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What are Real Estate Prices Responding to? An Examination of Daily Price Changes in Chicago, IL

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Abstract

This study examines factors that previous literature has found to influence real estate prices over both annual and monthly timeframes. This study is based on a unique dataset of daily asking price changes of two-to-four unit residential buildings in Chicago. The final sample consisted of 4,749 sold properties resulting in 12,807 unique daily price changes to examine. The purpose of this study was to examine if prices moved as a result of more than the 800 micro and macroeconomic event announcements over this six year period, 2005-2011. Logistic regressions were used to show how little these publicized announcements are reflected in the price adjustments that lead to a sale. Regression analyses were also completed in an attempt to examine the impact on price and the quantity of changes. The combined findings from these models suggest that practitioners and sellers do not look to these publicized announcements to determine price adjustments and that previous findings cannot be replicated in smaller event windows.

Keywords: Real estate; Microeconomic; Macroeconomic; Daily price changes; Multiunit; Residential

Introduction

With the real estate market under such distress, banks holding such a large amount of REOs, and residential rental rates on the rise it appears that the economics of real estate investing may be improving for those with the cash and the risk tolerance. While a real estate investor may not have the ability to buy big they do have the option of breaking into the residential investment community through indirect means, such as a REIT, or directly with the purchase of a smaller parcel. This study is intended to provide a comprehensive view of the small investor's pool of interest in Chicago and focuses on transactions that involve multi-unit properties that range in size from two to four units. Multi-unit properties abound in Chicago, and the unique data sample of sales that will be examined is over 11,000 multi-units between August 16, 2004 and December 25, 2011. This data does not simply show the list and final sale price but rather shows the daily price changes that ultimately led to a close (i.e. sale). Beyond the unique dataset, a reason for focusing on this property type is that it allows us to readily filter out more of the primary residence shoppers, who would likely view the purchase of real estate with more emotion than an investor, whose primary purpose is profit. An expectation of the multi-unit market is that these participants may be considered more experienced or at least better qualified and less emotionally tied to a particular purchase and may create a more efficient market.

The primary contributions of this research are threefold

1) To examine which publicized indicators are readily transmitted into real estate prices.

2) To extend the research on a real estate sector that has not received much attention, the multi-unit sector.

3) To examine a dataset that practitioners utilize on a daily basis.

The expectation of immediate price responses in real estate is often overlooked, though the reasoning is not entirely clear given that real estate brokers can alter prices anytime of any day and are not restricted by business hours. It should also be expected that not only is the investor heavily engaged in such a large purchase/sale but that the broker examines both macro and microeconomic factors that should have an impact on real estate prices, and ultimately have it reflected, almost immediately, in the asking price. It is common knowledge that a broker cannot make an immediate price change to the parcel since owner approval is required. However, this delay should only result in a lagged price change that still surrounds the event. Hypothetically speaking how can it be that publicized statistics and stories of falling prices, decreasing mortgage rates, foreclosures, poor vacancy rates, and increased rental rates have no immediate impact on pricing? Why have we only focused on monthly, quarterly, or even annual movements while ignoring the daily movements? The most logical answer to this question seems to be that the aggregated data is readily available while the daily data is not recorded in as easily accessible format. However, given all that can happen over these longer periods how can we determine why prices are actually moving? This paper shows how little these publicized figures are actually reflected in the asking prices and suggests that practitioners and sellers do not look to these announcements to determine price changes. This paper will also tend to raise the question of where are brokers receiving their cues to move prices.

This paper will begin with a review of the literature in Section 2, a detailed description of the data and methodology examined in Section 3 and Results and Conclusions in Section 4 and 5 respectively.

Literature Review and Motivation

The impact of macro and microeconomic variables on pricing has not been examined except when exploring price trends over months or even years. This is likely due to the lack of detailed data, however, as discussed previously, there is nothing preventing more immediate reactions. While daily price changes are considered noisier it is evident that examining only longer periods of time produces perplexing results. It is not uncommon for several announcements to occur within

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a month's time which would make understanding relationships quite difficult.

