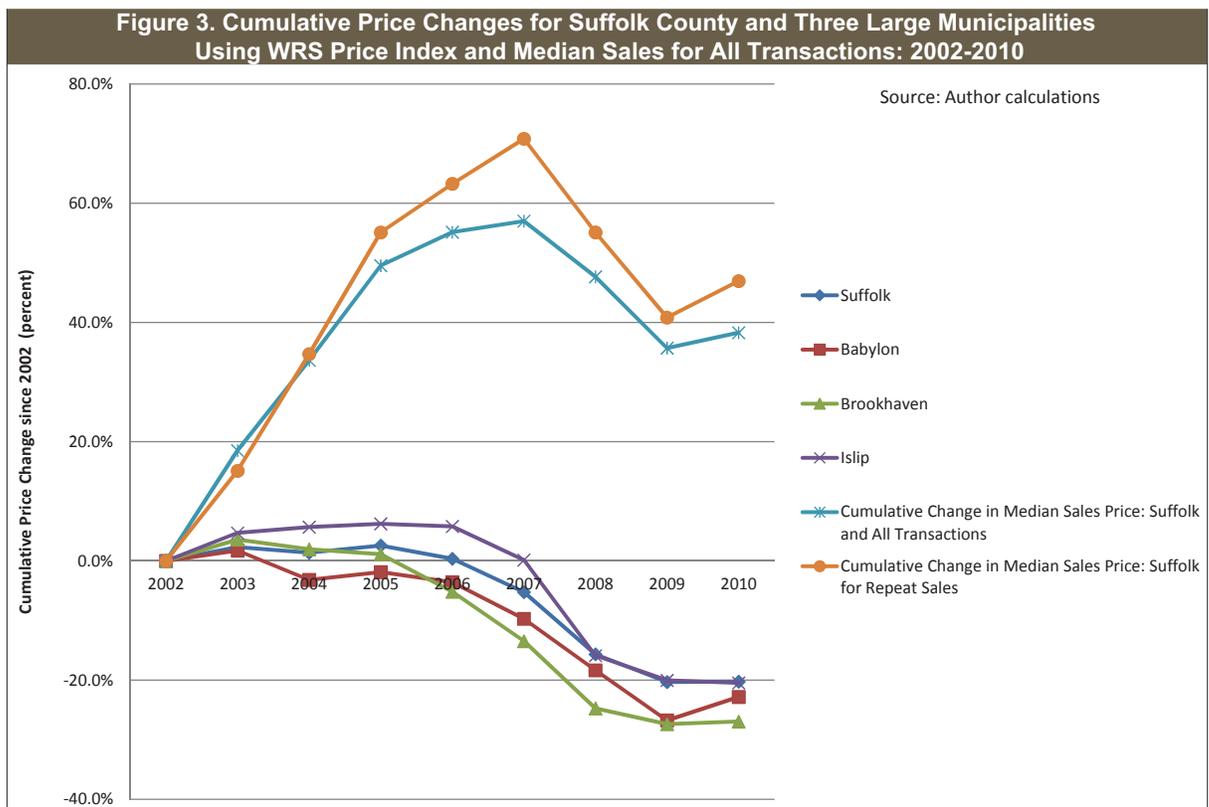
This section focuses upon the analysis of the transaction data just described. The centerpiece of the results is a set of estimates of WRS indexes of house price growth between 2002 and 2010. These are computed and reported for six counties and for three municipalities within each county. In total there are 24 separate WRS price indexes. These are compared to an index based upon the median sales price RAR usable transactions within the same

property class – single-family year-round residences. In addition, the volumes of sales transactions are tracked for the same time period for the six counties.

The Case of Suffolk County

The discussion begins with the results for Suffolk County. Four WRS indexes are computed; one for the entire county and one each for the municipalities of Babylon, Brookhaven, and Islip. These three were selected because they had the largest numbers of transactions among the numerous municipalities within Suffolk County. Figure 3 contains four WRS indexes and two based upon trends in median sales prices. Two indexes are also based upon median sales prices at the county level; one is based upon all transactions and one is based upon the repeat sales transactions. Each index tracks the cumulative percentage change in the index since 2002. The results are contained in Figure 3.²⁰

The main conclusion from this portion of the analysis is the sharp distinction between the pattern of price change based upon median sales and the WRS indexes during the first part of the 2000s. Both of the median sales indexes show substantial gains during the early 2000s and peak around 2007. The index based upon the median sales prices of repeat sales transactions peaks near 70 percent and the all-transactions median sales price index peaks at a little less than 60 percent of their 2002 values in 2007. Since 2007 both declined substantially; however, the most recent data still show that median sales prices are still about 40 percent higher than they were in 2002.

