

FEATURES

ABSTRACT

This study shows the extent of seasonality in home prices in various markets around the United States. Everyone knows there is seasonality in the pattern of sales volumes over the course of a year, but few studies have examined the effect on selling prices. In some residential markets, seasonally induced price effects may significantly add to appraisal error if not corrected. For example, not incorporating seasonal influences on prices can mean missing an average of -2.78% on the downside to 1.93% on the upside in certain Core Based Statistical Areas.

Correcting for the Effects of Seasonality on Home Prices

by Norm Miller, PhD, Vivek Sah, PhD, Michael Sklarz, PhD, and Stefan Pampulov

Buyers and sellers are driven to buy or sell a home based on a number of factors common to most households, such as school cycles, weather, or holidays. While everyone is aware of peak listings and sales in spring and summer, and fewer sales in the winter months, it is not clear if buyers and sellers, or for that matter appraisers, recognize that prices are systematically affected by these demand and supply patterns. When appraisers must reach back several months for comparable sales, it is doubtful that they consider making a seasonal adjustment to estimate what a comparable would sell for if it sold in the current month, beyond some general market trend for appreciation or depreciation patterns that attempts to adjust for the average annualized time impact.

By definition, a comparable is assumed to have similar characteristics to that of the property being appraised, and adjustments are made for time since sale, size, quality, features and location. It is acknowledged that below-market seller financing with a generous loan-to-value ratio can influence price, and some appraisers will make an adjustment for such market transaction influences. But did you ever consider making an adjustment for a house that sold in late December when appraising a property in the late spring or vice versa? It might be only six months since the sale, but sales occurring in the thinnest time of the year often sell for lower prices, and the reverse holds when comparing spring sales to an appraisal in December.

If no adjustment is made, there will be a bias and error in the valuation that could be incorporated in the valuation model. To make the adjustment, appraisers must be aware of the seasonality in price patterns in their markets and the magnitude of these fluctuations. This article looks at the seasonality in home prices and the effect on observed prices in residential property. Using a database of home sales from 138 Core Based Statistical Areas (CBSAs)¹ over eleven years (February 2000 to April 2011), this study finds significant price changes by month across the United States. Specifically, the results find that ignoring seasonality in home prices can lead to an average error of up to -2.78% on the

1. The term *Core Based Statistical Area* (CBSA) is a collective term for both metropolitan and micropolitan statistical areas. A metropolitan area contains a core urban area of 50,000 or more population, and a micropolitan area contains an urban core area of at least 10,000 (but less than 50,000) population. The Office of Management and Budget defines metropolitan and micropolitan areas for use by federal statistical agencies in collecting, tabulating, and publishing federal statistics; <http://www.census.gov/population/metro/>.

downside and 1.95% on the upside. This is significant from the point of view of any buyer, seller, or lender. Further, it may have policy implications as well, such as when property taxes are assessed.

Review of Existing Literature

A number of studies have documented seasonality in home prices, although it has never been studied with rigor. More importantly, studies have not analyzed the effect seasonality would have on appraisal. Studies focus on seasonality from inefficiency and return perspective. Goodman suggests that home sales peak during the spring-summer season.² Case and Shiller find a momentum effect in home prices, where changes in one year tend to continue for more than one year in the same direction.³ Kuo tests for seasonality in home prices and finds seasonality effects for Chicago and San Francisco using a nominal index measure.⁴ More recently, Kaplanski and Levy find evidence that the prices are higher, on average, in the summer by 0.86% to 3.75%.⁵ In a most recent and comprehensive study by Miller, Sah, Sklarz, and Pampulov, the results show significant seasonality across the year.⁶ The study is the most comprehensive study on seasonality, covering 138 Core Based Statistical Areas across United States. This study finds that on average, home prices peak in June and hit the lowest value in January. The results confirm previous findings that home prices peak during summer and hit their lowest level during winters.

Seasonal Adjustment Factors

People buy and sell residential real estate throughout the year. Many of them may presume that value of the house is independent of the time of the year they sell it and merely subject to longer-term price trends.

In other words, after controlling for factors that have been seen to affect the value of the house (such as living area, number of bedrooms, location), they may not be aware that when they buy and sell can matter so much. To correct for these price influences, a factor is needed for each month in each market that tells us how it compares to all the other months.