Several authors have examined how real estate reacts to micro and macroeconomic variables. For example, Kalra and Chan [1] were able to retrieve TOM data along with several specific characteristics of single family homes and found that mortgage rates have the expected sign and are significant. This is interpreted as lower interest rates reducing the period cost of homeownership and boosting the demand of the housing market, thus reducing the TOM. Cotter and Hoesli [2] report similar results. From a micro economic perspective, several papers have examined the impact of shocks of material pricing labor and capital cost, and regulation affecting supply. For example, Hwang and Quigley [3] examine these variables and document a lag in the pricing response. The apparent focus on a quarterly or even annual data makes it hard to determine what the cause of shifts truly is. Englund and Ioannides [4] and in a working paper Case et al. (1999) examine economic factors and find that GDP changes do lead to changes in the real estate market. Case et al. [5] examined pricing between 1975 and 1993. They identify a trend in which periods of high default rates strongly follow real estate price declines or interruptions in real estate price increases. While the findings here are of interest and confirm other results the discussion is limited to only the loan-to-value ratios and the contribution to default levels [6,7]. Given the amount of information that can occur in the selected time frames (e.g. a month, a quarter, or even a year) the ability to connect price movement to a particular variable's movement is not intuitive. Abraham and Hendershott [8] examine annual data and focus on a series of pooled time series cross-section regressions in which they test whether economic variables such as employment, income growth, inflation of real construction costs, and changes in real after tax interest rates can explain the variation in housing prices. However, given all that could happen in a year the examined responses may not have moved for the hypothesized reasons.

Several other real estate studies have examined the pricing of real estate and this study looks to contribute to this string of literature. For example, Case and Shiller [9] find that there is substantial evidence that inertia in housing prices exists. This means that increases in prices over any year tend to be followed by increases the subsequent year. Gau [10] examined monthly data and found that Vancouver apartment prices seemed to adjust without delay to changes in government tax shelter and rent control policies. Linneman [11] found that in the Philadelphia housing market publicly available information was capitalized into house prices. Darrat and Glascock [12] utilize monthly data to examine whether changes in monetary and fiscal policy and other financial variables have a significant causal effect on real estate stock returns. They examine data from 1965 to 1986 and find that base money and market returns have had a significant lagged effect on current real estate returns. Clapp and Giaccotto [13] examine local house price movements as a result of expected inflation and unemployment. The study examines both an assessed value index and a repeat price index. While the two indexes were highly correlated the impact of economic variables on each was not identical, which may confuse results. Asabere et al. [14] find overpricing and underpricing to be significant, showing a tradeoff between listing prices and TOM. Many of the independent variables that are examined in the studies mentioned above are carried into this study in order to inspect the informational efficiency of the market on a daily basis.

The response of the real estate market to key macro and micro economic announcements has been examined in both the ETFs and REIT markets too. However, while real estate investors may assume that they can extend the efficiency found in ETFs and REITs to the physical market, this may not be the case. The stock market is said to reflect information about real estate markets that is later embedded in infrequent property appraisals. While investors may be able to readily extend ETF and REIT efficiency to the physical market this cannot be done with certainty. If this efficiency can truly be transmitted than a study that examines daily price changes that result in a final sale should also display similar significant findings. This particular study may show a more efficient pricing mechanism since it examines how markets determine prices on a daily basis.

Data

The dataset was hand collected from all available 2-4 unit "Closed" properties in Chicago. "Closed" is the MLS term that indicates a property has sold. The complete dataset was gathered from MLSNI and spanned approximately 7 years. The focus was on multi-unit buildings ranging in size from 2-4 units with a close (i.e. sell) price of $50,000 to $500,000. This expansive closing price range was chosen after examining the average closing price of all 77 neighborhoods over the time period examined. There were only five neighborhoods whose average selling prices approached the upper limit of $500,000 which would have created a potential for upward bias. These neighborhoods were Kenwood and Lake View, whose averages were $365,500. Others included Fuller Park at $379,000, Lincoln Park at $417,750 and North Center at $476,000.