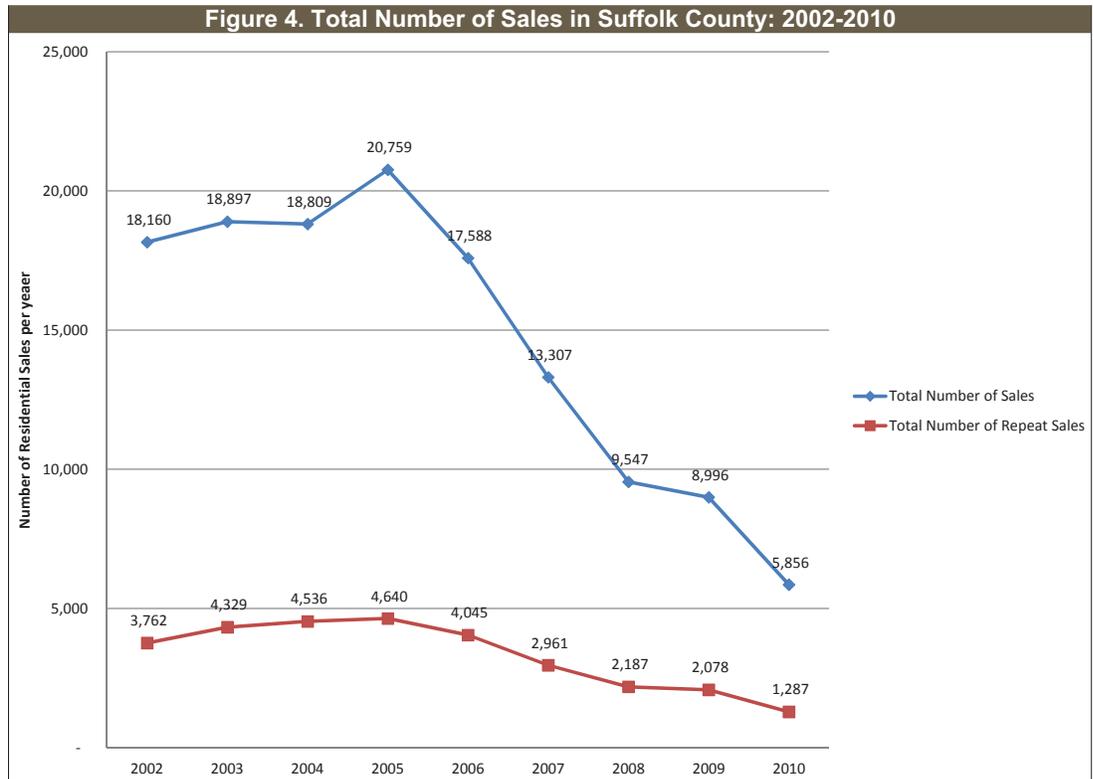


The pattern of prices based upon the WRS indexes values shows a different pattern. Prices rise very little between 2002 and 2005 using the WRS indexes. For example, the index for Suffolk County in 2006 equals its value in 2002, which indicates no change in the price of a constant quality dwelling. The WRS index for Islip shows a modest positive increase over this period while modest declines are found for the other two municipalities. The pattern among the WRS indexes beyond 2006 is similar to the indexes based upon median sales prices: that is, the price indexes decline substantially. Each of the WRS indexes fall by at least 25 percent from their peaks to their values for 2010. Over the entire period, the WRS indexes suggest that price levels are actually below their 2002 levels. Suffolk County and the town of Brookhaven are about 20 percent lower now than in 2002. Islip shows the largest decline since 2002 — about 25 percent.

There are two likely explanations for the differences in the performances of these two types of indexes. On the one hand, the WRS index, in principle, does a superior job of controlling for variations in the quality and size of the houses actually sold relative to the median sales price index. As such, the larger increases in the median sales index in the early part of the 2000s may indicate that the average size and quality of houses that were sold in the early years were on the high end of the quality and quantity spectrum relative to the average size and quality of the houses sold in the latter years. This concern is the primary basis underlying the case for the WRS index; that is, it offers a potentially superior control for the quality of housing by focusing on changes in the sales prices of the same houses.

On the other hand, the number of transactions available for the WRS index is much smaller than the number on which the median sales index is based, which may make the median sales price more accurate since it covers more transactions. However, this advantage seems rather modest in this case since the index based upon the median sales prices of repeat sales transactions — that is, the same data used to construct the WRS indexes — are also much higher than the WRS indexes. In other words, the sharp differences in the pattern of house prices between the WRS indexes and the median sales prices do not appear to be driven by differences in the sample size used to construct them. On the other hand, the time between the repeat sales is generally lower for the repeat sales transactions in the early 2000s (see Appendix Table A-2). Perhaps this suggests a different mix of houses for the WRS indexes than the median sales prices. More research on this topic is needed to generate a firm choice between these two alternative explanations.

The second focus of the analysis is upon the number of sales in 2002 through 2010. As in Table 2, two measures are computed for Suffolk County: the total number of RAR usable residential sales and the total number of RAR usable sales in repeat transactions. Both are plotted by each year of the data in Figure 4. Both show modest growth between 2002 through 2005. The peak numbers of