Using home data of 138 CBSAs from February 2000 to April 2011, a period of over eleven years, monthly adjustment factors for these CBSAs are generated using a standard Hodrick-Prescott filter system.⁷ This method separates two components of price changes, a longer-term trend and the cyclical/seasonality component. This method is important as the 12 months are nested in one year, but any month in a particular year is different from the same month in another year. Thus, there are 135 monthly adjustment factors over the sample period. Note that this adjustment factor for a month in any year is the change (increase or decrease in percentage) in the home prices relative to the average price of the house during that year. The hedonic housing price model used here controls for house characteristics such size, age of the house, and geographic location. The models required to generate these seasonal factors for so many markets were based on millions of home appraisals via a hedonic pricing model.

The adjustment factors⁸ are shown in Figure 1. These numbers are the average of each month for the United States (across all CBSAs) over the sample period. As the graph shows, the adjustment factor ranges from an average of -2.78% on the downside for the month of January to 1.95% on the upside for the month of June. The adjustment factor is lowest (absolute value) for the months of April and November for the sample period.

2. John L. Goodman, Jr., "A Housing Market Matching Model of the Seasonality in Geographic Mobility," *Journal of Real Estate Research* (Winter 1993): 117-137.
3. Karl E. Case and Robert J. Shiller, "The Efficiency of the Market for Single-Family Homes," *American Economic Review* 79, no. 1 (1989): 125-137; and Karl E. Case and Robert J. Shiller, "Forecasting Prices and Excess Returns in the Housing Market," *Journal of the American Real Estate and Urban Economics Association* 18, no. 3 (1990): 253-273.
4. Chiong-Long Kuo, "Serial Correlation and Seasonality in the Real Estate Market," *Journal of Real Estate Finance and Economics* 12 (1996): 139-162.
5. Guy Kaplanski and Haim Levy, "Real Estate Prices: An International Study of Seasonality's Sentiment Effect," *Journal of Empirical Finance* (forthcoming 2011); available at SSRN: <http://ssrn.com/abstract=1438826>.
6. N. G. Miller, V. Sah, M. Sklarz, and S. Pampulov, "Is There Seasonality in Home Prices—Evidence from CBSAs," *Journal of Housing Research* (forthcoming 2011).
7. R. J. Hodrick and E. C. Prescott, *Postwar U.S. Business Cycles: An Empirical Investigation* (discussion paper 451, Carnegie-Mellon University, 1980).
8. An average adjustment factor is calculated for each month by averaging the factors for that month across the sample period. Because of the nested nature of the seasonality factor, the analysis results in an adjustment factor for each month, for each year for the eleven-year sample period. Thus, there are 135 adjustment factors over the entire sample period (February 2000 to April 2011). Then, an average is calculated for each month from the sample. This average is what is presented in the results as the adjustment factor for each month. The complete list of adjustment factors for the entire sample is available with the authors.

Table 1 shows the adjustment factor for some of the CBSAs, while Figure 2 and Figure 3 show the adjustment factors for the top-five CBSAs with the most and least weather variety in the nation, respectively.