The earliest list date of a property in the complete dataset was August 16, 2004 while the earliest list date with a price change is September 20, 2005. The latest list date of the examined closed sample is December 25, 2011. Exhibit 1 shows select descriptive statistics for the collected sample. Additional details on the subject properties, totaling 4,749 properties, can be found in Appendix A.

Exhibit 1

Select descriptive statistics for properties with price changes: These panels provide select descriptive statistics for the properties that initiated price changes. Further detail on the dataset can be found in Appendix A.

Panel A: This table shows the total number of unique properties that were included and separates them into those that initiated a price change and those that did not. The table also shows how each particular property was classified when listed. Note that the listing classification of Foreclosure (F), Short Sale(S), and Court Approved(C) is the responsibility of the Broker (Table 1).

*Two properties were omitted due to an apparent abuse of the top-listing function. These two properties alone counted for nearly 100 price changes over a two year period.

Panel B: This table displays the total number of properties that initiated a price change (4,749) from the above panel. The table displays each daily directional change as a unique observation. A small number

	Closed With No Price Change	Closed With Price Change
Foreclosed (F)	1,809	1,009
Short Sale (S)	791	1,093
Court Approved (C)	31	23
No Specification Noted (NA)	3,779	2,624
Total Closed	6,410	4,749 *

Table 1: Panel A.

of owners changed prices twice within a day with no net change implying a goal to only top list. These events were ignored in this analysis since the goal was only to receive a status change (Table 2).

Panel C: This table shows additional descriptive details about the 4,749 properties with regards to list and final prices. The first tables partition the properties in $50,000 increments for both the final sell price and the original list price. The final table displays the total discount from the original list price and market time for each of the properties in the sample. The table continues to divide the properties by classification type (NA, F, S, and C) (Table 3).

The events that are included in order to explain price movements are shown below in Exhibit 2. These events were chosen using variables from prior research (many of which were referenced above) and then expanding significantly since the limitation of monthly or annual data reporting was not an issue. The studies here are based on the announcement date that the information became publicly available and not simply the aggregate impact over a month's time. The studies mentioned throughout this paper may have examined some of the same variables but were limited to monthly, quarterly or even annual data. The daily price data that is central to this study allows for a more detailed examination of real estate pricing. While daily data is considered noisy it is still necessary in order to examine the impact of announcements. The rationale behind examining this asset class on a daily basis is similar to that of examining other asset prices reactions to announcements through event studies. The variables included in this study were the specific announcement dates of foreclosure filing reports, real GDP, Case Shiller, Fixed Mortgage Rate, Building Permits, Fed Funds Rate, Unemployment Rate, Prime Rate, CPI, residential construction, and real estate related articles in the top three Chicago newspapers. The articles contributed forty unique events that are likely to have an impact on the real estate investor and are not simply a reproduction of the other announcements. A general list of the article topics can be found in Appendix B. Given that the response may not immediately be reflected in prices not only was the event week monitored for price movements but also the response of the prices the following week. The expectation is that practitioners would be able to alter prices within one week of a particular announcement. This expectation is not unrealistic since price changes can be implemented immediately and are not constrained by any set of hours. The descriptive statistics for the events are shown below in Exhibit 2.

	Unique Price Changes
Negative Movements	12,183
Positive Movements	624
Total Changes	12,807

Table 2: Panel B.