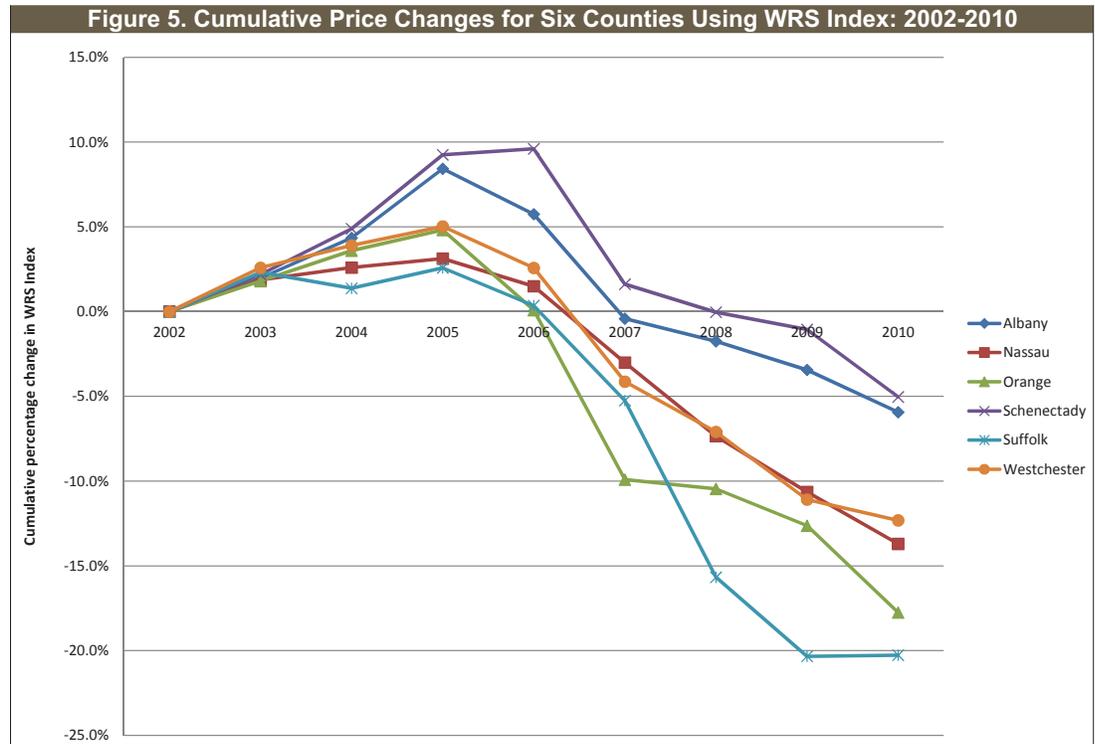


total sales are 20,659 and 4,640, respectively, in 2005. Both series also decline dramatically and steadily through 2010. Total sales and repeat sales transactions in 2010 are more than 70 percent below their peak in 2005 and only two-thirds of their levels in 2002. This is powerful evidence of the impact of the Great Recession in Suffolk County. Such declines can greatly reduce the capacity to assess market values of properties for the purpose of updating assessed values to current market conditions.

Comparisons Among Six Counties

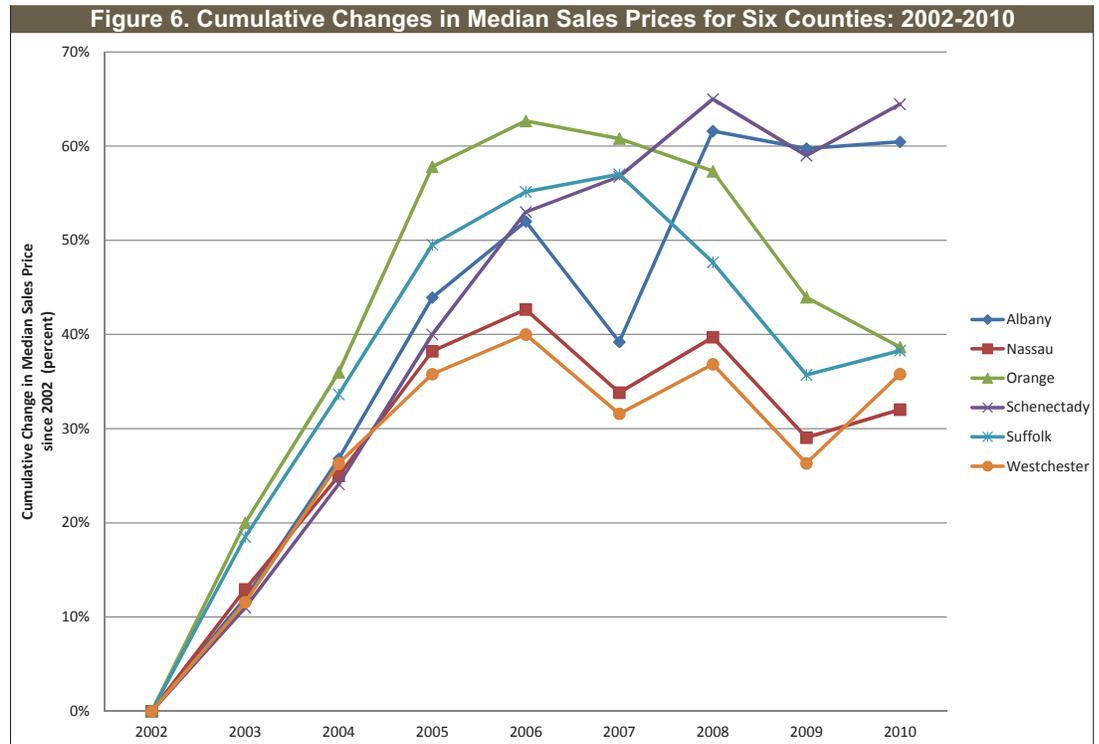
A comparison of the WRS indexes for each of the six counties is offered in Figure 5. Qualitatively, the four downstate counties show a similar pattern: peaking in 2005 and then declining steadily through 2010. Suffolk's 20 percent decline between 2002 and 2010 is the most severe among the group. Orange is next with a 17.75 percent decline since 2002 and more than 22 percent since the peak in 2005. Nassau and Westchester have similar patterns during the entire period and declines of -13.7 and -12.2 percent over the entire period, respectively, which are more modest than those for Orange and Suffolk. The outliers in this group are the two Upstate counties of Albany and Schenectady. Prices are about 5 percent lower now than in 2002; however, their drops since their peak in 2005 are more than -14 percent, which seems substantial.