Figure 1 Average Adjustment Factors for U.S. CBSAs, February 2000–April 2011

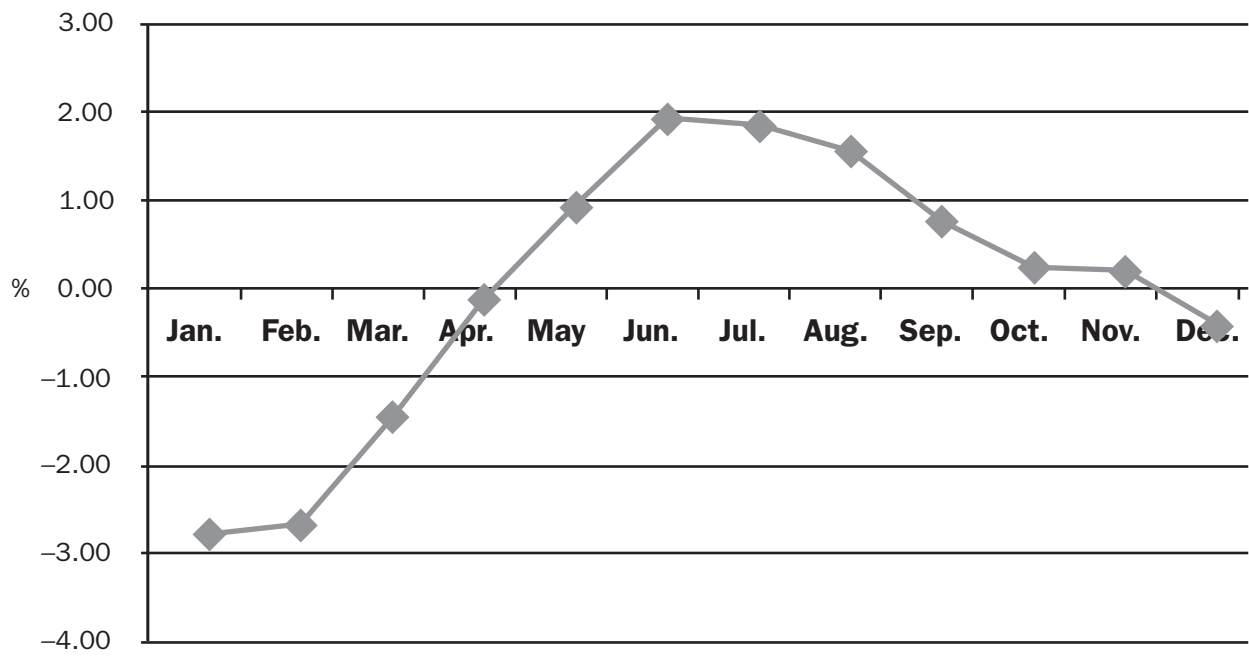


Table 1 Representative Adjustment Factors for CBSAs

CBSA	Adjustment Factors (%)											
	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Miami-Miami Beach-Kendall, FL	-2.35	-1.82	-0.80	-0.77	0.02	1.04	1.26	0.91	-0.02	0.61	0.63	1.25
Boston-Quincy, MA	-2.20	-4.40	-2.61	-1.96	0.33	4.50	4.27	3.25	1.08	-0.47	0.21	-1.59
Charlotte-Gastonia-Concord, NC-SC	-3.91	-3.68	-2.04	0.78	1.71	3.61	2.51	1.04	0.20	0.08	0.16	-0.16
Cincinnati-Middletown, OH-KY-IN	-3.79	-4.72	-2.31	-0.34	1.06	3.86	3.19	2.35	1.12	0.69	-0.35	-0.31
New York-White Plains-Wayne, NY-NJ	0.20	-1.23	-0.78	-1.34	-1.29	-1.06	0.70	1.30	2.27	1.36	-0.03	0.07
Los Angeles-Long Beach-Glendale, CA	-2.33	-2.45	-0.52	-0.08	0.60	1.74	1.38	1.51	0.76	-0.23	0.05	-0.50
San Francisco-San Mateo-Redwood City, CA	-3.60	-2.19	0.34	1.19	1.73	2.85	1.62	0.77	-0.51	-0.08	0.07	-2.37
Phoenix-Mesa-Scottsdale, AZ	-1.86	-1.36	-0.86	-0.04	0.11	0.69	0.28	0.58	0.35	0.61	0.98	0.14
Chicago-Naperville-Joliet, IL	-4.07	-6.08	-4.19	-0.65	0.71	4.09	4.23	3.05	1.64	1.04	0.18	0.63

Note: The complete list of coefficients for the CBSAs can be obtained from the authors on request.