Final Price ($)	N	List Price ($)	N
50-100,000	1280	<50,000	10
100-150,000	854	50-100,000	554
150-200,000	716	100-150,000	709
200-250,000	552	150-200,000	837
250-300,000	464	200-250,000	585
300-350,000	318	250-300,000	584
350-400,000	245	300-350,000	419
400-450,000	177	350-400,000	349
450-500,000	143	400-450,000	229
		450-500,000	206
		500-550,000	157
		550-700,000	102
		700-900,000	8
Sum	4749	**Sum**	4749
	Sum	**Average**	**St Dev**
Discount in Price (NA)	$ 144,712,766	$ 30,479	$ 48,112
Discount in Price (F)	43,964,451	9,260	27,401
Discount in Price (S)	96,893,564	20,413	51,387
Discount in Price (C)	1,839,671	387	7,919
Market Time (NA)	524634	110	162
Market Time (F)	204319	43	120
Market Time (S)	274466	58	141
Market Time (C)	4448	1	17

Table 3: Panel C.

Exhibit 2

Descriptive statistics for selected announcements: The table below provides the descriptive statistics for the announcements used in the study. The classification of positive and negative are from the perspective of how the information would be depicted by the general economy. The begin and end dates are meant to show the range of events for each type of announcement examined (Table 4).

Given that local practitioners cannot be expected to monitor all news outlets or deem each to be equally significant, the announcements were further divided into three categories: Regional, National, and Real Estate Specific National events. Regional announcements consisted of Foreclosures, Real GDP, Unemployment, Periodicals, and Rent (CPI). These announcements were selected due to the narrower scope that focused on the Midwest and Chicago specifically. National variables were meant to encompass those announcements that were broader in scope and included CPI, Prime Rate, and Federal Funds Rate. Events in this category impact the real estate market on a broader scale and may not be immediately recognized in the prices. Finally, Real Estate specific announcements were specific to the real estate industry as a whole but national in scope. The announcements that were included in this subset are Case Shiller, Fixed Mortgage Rates, Building Permits, and Residential Construction. It is evident that several of the variables will have a high correlation with others, specifically CPI/RentCPI and PrimeRate/FedFunds. Therefore different combinations of announcements were included in models to examine which had the greatest potential impact on price movements. It should also be noted that positive and negative events for all variables, with the exception of periodicals, are gauged from an economic point of view so care is needed when examining results. For example, a positive rent (CPI) event would be a downward shift from one period to the next. However,

	Begin Date	End Date	Positive	Negative	Total
Foreclosure Survey	9/23/2008	9/21/2011	3	7	10
Real GDP	10/26/2005	9/13/2011	8	5	13
Case Shiller	8/30/2005	12/27/2011	27	50	77
Fixed Mortgage Rates	9/1/2005	12/29/2011	157	174	331
Building Permits	9/20/2005	1/19/2012	19	58	77
Federal Funds Rate	9/20/2005	12/16/2008*	10	7	17
Unemployment	8/31/2005	2/1/2012	41	31	72
Prime Rate	9/20/2005	12/16/2008*	10	7	17
CPI	9/15/2005	2/17/2012	20	58	78
Residential Construction -Constant Quality	9/20/2005	2/16/2012	37	41	78
Rent (CPI)	9/15/2005	2/17/2012	16	62	78
Periodicals	1/2/2006	2/19/2012	20	18	38
Total			368	518	

Table 4: Descriptive Statistics for Selected Announcements.

this would of course not be what a real estate investor, or seller, who prices assets based on cash flows would consider beneficial so care will be taken when reporting results. Similarly, a positive event from a seller and investor perspective for the federal funds rate is a downward shift while a positive event from a seller and investor for foreclosures is a downward shift. The expectation is that the positive events would help to explain the likelihood of a positive price movement and that the negative events would explain the negative price change movements. The variables outlined above should impact prices at varying levels and should not require a month, quarter or even a year to influence prices if the market were efficient.