The alternative index to the WRS is based upon median sales. Figure 6 contains cumulative percentage changes in the median sales price for *all transactions* for all six counties. The dominant pattern observed for Suffolk applies to the other five counties as well.



Namely, median prices are substantially higher in 2010 than they were in 2002 for each county. The four downstate counties show increases between 30 and 40 percent. Albany and Schenectady show increases of about 60 percent over the period. The downstate counties peak around 2006, but their peaks differ markedly. Orange had the highest peak at just over 60 percent and has since declined by 20 percent. Nassau and Westchester peak in 2006 and have declined by much smaller amounts. Except for a blip in 2007, the paths for Albany and Schenectady have been generally positive, though they did flatten out in the past two years.

An attempt was made to develop insights about smaller areas within these six counties by focusing upon the largest three municipalities or school districts within each county. A challenge is choosing the appropriate definition of a local submarket while maintaining a sample size sufficient to generate reliable statistical results. It is quite common in the larger industry to develop indexes at the ZIP code level. This often generates substantial sample sizes; however, even the ZIP code can generate insufficient samples and, of course, many ZIP codes encompass multiple neighborhoods. The approach used in this paper is to focus upon the three largest government units within each county and to examine both municipalities and school districts. School districts were used in Orange and Westchester Counties and municipal governments were used for the other four counties. For each of these 18 local government units, WRS indexes were computed. The cumulative price changes for each of them for the period between 2002 and 2010 are contained in Table 3 as well as the sample sizes available for each unit (rightmost column).



First, note the wide variation in the sample sizes available for this estimation exercise. Substantial sample sizes are available for the selected municipalities in Suffolk County and the two largest municipal governments in Nassau County, but the sample is only 270 observations for Valley Stream. Sample sizes for the others vary considerably from a low of 111 in Lakeland (Westchester) to a high of 4,074 for Islip.

This can lead to less reliable estimates of certain key parameters needed to compute the WRS index. In fact, most of the coefficient estimates seem reasonably precise, but there are some in places with smaller sample sizes that are quite small. For example, the ratio of the coefficient estimate of the year 2010 indicator variable for Lakeland is only about 0.33 and is not significantly different than zero. In fact, the least significant coefficient estimates are found for the latter years and the municipalities with the overall sample sizes. A fuller discussion and examine of these coefficients may be presented in the future.

Having said this, the patterns suggested by the results in Table 3 seem broadly consistent with the results for those at the county level, but do reveal variation around the county averages. In the case of Albany County, the city of Albany showed a cumulative decline larger than the overall county (-11.9 percent versus -6 percent) while Bethlehem showed less of a decline at -2.1 percent. Lakeland of Westchester and Valley-Montgomery of Orange show the largest declines of -27.6 and -25.2 percent, respectively. The results, not surprisingly, also highlight one of the challenges associated with the estimation of these indexes at highly granular levels — small sample sizes. Lakeland, for example, only had 17 usable RAR repeat

Table 3. Cumulative Percentage Changes in Residential Values Using WRS for 18 Municipalities and School Districts

County	Muni Name	2002	2003	2004	2005	2006	2007	2008	2009	2010	Sample Size
Albany	Albany	0.0%	-2.9%	-4.6%	1.1%	-0.1%	-19.7%	-7.0%	-10.9%	-11.9%	878
Albany	Bethlehem	0.0%	5.6%	8.6%	11.3%	8.1%	0.8%	-0.2%	-0.9%	-2.1%	475
Albany	Colonie	0.0%	0.5%	3.7%	7.8%	3.4%	2.3%	-2.8%	-2.0%	-7.8%	839
Nassau	Hempstead	0.0%	1.0%	0.8%	1.0%	-0.1%	-5.3%	-9.8%	-15.3%	-20.5%	3337
Nassau	Oyster Bay	0.0%	1.8%	2.9%	3.1%	0.2%	-4.8%	-8.7%	-5.4%	-8.1%	1251
Nassau	Valley Stream	0.0%	-3.1%	-3.5%	-4.5%	-3.9%	-14.6%	-17.6%	-23.4%	-19.0%	270
Orange	Newburgh	0.0%	7.4%	15.8%	19.6%	13.1%	-11.7%	3.7%	-2.9%	-10.8%	384
Orange	Monroe_Woodbury	0.0%	2.2%	1.3%	3.4%	-2.0%	3.9%	-8.4%	-11.0%	-16.9%	299
Orange	Valley-Montgomery	0.0%	-5.4%	-9.0%	-3.5%	-8.4%	-19.1%	-20.4%	-21.1%	-25.2%	256
Schenectady	Schenectady	0.0%	-5.4%	0.0%	5.2%	4.1%	9.0%	-5.8%	-7.5%	-7.6%	546
Schenectady	Rotterdam	0.0%	0.1%	-3.9%	2.0%	7.7%	5.2%	-3.3%	-4.8%	-7.5%	378
Schenectady	Niskayuna	0.0%	-2.4%	3.5%	8.4%	6.1%	-8.4%	3.2%	-3.6%	-8.0%	369
Suffolk	Babylon	0.0%	1.7%	-3.2%	-1.9%	-3.6%	-9.7%	-18.4%	-26.8%	-22.8%	1678
Suffolk	Brookhaven	0.0%	3.6%	1.9%	1.1%	-5.2%	-13.5%	-24.7%	-27.4%	-27.0%	2105
Suffolk	Islip	0.0%	4.7%	5.7%	6.2%	5.8%	0.1%	-15.9%	-20.1%	-20.5%	4074
Westchester	Yonkers	0.0%	2.7%	1.1%	4.5%	3.5%	-8.4%	-8.9%	-11.8%	-13.7%	487
Westchester	New Rochelle	0.0%	11.7%	8.7%	16.8%	6.8%	20.7%	0.9%	-6.5%	-9.0%	297
Westchester	Lakeland	0.0%	-7.6%	-7.4%	-12.5%	-14.4%	-12.5%	-26.6%	-22.8%	-27.6%	111

School Districts in Bold. All others are towns or cities.