Figure 2 Monthly Adjustment Factors—CBSAs with Most Weather Variety

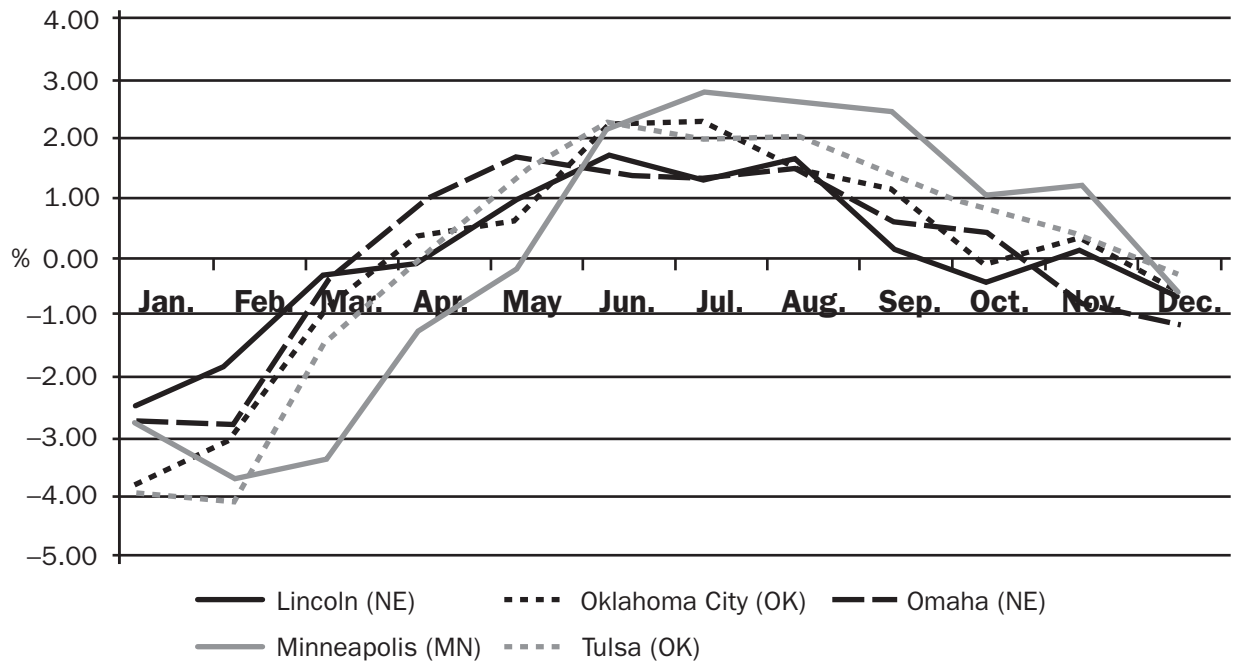


Figure 3 Monthly Adjustment Factors—CBSAs with Least Weather Variety

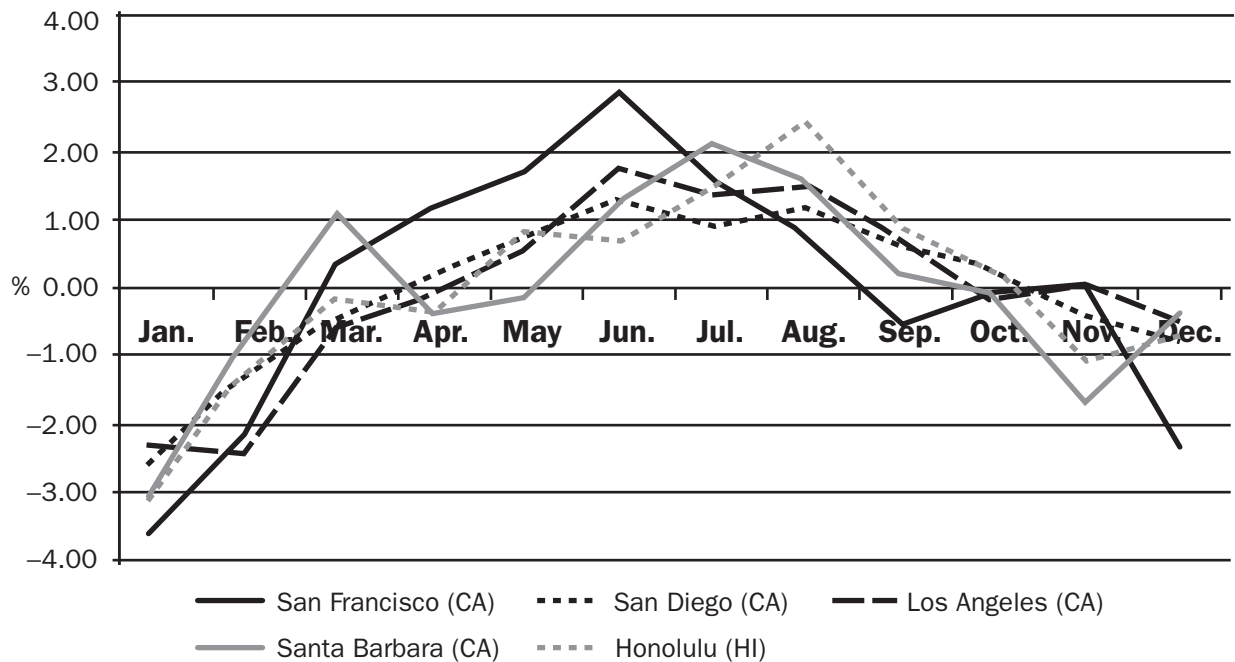


Figure 4 and Figure 5 show the top-ten CBSAs with the most positive and most negative adjustment factor, respectively, during a year.

home prices as measured by range. Figure 7 shows the minimum and maximum adjustment factor for CBSAs with most seasonality in home prices as measured by range.