Methodology

The price changes were reported and collected on a daily basis; however they were aggregated into week's when running the analysis. The logic behind creating these weekly subsets is that while a broker is expected to keep abreast of information and these groups of sellers are likely to monitor the investment environment more regularly than other participants, the need for the broker to receive permission is necessary and may not be achievable on the same day. In other words even if a broker or seller are keeping themselves informed, they must communicate the desire to make a price change. While the realization of a needed price change and the intent can easily be accomplished in moments, the likelihood of this seems questionable and given the amount of data the effects could be viewed in a weekly format with greater clarity. Understanding that prices can, and do, change daily it seems realistic to expect that significant news will have an immediate impact on the price resulting in a price change that very week. This fact led to the first set of regressions run. A current week, one week lag and two week lag model were utilized for all models since an event may have occurred at the end of a week or a broker may not be able to initiate the price change in a timely manner.

The selected variables noted in the previous section led to a large set of event dates, and the need to test multiple models was necessary. The first goal of this study is not to identify the variables which have the greatest impact but instead to identify announcements that have an impact. This first set of analyses does not examine the magnitude of change but instead examines if the change was positive or negative as a result of announcements. For this reason the dependent variable is binary and the logistic regression model is the most appropriate model given the intent of this study. A total of six models, including two lagged models, one week and two week lags, were completed for each of four different combinations in order to ensure that directions and magnitudes were properly examined. The four different combinations were as follows:

Positive event dates (n=368) modeled with positive price changes (n= 624)

The expectation is that these events will lead to positive price movements

Negative event dates (n=518) modeled with positive price changes (n= 624)

The expectation is that these events will not result in positive price movements

Positive event dates (n=368) modeled with decrease in price changes (n= 12,183)

The expectation is that these events will not result in negative price movements

Negative event dates (n=518) modeled with decrease in price changes (n= 12,183)

The expectation is that these events will lead to negative price movements

The results from all logistic regressions provided constant results so the results section will focus on the one week lagged stepwise for consistency. Given that the variables were all theoretically appropriate, the variables that were significant are just as important in explaining the real estate market as those that were omitted since this helps to understand what moves, or does not move, the market prices. In an effort to create more logical event classifications the second set of models that were completed examined the subsets of announcements. This resulted in similar models to what was presented above except that the event dates are not examined as one and are instead divided based on Regional, National and Real Estate Specific National Events. Each specification below was completed with positive price changes, negative price changes, and the combined price changes.

Positive regional event dates (n= 88) modeled with positive price changes (n= 624)

The expectation is that these events will lead to positive price movements.

Negative regional event dates (n= 123) modeled with positive price changes (n= 624)

The expectation is that these events will not result in positive price movements.

Positive regional event dates (n=88) modeled with decrease in price changes (n= 12,183)

The expectation is that these events will not result in negative price movements.

Negative regional event dates (n= 123) modeled with decrease in price changes (n= 12,183)

The expectation is that these events will lead to negative price movements.

The previous models were also completed with positive (N=40) and negative (N=72) National announcements and positive (N=240) and negative (N=323) Real Estate Specific National announcements. Once the different lags were included this set of analyses resulted in 36 unique models. However, many of these regressions produced similar results so only the lagged models that exemplify the relationship between positive events and positive reactions are discussed below alongside negative events and negative reactions. The final set of regressions that was completed mirrored the subset analysis presented above (Regressions 5 – 8) except that the dependent variable is the percentage price change of the complete real estate portfolio on a weekly basis over the entire window being analyzed. The purpose of this final set of regressions was to examine not only if a price change resulted on an individual parcel but also how the particular announcements may have impacted the parcel and portfolio as a whole. Since all models produced similar results the following results section will focus only on the one week lag models.

Results

The first set of stepwise logistic regressions that were completed modeled positive event dates with positive price changes. The expectation for these six models is that the positive event dates should

be related to price change increases. The total number of positive events is reduced since several variables trend together, specifically RentCPI/CPI Data and FedFunds/Prime. For this reason models were run with combinations of each. Of the six key models run four were highly significant at the 5% level while the other two were significant at the 10% level. However, only the stepwise regressions for both lagged and non lagged explanatory variables, Exhibit 3 and Exhibit 4, are presented here.

Exhibit 3

Positive event with increase price changes stepwise lag: The table below provides the results when all variable were included at a lag of one week (Tables 5-7).