Source: Author calculations using weighted repeat sales indexes

sales transactions in 2010, which surely drove down statistical significance in the estimate of its coefficient for 2010.

A Look at the Number of Sales by County

As was noted for the case of Suffolk County, the number of total residential sales and repeat sales transactions declined by substantial amounts in the past few years. The same basic pattern exists for each of the six counties in this sample (see Table 4). Indeed, some of the numbers seem implausibly low and raise concerns about whether all transactions have been accounted for in these data. Transactions for 2007 seem low and suspect, which is why this row is highlighted in the table. Indeed, I was able to obtain information about the number of regular sales in Nassau County from another source and found much higher numbers than are suggested by the data in this sample. More investigation and discussion with the Office of Real Property Tax Services will be done to examine this year. Having noted this possible anomaly, there is no doubt that the number of sales is down dramatically in each county by substantial amounts in the last three years relative to the 2002-2006 periods.

Conclusions, Some Implications, and Possible Next Steps

The main purpose of this paper is to develop a process and initial estimates of movements in residential property prices and the volume of residential housing sales for places within New York State. This case study focuses upon six counties: Albany, Nassau, Orange, Schenectady, Suffolk, and Westchester. The source of the data is sales transactions available through the Office of Real Property Tax Services. Two methods are used to measure price changes. One is a weighted-repeat sales index, which is the

Table 4. Numbers of Total and Repeat Sales for Six Counties

Year	Albany		Nassau		Orange		Schenectady		Suffolk		Westchester	
	Total Number of Sales	Total Number of Duplicate Sales	Total Number of Sales	Total Number of Duplicate Sales	Total Number of Sales	Total Number of Duplicate Sales	Total Number of Sales	Total Number of Duplicate Sales	Total Number of Sales	Total Number of Duplicate Sales	Total Number of Sales	Total Number of Duplicate Sales
2002	2,446	773	12,964	3,131	3,014	879	1,410	456	18,160	3,762	6,069	1,195
2003	2,560	800	13,034	3,139	3,435	966	1,513	452	18,897	4,329	6,073	1,141
2004	2,771	898	14,621	3,817	3,935	1,118	1,704	528	18,809	4,536	6,851	1,429
2005	2,694	925	14,740	4,155	3,718	1,051	1,845	620	20,759	4,640	6,917	1,486
2006	2,597	889	11,540	3,381	2,789	789	1,649	581	17,588	4,045	4,610	1,046
2007	67	27	524	133	186	51	36	13	13,307	2,961	458	98
2008	1,863	645	3,968	958	1,583	452	1,158	368	9,547	2,187	3,800	813
2009	1,849	626	556	138	1,481	404	1,066	363	8,996	2,078	3,119	674
2010	1,255	409	1,116	91	1,253	319	712	238	5,856	1,287	3,403	641
Total	18,102	5,992	73,063	18,943	21,394	6,029	11,093	3,619	131,919	29,825	41,300	8,523
Percent Repeat		33%		26%		28%		33%		23%		21%

dominant approach used in this field because of its potential to control for changes in the size and quality of sold housing. The other is another widely used, intuitively appealing, but potentially misleading indicator – the median sales price of houses sold. The time period for the analysis is 2002 through 2010.

The primary conclusion of this paper is that residential house prices have declined by substantial amounts in each of these counties since reaching their peak values in 2005 and 2006 (see Figure 5). Albany and Schenectady counties experienced price declines of about -15 percent since peaking in 2006. The four downstate counties reached their peaks in 2005. Prices in Nassau and Westchester are about 17 percent below those peaks. Orange and Suffolk experienced declines of about 23 percent since their peak. Importantly, prices are lower now than in 2002 for each county. The largest declines were in the four downstate counties. These results are consistent with other publicly available WRS price indexes provided by the Federal Housing Finance Agency and Case-Shiller. What is different is that the indexes in this paper pertain to smaller geographical areas than are covered by the publicly available indexes.

Measures of house price changes were also computed for three municipalities within each county. The goal of this is to investigate the degree of granularity with which these house price indexes can be developed. Both municipalities and school districts were considered. The results for each municipality are generally consistent with the pattern of price declines within each county, though, as expected, variation around the county average was observed (see Table 3). For example, prices in Brookhaven (Suffolk) are estimated to be 25 percent below their values in 2002 whereas prices for the entire Suffolk County were down by 20 percent. This analysis also highlighted some of the challenges in the estimation of price indexes for smaller areas – limited sample sizes. For example, only 111 observations were available to estimate the

price indexes for Lakeland (Westchester) versus over 4,000 for Islip (Westchester).

