Collateral Values – Residential Real Estate

In this white paper we discuss the methodology Visible Equity employs in the calculation of current values for residential real estate, often referred to as simply collateral values or home prices.

In general, there are two types of automated valuation models/methods (AVMs) commonly used to estimate home prices, hedonic methods and index methods. Some approaches use a hybrid of these methods.

A hedonic method uses regression or similar statistical analysis to estimate the influence that each key feature of a property (e.g., square footage, bedrooms, bathrooms, year built, acreage, etc...) has on the overall property value. A subject property's key features are applied to the model and a current value or home price is calculated.

An index method, on the other hand, utilizes changes in property values as the basis for estimating home prices. For a given area, all sales/refinancing transactions are analyzed. If a property has at least two transactions, the difference between the transactions is calculated, and the property is included in the analysis. Combining multiple properties that meet this criteria can be used to create an "index", or in other words a trend line of how real estate values have performed in a given area. A subject property's known value (from an appraisal or a sales transaction) and associated date is then applied to the appropriate index to calculate a current value.

Visible Equity "Index" Valuation Method for Valuing Residential Real Estate

Visible Equity utilizes the index method. Visible Equity's indices are based on data at the metropolitan statistical area (MSA) level from the Federal Housing Finance Agency (FHFA) and S&P/Case-Shiller (Case-Shiller).

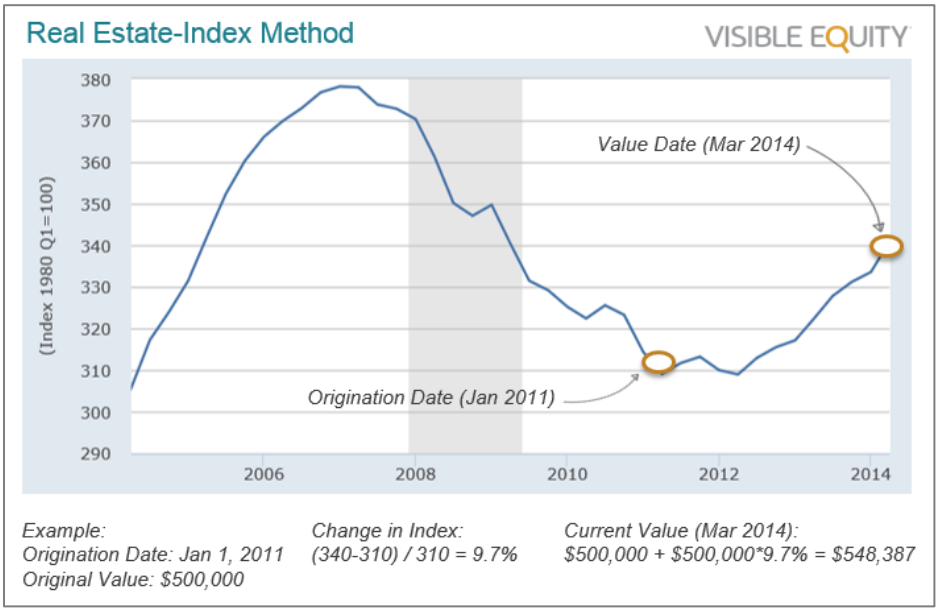
The index approach to valuation is best understood using a simple example. Consider a candidate property in the Los Angeles MSA which sold two years ago for $300,000. In the two years since the property sold, properties in the Los Angeles MSA have appreciated an average of 10%, as derived from the Los Angeles index. Applying the index method yields a current value of $330,000 ($300,000 + $300,000 x 10%).

However, calculating a current value in practice is more complicated, especially if multiple properties in multiple locations are being analyzed. The first step in estimating home prices is to determine the appropriate MSA index to use. This is accomplished by matching each subject property's address to an MSA. The second step is to determine the correct time interval and starting point to which the index value will be applied. The starting point of this interval is generally found by identifying an origination date and an original value for each loan in question, but a date of sale and sales price or appraisal date and appraised value might also be used. The end point of this interval is the current date, or date of valuation. The final step is to plot the starting point on the appropriate index and track the index to arrive at the current value. Underlying this process is the need to maintain the MSA data and make adjustments for the lag in reporting time, which will be discussed later in this paper.

The following graph shows an example property plotted along an index line, which allows for the calculation of a current value. In this case, a loan was originated on Jan. 1, 2011. The loan was secured

by a residential real estate property which had an original collateral value of $500,000. To calculate the value as of Mar. 2014, the change in the underlying index was calculated to be 9.7%. This change was applied to the original value to calculate a current value of $548,387, as shown in figure 1.