Given that the positive price change was denoted as 1 the negative coefficients imply that a positive announcement on lagforeclosures (such as they went down month on month) would reduce the likelihood of a positive price change. Similarly, a positive event for lagunemployment is when less people are unemployed compared to a prior period. A seller may feel that since the employment market is improving that a price increase would be prudent, however this does not seem to be the case. Only the logic of the lagbuildingpermits variable has an intuitive direction. A positive event for building permits would lead to a potential of increased supply on the market which would not justify a positive price change. The exhibit below, Exhibit 4, models price impact the same week, not lagged.

Exhibit 4

Positive event with increase price changes stepwise: The table below provides the results when all variable were included with no lag (Tables 8-10).

Test	Chi-Square	DF	Pr > ChiSq
Likelihood Ratio	14.9722	3	0.0018
Score	18.4547	3	0.0004
Wald	16.1891	3	0.001

Table 5: Testing Global Null Hypothesis: BETA=0.

Parameter	Df	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq
Intercept	1	1.971	0.1236	254.3108	< .0001
Lagforeclosoure	1	-1.7474	0.8358	4.3711	0.0366
Lagbuildingpermits	1	-1.0731	0.3784	8.0401	0.0046
Lagunemployment	1	-0.6765	0.2978	5.1608	0.0231

Table 6: Analysis of Maximum Likelihood Estimates.

Effect	Point Estimate		95% Wald Confidence Limits
Lagforeclosure	0.174	0.034	0.896
lagbuildingpermits	0.342	0.163	0.718
lagunemployment	0.508	0.284	0.911
Percent Concordant	27.5	**Somers' D**	0.166
Percent Discordant	10.9	**Gamma**	0.432
Percent Tied	61.6	**Tau-a**	0.041
Pairs	65520	**c**	0.583

Table 7: Odds Ratio Estimates.

Test	Chi-Square	DF	Pr > ChiSq
Likelihood Ratio	13.9998	3	0.0029
Score	15.6312	3	0.0013
Wald	13.7052	3	0.0033

Table 8: Testing Global Null Hypothesis: BETA=0.

Given that the list price can be changed almost immediately, the above exhibit examines the likelihood that the positive events resulted in a positive listing price change. Both foreclosure and buildingpermits carried the same sign as those in the lagged model and show similar significance. The contribution of this model is that rentcpi is positive and significant. The results above show that when positive events related to rentcpi are announced, for example a decrease in rentcpi, a positive price change is reflected in the properties. The direction of this variable is not logical since we would expect a positive rentcpi announcement to have a negative coefficient, reflecting the fact that cash flows of the property are likely reducing or not increasing appropriately. The fact that mortgage rates, residential construction and periodicals had no significant impact is surprising since releases with regards to these variables, along with others, should theoretically alter the prices of an efficient asset market immediately.

The second set of regressions that were completed modeled negative event dates with negative price changes. Of the six key models that were examined with this dataset all were highly significant at the 5% level. For consistency in reported results only the stepwise models for both the lagged and non lagged variables, Exhibit 5 and Exhibit 6, are reproduced here. In the following exhibits a negative price change is denoted as 1.

Exhibit 5

Negative events with decrease price changes stepwise lag: The table below provides the results when all lagged variables were included (Tables 11-13).

Parameter	Df	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq
Intercept	1	1.8154	0.1121	262.1026	< .0001
Foreclosure	1	-1.8154	0.8242	4.852	0.0276
Buildingpermits	1	-1.0729	0.4034	7.0724	0.0078
Rentcpi	1	1.49	0.757	3.86	0.0493

Table 9: Analysis of Maximum Likelihood Estimates.

Effect	Point Estimate		95% Wald Confidence Limits
foreclosure	0.163	0.032	0.819
buildingpermits	0.342	0.155	0.754
rentcpi	4.425	1.004	19.495
Percent Concordant	16.2	**Somers' D**	0.113
Percent Discordant	4.9	**Gamma**	0.536
Percent Tied	78.9	**Tau-a**	0.028
Pairs	66144	**c**	0.557

Table 10: Odds Ratio Estimates.