Figure 6 shows the minimum and maximum adjustment factor for CBSAs with least seasonality in

Figure 4 Top 10 CBSAs—Most Positive Adjustment Factor during a Year

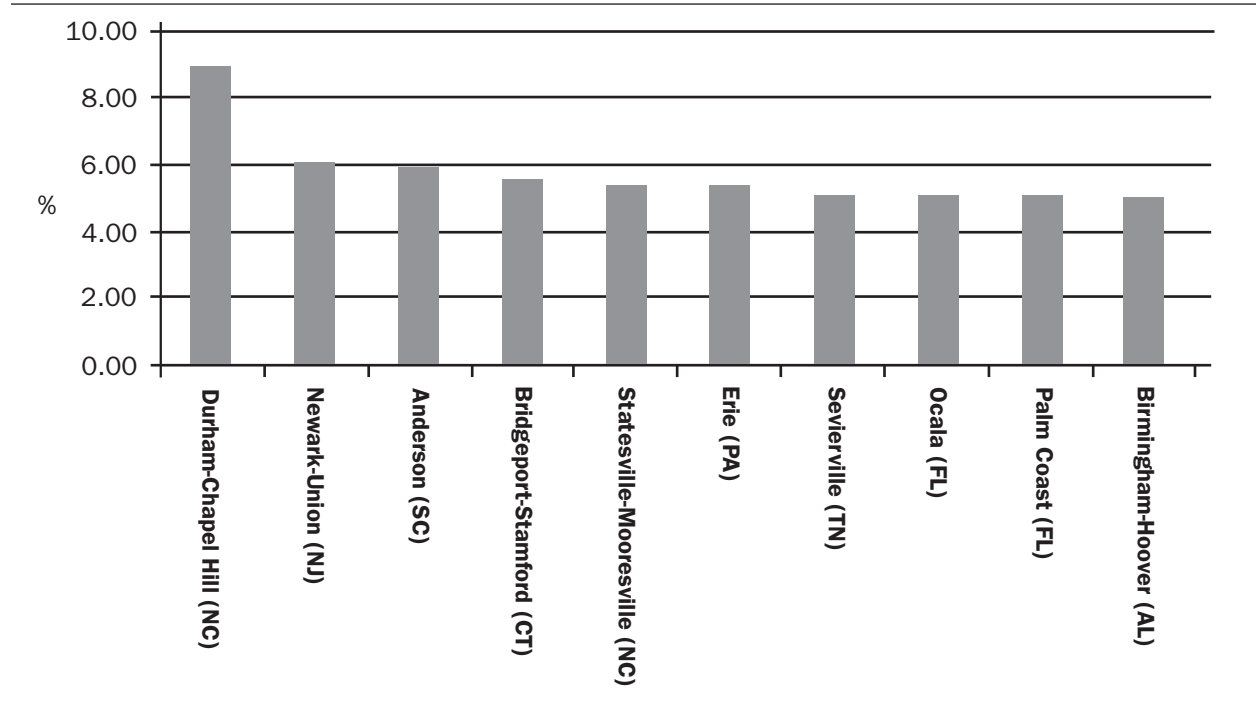
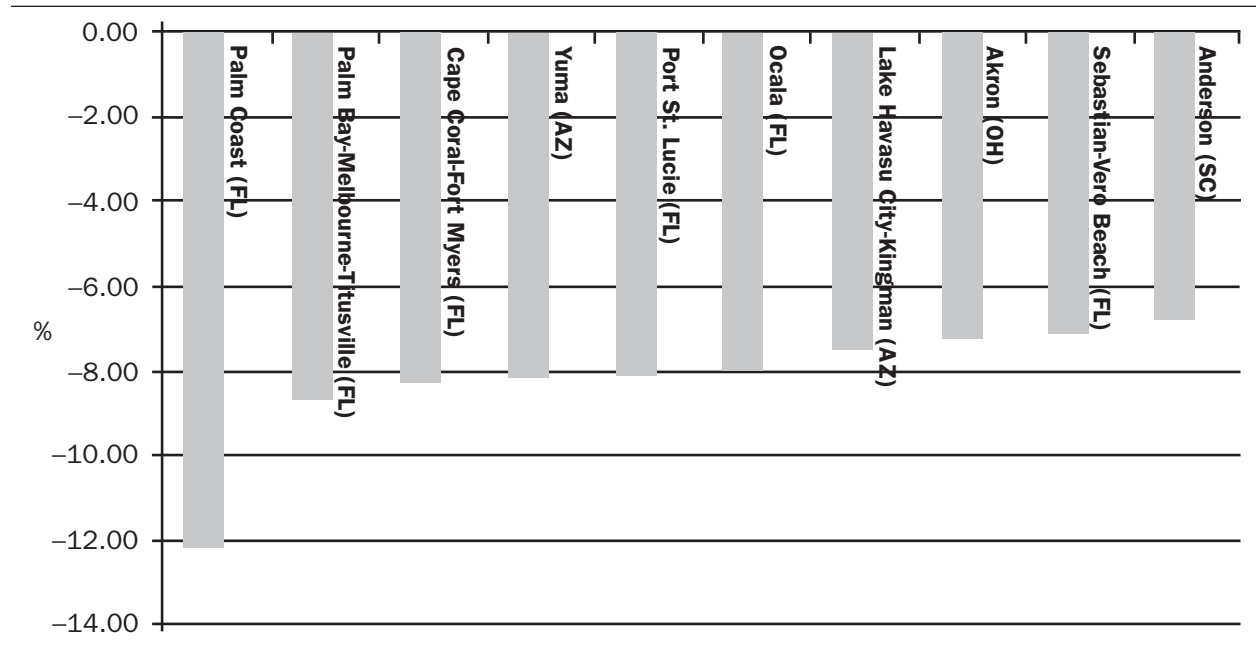