The results also reveal some differences between the WRS indexes and the indexes based upon median sale prices. The WRS indexes show lower prices in 2010 than in 2002 for all six counties and substantial declines since their peak values in 2005 and 2006. The indexes based upon median sales prices show larger increases in the early 2000s than the WRS indexes and show net gains between 2002 and 2010. The indexes based upon median sales prices also show substantial declines in house prices since their peak values for the four downstate counties (see Figures 5 and 6). The largest increases in median sales prices for the entire period were seen for Albany and Schenectady, where this form of a house price index shows cumulative increases of about 60 percent since 2002. The downstate counties show less growth, but median sales prices are still up by more than 30 percent since 2002. As noted, there are pros and cons to each index. The WRS does a potentially superior job of controlling for changes in the size and quality of houses sold since it tracks changes in the same house over time. Countering this potential advantage is the fact that the size of the sample for such estimation is only about one-third the size of the number of total sales transactions used to construct the median sales based index and that the time between the repeat sales may be much smaller in the early part of the 2000s than in later years. More research would be helpful to identify the reasons for the divergence in the types of indexes in the early 2000s.

A fourth and final conclusion that emerges from the analysis summarized in this paper is the substantial decline in the number of sales transactions (see Table 4). The most extreme declines were in Nassau County, where 2010 transactions are less than 10 percent of those in 2002. Orange County transactions were about one-third of their 2002 volume. The other counties saw 50 percent declines in sales volume. This is critical because limited sample sizes hamper the ability to provide accurate estimates of the market value of housing, which is the keystone of a sound property tax system.

Some Implications

Declining property values reduce the size of the property tax base. If assessed values and statutory property tax rates remain the same, declining property values lead to increases in the effective property tax rate. For example, consider the case of a house with an assessed and market value of \$250,000 in 2005 and in a locale with a statutory property tax rate based upon full assessed value of 3 percent. The property tax payment would be \$7,500. The effective property tax rate would rise to 3.75 percent if the true market value of this property dropped by 20 percent and its assessed value and the statutory tax rate remained at 3 percent. This is a likely dilemma facing many jurisdictions hit hard by the housing bust of the past few years. Two additional factors

accentuate the dilemma. One is related to the likelihood that the declines in property values differ among the price tiers; the lower price tiers appear to have been the hardest hit. Second, the crisis has diminished the number of regular or nondistressed sales with which to develop accurate estimates of current market valuations.

Follain and Follain (2009) write about this dilemma in an article entitled “Property Tax Reform: A Tough Act that Just Got Tougher.”²¹ If the price indexes developed in this paper are to be believed, effective property tax rates may have actually risen in many parts of New York State since the height of the house price boom. This would be the case if assessed values have failed to adjust for the declines indicated by the WRS price indexes. My guess is that assessed values have declined somewhat, but not as much as the price indexes would suggest. More research on trends in assessed values is needed to reach a firm conclusion on this point.

More broadly stated, the results suggest that the recently enacted Property Tax Cap offers only a partial remedy to the challenges associated with heavy reliance upon the property tax in New York State during periods of declining property values. In such an environment, a simple cap on the total property tax levy for an entire jurisdiction comes up short of providing another and more telling measure of the property tax burden — lower effective property tax rates. Other steps and policies are needed to cure the patient. One first step is to identify and implement the improvements in assessment practices that will ensure market values are reflected in assessed values. While a challenging assignment, especially during periods with diminished numbers of sales, my own opinion and experience suggest that improvements can be attained by using some of the statistical methods developed and being developed in recent years to estimate the market values of residential real estate in declining markets. My guess is that homeowners in areas especially hard hit by the Great Recession and the ongoing housing crisis are keenly aware of the disconnect between movements in their assessed values and the market prices of their homes and would welcome the kind of work that I have in mind.

Possible Next Steps

There are a number of possible next steps that might be pursued to both extend and apply the results of this paper. Some involve application of these processes to more places, investigation of other techniques to improve the size of the sample, and to provide more precise measures of the accuracy of the WRS and median sales indexes. Some others involve the utilization of these results to evaluate their impact on the property tax base itself. Here is a brief discussion of some of the options under consideration.

Regarding potential improvement to the process, these are steps that can be pursued:

1. The data highlight a potential concern with the data for 2007 in several counties, which seem to suggest

implausibly low sales volumes for this year and these counties.

2. More analysis can be done to measure differential price changes among price tiers.
3. Some recent research has been conducted that offers the potential to improve upon the robustness and precision of WRS indexes. Some involve the utilization of a related approach – matched-pair analysis.
4. The great frontier in this area is how to extend the sample to include foreclosure sales and sales of other non-RAR usable transactions.
5. Of course, applying the current processes or improvements to it for more areas would be an obvious improvement. This can be done readily with the existing New York State data available to us. It can also be done with data for other states since the data can often be purchased from a variety of private firms who collect and assimilate public data of the type used in this analysis.

More investigation of each of these points may be worthy of consideration.

Regarding the application of these results to current policy debates, two possible next steps may be fruitful. One involves the analysis of how assessed values have changed during the period between 2002 and 2010. The WRS price indexes suggest how they perhaps should have changed if the goal of the property tax system is to keep full assessed values equal to market values. Work is underway to do this for these same six counties. Parcel level data have already been obtained for each of these six counties from the Office of Real Property Tax Services to permit a study of this type. The focus will be upon two years, 2005 and 2010. The question is whether full assessed values have adjusted since then according to movements in the market value of housing as measured by the WRS indexes. In any event, the analysis will allow the computation of the real or effective property tax rate in both years.

The other application involves analysis similar to that described in the literature review section of this paper. That is, indexes of property values will be used as independent variables to explain various measures of a county's fiscal condition. A variety of such indicators are being considered. For example, the New York State Office of the Comptroller's Office has produced a set of measures of financial stress for local governments in New York State.²² One of the indicators is based upon median sales prices. One possibility is to investigate the impact of the replacement of that index with the WRS index, which would likely indicate much higher levels of financial stress. More generally, this application would seek to identify the various ways in which local governments are responding to reductions in the property tax base.