Test	Chi-Square	DF	Pr > ChiSq
Likelihood Ratio	35.5256	2	< .0001
Score	404.3568	2	< .0001
Wald	68.7234	2	< .0001

Table 11: Testing Global Null Hypothesis: BETA=0.

Parameter	Df	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq
Intercept	1	5.5838	0.2139	681.4873	< .0001
lagFixedRate	1	0.7333	0.3515	4.3526	0.037
lagFedFunds	1	-4.8713	0.6347	58.9062	<.0001
Lagunemployment	1	-0.6765	0.2978	5.1608	0.0231

Table 12: Analysis of Maximum Likelihood Estimates.

The lagged model shows that the lagfixedrate variable has a positive coefficient associated with it. Given that a negative event for this variable is denoted as a rate increase it is not surprising that increased rates would escalate the likelihood of a decrease in asking price. A negative event for lagfedfunds is when the rate increased. This variable has a negative coefficient implying that a negative event (increase in the fed funds rate) reduces the likelihood of a negative price change, which was not expected. Exhibit 6 models the same data but without the events lagged one week.

Exhibit 6

Negative events with increase price changes stepwise: The table below provides the results when all variable were included with no lag (Tables 14-16 Shown in Appendix).

The model above shows that two negative events associated with a negative Case Shiller reports and an increase in the fixed mortgage rate adds to the likelihood of a price decrease. However, the model also shows that a decrease in building permits leads to a price decline which is not entirely intuitive since the constant supply cannot explain the price decrease. Alternatively, it could be that sellers are using the building permits as a lead indicator and assume that if less building permits are being issued than the market must be worse off than anticipated. The negative coefficient associated with fedfunds implies that an increase of the fed funds rate would decrease the likelihood of a negative price change. This final finding is not intuitive since this would lead to increased borrowing costs which should have a negative impact on market prices. The fact that the lagged model did not produce significant findings outside of the fed funds rate movements implies that the lagged model in this instance is not more informative than the non lagged model presented above. However, in both cases the lack of attention on variables that should alter pricing such an unemployment and Rent (CPI) is surprising. These variables, while theoretically appropriate, do not appear to result in immediate market price changes.

The next set of regressions completed, though not included here, modeled negative event dates with positive price changes. There is no theoretical explanation for these models but they were completed as a robustness check. The six common models that were run with the negative event dates and positive price changes were not statistically significant. This finding was not surprising since there is no theoretical support for negative events to create positive price changes. The lack of significance does add a level of validity to the previous sets of regressions which not only had a theoretical foundation but also produced significant variables.

The final set of regressions completed in this category modeled positive event dates with negative price changes. The six common models that were run with the positive event dates and negative price changes were marginally significant. The purpose of this test was to examine if the positive news could explain any negative price movements. The expectation was that no relationship would exist. The two stepwise models that were displayed above for the other models were minimally significant here and in both instances stopped after including caseshiller and buildingpermits. This would imply that as buildingpermits increased the probability of a price decline was significant. This is theoretically acceptable since buildingpermits may be considered a lead indicator of competition. However, there is no theoretically acceptable reason why an increase in the Case Shiller index results in a price decline, unless sellers take this to mean demand is up and they feel that being top listed is worthwhile. In any event the results that were displayed above do show that a relationship does exist among event announcements and price movements that does not require a month, quarter, or year to capture.

Effect	Point Estimate		95% Wald Confidence Limits
lagFixedRate	2.082	1.045	4.146
lagFedFunds	0.008	0.002	0.027
Percent Concordant	40.8	Somers' D	0.255
Percent Discordant	15.3	Gamma	0.454
Percent Tied	43.9	Tau-a	0.002
Pairs	450711	c	0.627

Table 13: Odds Ratio Estimates.