Figure 5 Top 10 CBSAs—Most Negative Adjustment Factor during a Year



Finally, some cities in the sample that are tourist destinations were examined to see their pattern of price changes. Figure 8 shows the price variation of 45 such cities in the study sample.

Figure 6 CBSAs with Least Seasonality (Smallest Range) in Home Prices

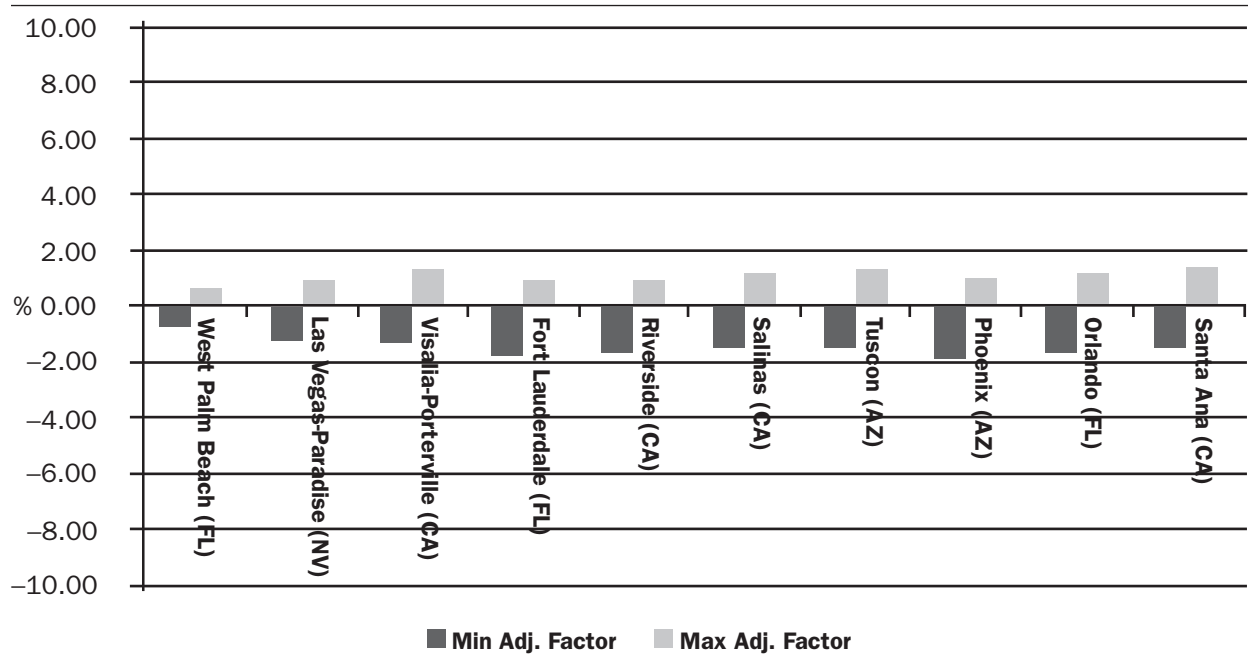
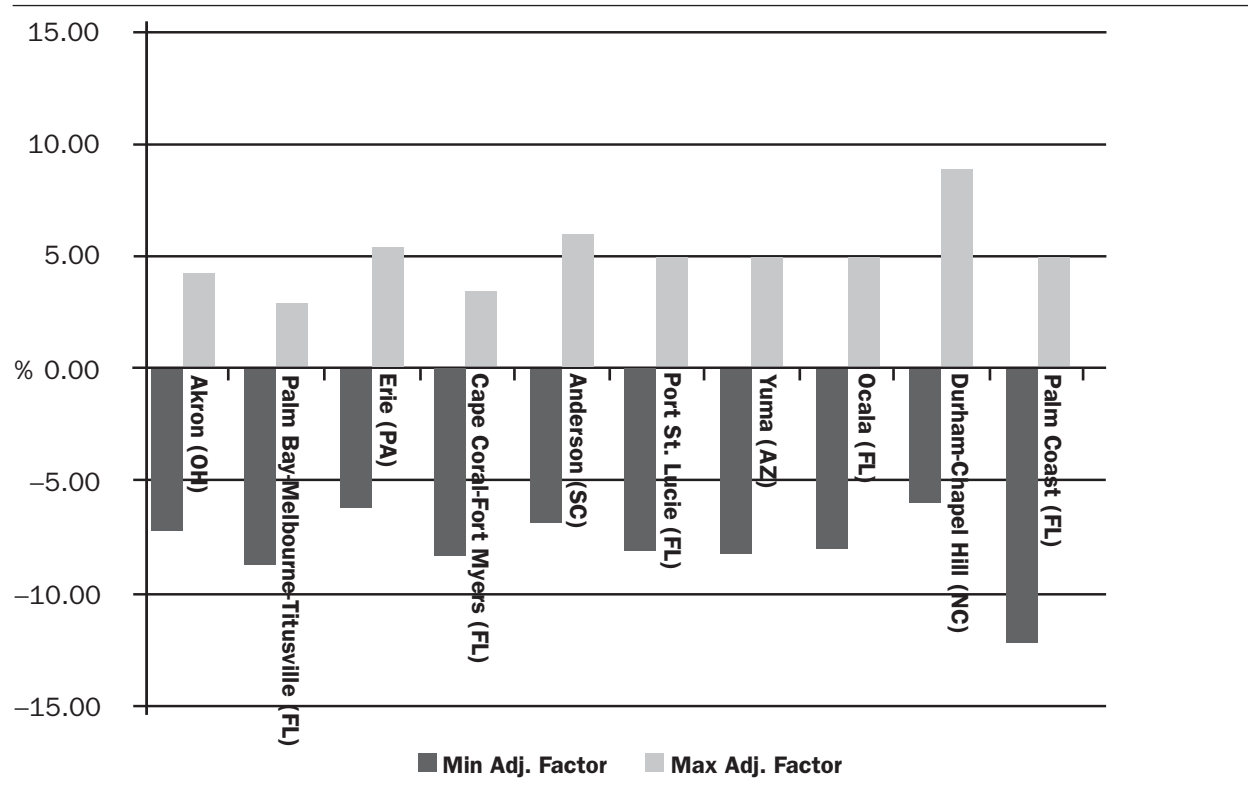