Appendix: Details of the WRS Estimation Process for the Case of Suffolk County

The WRS estimation process consists of three steps. The first entails a regression by ordinary least squares (OLS). The dependent variable consists of the differences in the natural logarithms of the original sale price and the second or repeated sale (lagsp). The independent variables are indicator variables that capture the differences between the year of the first and the second/repeat sale. The squared residuals from this regression are then regressed against the time between the sales and time squared to generate a revised estimate of the variance of the residuals. These adjusted residuals are then used as weights in another regression of lagsp against the year dummy variables. This is done to account for heteroskedasticity and produce more precise estimates of the key variables – the year dummy variables. The estimates of this final weighted-repeat sales regression are then used to construct a price index. The index (I_t) is constructed as: $I_t = 100 e^{-\beta(t)}$ where the $\beta(t)$ for $t = 1$ to T are estimates of the second stage parameter estimates. The full description of this process is contained in a paper by Charles Calhoun and available at the FHFA Web site (http://www.fhfa.gov/webfiles/896/hpi_tech.pdf).²³

Table A-1 contains the estimates of the three sets of regression results for the case of Suffolk County. The table includes the standard errors of each estimate, the sample size, and the R^2 for each regression. Note that the statistical significance of the coefficient estimates is generally quite high as determined by the ratios of the coefficient estimates to their standard errors, which are generally in double-digits.

Table A-2 highlights one other aspect of the data used for the estimation: the difference in months between the first and second sale. The average difference is noted for each year of the second sale. For example, the average difference between the first and second sale for a property that last sold in 2010 is 58 months. The average difference is much lower for the

	Step 1	Step 2	Step 3
VARIABLES	lagsp	ressq	lagsp
year2002	0.288		0.332
std error	0.018		0.016
year2003	0.343		0.355
std error	0.012		0.012
year2004	0.353		0.346
std error	0.011		0.011
year2005	0.373		0.358
std error	0.011		0.010
year2006	0.358		0.336
std error	0.011		0.010
year2007	0.312		0.278
std error	0.011		0.011
year2008	0.190		0.162
std error	0.011		0.011
year2009	0.130		0.105
std error	0.011		0.011
year2010	0.130		0.106
std error	0.012		0.012
yeardiff		0.0546	
std error		0.0010	
yeardiffsq		-0.0021	
std error		0.0000	
Constant			
Observations	12493	12493	12493
R-squared	0.167	0.409	0.182

earlier years of the sample because the data begin in 2001. In principle, more precise estimates may be obtained, especially for the earlier years, if first sales were observed prior to 2001.

Year of Second Sale	Average Time between Sales in Months
2002	16
2003	22
2004	27
2005	31
2006	35
2007	41
2008	44
2009	52
2010	58
Overall Average	38

Endnotes

- 1 This paper benefited from the support of the Rockefeller Institute of Government. Helpful comments were provided throughout the project by Tom Gais, Bob Ward, and Don Boyd. Jim Dunne, the director of property tax research at NYS Department of Taxation and Finance, also provided helpful comments throughout the project.
- 2 Sales of properties can be said to fall into two or three broad categories. The dominant category during normal housing markets consists of regular or arm's-length sales in which the buyers and sellers of housing units act independently and have no relationship to each other. The concept of an arm's-length transaction is to ensure that both parties in the deal are acting in their own self interest and are not subject to any pressure or duress from the other party. Two additional categories comprise irregular or distressed sales. These include nonarm's-length, e.g., parent sells a house to his or her child. They also include sales in which the buyer is the lending institution and is buying a property as part of the foreclosure process, i.e., foreclosure sale. Another aspect of the distressed real estate includes REO (real estate owned sales) in which the lender sells the home after a foreclosure to an independent third party. A recent article by James R. Follain, Norman Miller, and Mike Sklarz, "Measuring the Size of the Inventory of Distressed Real Estate: The Drain Is Still Clogged," (January 30, 2012) discusses some of these concepts and is available at: <http://www.homevalueforecast.com/lessons/measuring-the-size-of-the-inventory-of-distressed-real-estate-the-drain-is-still-clogged/>. The technical term in the State database for the transaction used in this paper is RAR Usable, which means there were no special circumstances in the sale that might prevent it from being a valid indicator of market value. For example, foreclosure sales and intrafamily transfers for nominal dollar amounts are not RAR Usable and are excluded from the calculations in this paper. Other conditions to be RAR usable include: no conditions of transfer apply; the transfer must be of a single assessment parcel; the transfer must have occurred between the filing of the latest assessment roll and the filing of the preceding final assessment roll; the full sales price must be greater than \$10,000; the assessed value must be greater than zero; the transfer must not be a condominium; and, the property is wholly within the assessing unit (parcels existing in multiple assessing units are excluded). The full list of these conditions and a discussion of the role of RAR can be obtained at: <http://www.orps.state.ny.us/ess/rar/rar.htm#whatis>.
- 3 James R. Follain, Ph.D., "A Study of Real Estate Markets in Declining Cities," Research Institute on Housing for America (January 6, 2011) at <http://www.housingamerica.org/default.html> and at http://www.rockinst.org/pdf/cities_and_neighborhoods/2011-01-06-Real_Estate_Declining_Cities.pdf
- 4 We were provided access to these data for the purpose of this research by the Office of Real Property Tax Services of New York State. These data are stored on its SalesWeb Web site and are used to develop equalization rates for property taxes in and around the state. The original sources of the information are the local assessor public record files. We appreciate the opportunity to work with these data.
- 5 Residential Assessment Ratios (RAR) are calculated as a measure of assessment equity. Sales that are considered representative of market values and thus usable in calculation of such ratios are described as RAR usable.