Unlike the first set of regressions that focused on those variables that created the strongest model the second set of logistic regressions examined the subsets of announcements: Regional, Real Estate Specific National announcements and National Announcements. The summary results of the one week lag models have been provided in Appendix C. The intent of these regressions was to divide announcements into logical subsets. The expectation was that those announcements that are more narrowly focused on the region in question would have a greater impact. However this was not the case. While the overall significance of the models was negligible the events did produce more logical movements when looking at the impact of negative announcements. For example negative events did in fact produce an increased likelihood of a negative price movement. Unfortunately this relationship was not as evident when examining the impact of positive events on the likelihood of positive price changes. From this set of regressions we see that the signs are more logical as a result of the event subsets but the models themselves are still not statistically significant. This tends to confirm the results of the first set of regressions that found no consistent relationships between events and price changes.

The final set of regressions examined the three subsets of announcement: Regional, Real Estate Specific National announcements and National Announcements and the magnitude of the price changes among all parcels. The intent of this set of regressions was to examine the effect on real estate prices when treated as a portfolio and not simply to examine whether a change took place. The results of these regressions are presented in Appendix D. However, the results of these regressions were similar to those outlined above and in Appendix C. In all instances the significance of the models was negligible and in many cases the sign on event impacts on prices were not logical. For example, positive announcements at the regional level such as lagged foreclosure, unemployment and real GDP resulted in downward price adjustments. However, in all instances the positive announcements did not result in significant impacts. The results for the negative announcements modeled with negative price changes were also not significant and produced mixed signs which further illustrates that practitioners are not looking to any of these announcements when determining price changes.

Conclusion

Understanding why and how real estate prices move is paramount to understanding the efficiency of pricing in the real estate market. However, being able to determine what moves prices more frequently than quarterly or annually is much more valuable to practitioners that are actively involved in the real estate market on a continual basis. The unique dataset that was examined in this paper consisted of over 11,000 2-4 unit properties that sold in Chicago. These properties resulted in over 12,000 unique price changes to analyze with respect to announcements. Unfortunately, the 850 event dates, spanning 12 macro

and microeconomic variables, did not explain nearly as many of the price movements as hypothesized. The fact that these broad variables paired with so many daily price changes, segmented weekly, could not explain price movement exceedingly well is not ideal. Even with several dozens of different variations of models the results still remained insignificant. If these variables can only marginally help to explain a price movement the questions still remain, which are, what is moving prices and why is this not being reflected in a more timely fashion? The examination of pricing on a monthly or annual basis, as many previous studies do, is not adequate when modeling price changes that can be altered immediately. The variables that were chosen for this study were often found in previous literature to be significant over these longer event windows. However, while many of these variables were significant when examined in the larger windows (e.g. months, quarters, and years) they were not significant in the much smaller windows here. This aggregation of price changes that has been completed in the past appears to confuse the results and overestimate relationships. Understanding that many announcements take place over a month, quarter, or year this study implies that the results found when price changes are aggregated do not have the anticipated impact when partitioned into shorter time frames.

The lack of significant results in this study does not discount the value of this paper or prior work but instead acts as the first part of another story. We see here that these popular variables often included in research cannot be used to explain daily prices which leads to the questions of why do prices change daily and more importantly what is the logic behind price movements? Are prices set arbitrarily high and then brought down in an effort to top list more frequently? If this is the case then why did 624 positive price changes exist in this data set? Do real estate brokers not take any cues from publicized announcements? The results here will likely raise more questions than they answer but the conclusion is clearly that these variables are not as strong at modeling daily/weekly price movements as they are in modeling movement over longer time frames. While seemingly ignored it is necessary to gain a clearer perspective on what is moving prices daily since this would likely have implications on longer periods too. The research on this topic is not entirely unambiguous and this study presents preliminary findings that raise questions which exemplify the need for further research which will examine geographic boundaries, seasonal variations, day of the week implications and other latent variables that may help to explain price movement more clearly.

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