Figure 7 CBSAs with Most Seasonality (Largest Range) in Home Prices



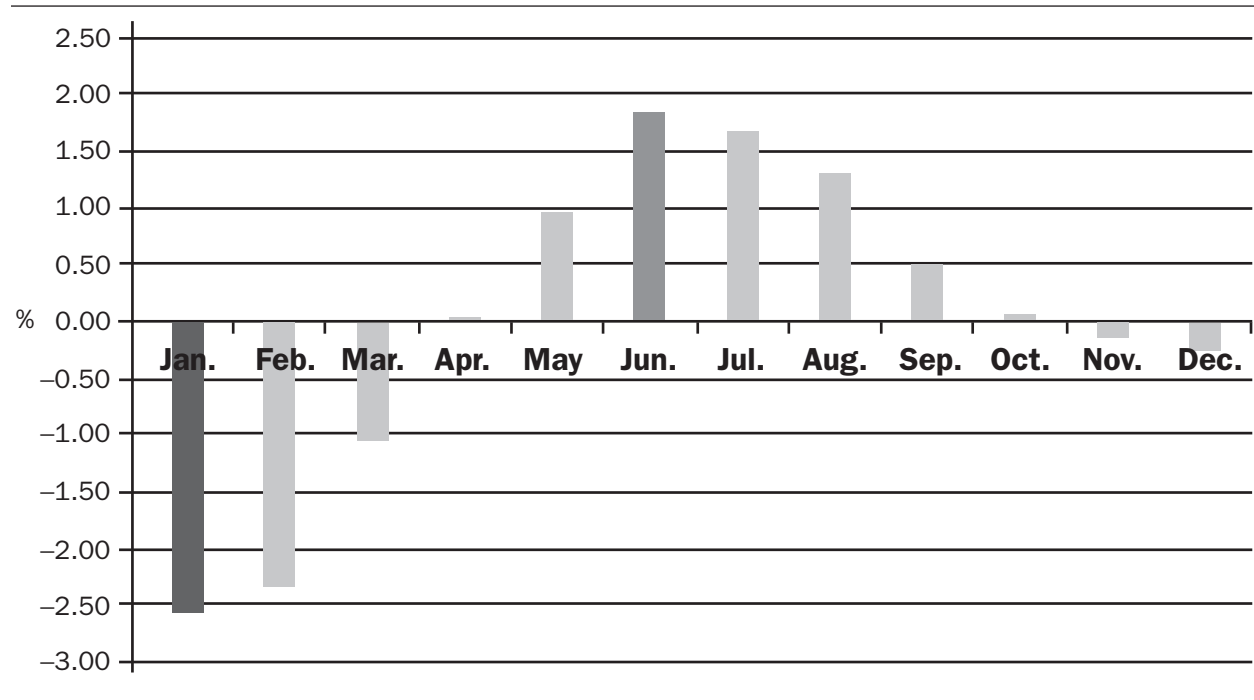
Implications and Conclusions

The research results discussed here can be practically applied by appraisers in day-to-day appraisal. This will involve incorporating the seasonal effects in the adjustments of comparables when using as market approach to value. Specifically, it will involve adjusting the comparable property with a seasonal factor to bring it to par with the subject property. Say, for example, the subject property is being appraised in the month of June, while the comparable property being used was sold in the month of January. This would mean that the price of the property has to be finally adjusted (after adjusting for all other factors) by the difference in the seasonal adjustment factors between the two months. This would generally be an upwards adjustment. From Figure 1, we can see this seasonal adjustment factor will on average be approximately a positive 0.85%, but it could be much more in those markets with greater seasonality in prices.

Only if the comparable property entered into contract exactly one year before it is being used to

value a subject property could seasonality be ignored.⁹ Then, the appraiser need only consider the longer-term price trend. Note that the seasonal adjustment factor is specific to a CBSA and hence varies across the nation. Failing to adjust for this seasonal factor will bias the valuation. In the example previously mentioned, ignoring the seasonal adjustment factor leads to a downward bias of approximately -0.85% . As of 2011, such a downward bias would not be of any interest to lenders who are putting pressure on appraisers for conservatively lower valuations. But, when seeking accurate and true values, the sophisticated residential specialist should make such adjustments up or down, as the case may require. In conclusion, the results from this study have significant implications for appraising homes. Errors and bias can be several percent in the most seasonal markets, and this is too much to brush away as we strive for better and better valuation outcomes.

Figure 8 Monthly Adjustment Factors—Tourist CBSAs



9. This means the sale probably closed about 10 to 10.5 months before the date of the appraisal.

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Web Connections

Internet resources suggested by the Y. T. and Louise Lee Lum Library

Federal Housing Finance Agency

—Downloadable House Price Index Data

<http://www.fhfa.gov/Default.aspx?Page=87>

—House Price Index News Releases

<http://www.fhfa.gov/Default.aspx?Page=8>

Hanley Wood Market Intelligence

<http://www.hwmarketintelligence.com/v4/default.asp>

Monthly House Price Indexes for Census Divisions and U.S.

<http://explore.data.gov/Prices/Monthly-House-Price-Indexes-for-Census-Divisions-a/uhxr-wv7z>

S&P/Case-Shiller Home Price Indices

<http://www.standardandpoors.com/indices/sp-case-shiller-home-price-indices/en/us/?indexId=SPUSA-CASHPIDFF-P-US--->