- 6 Kim Reuben and Serena Lei, "What the Housing Crisis Means for State and Local Government," *Land Lines* (October 2010) at https://www.lincolnst.edu/pubs/dl/1847_1155_LLA10103%20Housing%20Crisis%20and%20Govts.pdf. The full set of papers can be found at: <https://www.lincolnst.edu/education/course/detail.asp?id=720> and in *Regional Science and Urban Economics*, 41, 4 (July 2011).
- 7 Bryon Lutz, Raven Molloy, and Hui Shan, "The Housing Crisis and State and Local Government Tax Revenue: Five Channels," *Regional Science and Urban Economics* 41, 4 (July 2011): 306-19.
- 8 James R. Follain, Ph.D., and Barbara A. Follain, "ZIPpity Do Da!" *Cyberhomes* (February 5, 2007), <http://www.ficonsulting.com/zippity-do-da>.
- 9 William M. Doerner and Keith R. Ihlanfeldt, "House Prices and City Revenues," *Regional Science and Urban Economics* 41, 4 (July 2011): 332-42, <http://www.sciencedirect.com/science/article/pii/S0166046211000263>.
- 10 See the latest report: http://www.realtor.org/wps/wcm/connect/5e37be0045ba291385f5c7342c47dc89/REL10Q4T_rev.pdf?MOD=AJPERES&CACHEID=5e37be0045ba291385f5c7342c47dc89
- 11 James R. Follain, Ph.D., and Barbara A. Follain "Are We Ready for a New Index of House Value?" *Cyberhomes* (October 8, 2007), <http://www.ficonsulting.com/node/19>.
- 12 Future research along these lines is possible by estimating hedonic price indexes with the New York State *parcel* data, which has much more information about each housing unit and may support a hedonic approach.
- 13 Charles Calhoun, "OFHEO House Price Indexes : HPI Technical Description," Office of Federal Housing Enterprise Oversight. (March 1996). This paper explains the basic WRS approach used by FHFA, which is followed in this paper. See: http://www.fhfa.gov/webfiles/896/hpi_tech.pdf.
- 14 Some of my work has been published in academic outlets such as James R. Follain and Charles C. Calhoun, "Constructing Indices of the Price of Multifamily Properties Using the 1991 Residential Finance Survey," [The Journal of Real Estate Finance and Economics](#) 14, 1-2 (1997): 235-255. I also have substantial experience in the business of building modern automated valuation models and ongoing efforts to improve upon the standard approaches.
- 15 See the FHFA Web site for more information and the index values: <http://www.fhfa.gov/Default.aspx?Page=14>
- 16 Here is a link to the latest CS indexes: <http://www.standardandpoors.com/indices/sp-case-shiller-home-price-indices/>.
- 17 The New York Commuter area includes these places: Fairfield, CT; New Haven, CT; Bergen, NJ; Essex, NJ; Hudson, NJ; Hunterdon, NJ; Mercer, NJ; Middlesex, NJ; Monmouth, NJ; Morris, NJ; Ocean, NJ; Passaic, NJ; Somerset, NJ; Sussex, NJ; Union, NJ; Warren, NJ; Bronx, NY; Dutchess, NY; Kings, NY; Nassau, NY; New York, NY; Orange, NY; Putnam, NY; Queens, NY; Richmond, NY; Rockland, NY; Suffolk, NY; Westchester, NY; and Pike, PA.
- 18 These are referred to as property class 210 in the state data.
- 19 This is a hotly debated topic. James R. Follain, Ph.D., Norm Miller, Ph.D., and Michal Sklarz, Ph.D., recently used data from eight counties in New York and California to highlight some of the challenges associated with the distressed inventory in "Measuring the Size of the Inventory of Distressed Real Estate: The Drain Is Still Clogged" (January 30, 2012), <http://www.homevalueforecast.com/lessons/measuring-the-size-of-the-inventory-of-distressed-real-estate-the-drain-is-still-clogged/>.
- 20 The appendix contains some of the details of the estimation process for the case of Suffolk County and a brief discussion of the estimation process.
- 21 James R. Follain, Ph.D., and Barbara A. Follain "Property Tax Reform: A Tough Act That Just Got Tougher," *Cyberhomes* (January 28, 2009), <http://www.ficonsulting.com/node/70>.
- 22 <http://www.osc.state.ny.us/localgov/pubs/research/schoolsfiscalstress.pdf>.
- 23 Charles Calhoun provided valuable assistance in the development of the Stata code I used to implement the process.

About The Nelson A. Rockefeller Institute of Government

The Nelson A. Rockefeller Institute of Government, at the University at Albany, is the public policy research arm of the State University of New York. The Institute was established in 1982 to bring the resources of the 64-campus SUNY system to bear on public policy issues. The Institute is active nationally in research and special projects on the role of state governments in American federalism and the management and finances of both state and local governments in major areas of domestic public affairs. Thomas Gais is director of the Institute. James R. Follain, author of this paper, is a senior fellow at the Institute. Michael Cooper, the Institute's director of publications, was responsible for production of this report.