Figure 1



As the underlying index is updated, updated values can be estimated in the same manner as described above. For example, if the index value in Mar. 2015 was 350, the change in value would be 12.9% (350-310)/310 and the value as of Mar. 2015 would be $564,516 ($500,000 + $500,000 x 12.9%).

The same index is used to estimate the value for all properties in the same geographic area. For example, let's assume another loan was originated on the same day, but had an original collateral value of $300,000. The value of this property as of Mar. 2014 would be $329,032 ($300,000 + $300,000 x 9.7%) and the value as of Mar. 2015 (again assuming and index value of 350) would be $338,710 ($300,000 + $300,000 x 12.9%).

Repeat-sales Indices

Both the FHFA and the Case-Schiller indices are considered "repeat-sales" indices. Repeat-sales indices are calculated by collecting sales data on all transaction during a particular time period and geography and then searching for a prior sale of the same home. If a prior transaction is found the two transactions are paired and are considered a "repeat sale".

An extensive literature exists on the estimation of house price indices, beginning with Bailey, Muth, and Nourse (1963) and substantially improved by Case and Shiller (1989).

Repeat-sales indices are estimated with considerable error in smaller samples. However, it is our opinion that the publicly available indices of FHFA and S&P/Case-Shiller are not subject to the small sample criticism.

Index Method Strengths and Weaknesses

The main advantage of a repeat-sales index is that home quality is kept approximately constant because home prices are based on sales of the same property and therefore avoid the problem of trying to account for price differences in homes with varying characteristics.[1] Additionally, as previously mentioned, indices are based off of actual paired sales data (FHFA also include refinances), not median or average prices or other metrics that can easily become skewed. Next, when analyzing a portfolio of properties the "hit rate" or the ability to obtain a current value is high because it does not rely on knowing exact property characteristics or identify specific comparable properties. This issue is of particular importance when trying to value properties in rural areas and non-disclosure states[2]. Finally, the approach is not as susceptible as alternative methods to data errors and anomalies that have the potential to cause large discrepancies in values.

The index approach will be less accurate for individual properties that are not representative of the surrounding market, a concept referred to as "basis risk." Basis risk refers to circumstances in which individual values do not track the value of the index. Basis risk will be present in the valuation to the extent that the housing index is not perfectly correlated with changes in individual house prices. Properties with unusual features or that have undergone recent renovations or substantial deterioration will likely appreciate at rates different than average market conditions would suggest. Individual basis risk can be overcome in a portfolio of valuations, as long as the individual valuation errors are not systematically correlated. Ex ante, there is no reason to believe this would be the case in a typical portfolio of loans. In addition, indices do not account for homes that were sold during the reported time period, but that did not have a prior sale. These transactions represent legitimate market activity, but are excluded from the analysis. Lastly, the index method relies upon an accurate starting point, so if the baseline appraisal or sales data are inaccurate, this inaccuracy will be carried over to the current value.

Overall, we are of the opinion that the index method provides a consistent, objective, and reasonable approach to obtaining an automated evaluation of a candidate property's current value, subject to the limitations discussed above.

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[1] Homes that undergo substantial remodels after an initial transaction but prior to the second transaction are violations of the assumption that repeat-sales keep home qualities constant. Repeat-sales indices take steps to identify changes in home prices through time that appear to have been influenced by substantial remodels.

[2] FHFA is able to provide indices in non-disclosure states because the transaction data required to estimate repeat-sales indices come from mortgage information obtained via Fannie Mae and Freddie Mac.

Visible Equity Index Options

Visible Equity maintains two indices, an FHFA Index and a Hybrid FHFA/Case-Schiller Index.

The FHFA Index only uses FHFA data. The FHFA index is released and updated on a quarterly basis. and are not seasonally adjusted. Indices from Case-Shiller are updated monthly and are seasonally adjusted.

The hybrid FHFA/Case-Schiller index combines the two datasets by pairing every FHFA MSA with the most statistically correlated Case-Shiller MSA. Visible Equity then finds the difference between the FHFA dataset and the Case-Shiller dataset in the correlated MSA and applies the difference to the subject MSA.

For example, the Salt Lake City MSA is represented in the FHFA dataset, but not the Case-Schiller dataset. Under the hybrid approach, the Salt Lake City MSA would be compared statistically to each of the 20 cities in the Case-Shiller database, using the FHFA dataset common to both MSAs. Let's assume Seattle, Washington was determined to be the most statistically correlated MSA. The Case-Shiller data for Seattle would then be compared directly with the FHFA data for Seattle and the average difference would be applied to the FHFA index for Salt Lake City.

Overcoming Month-to-Month Index Discrepancies

The lag in FHFA reporting creates a dilemma wherein we would like to provide a more current value than is available from the reported data. To overcome this lag period, Visible Equity provides one of four possible methods to project indices from the last reported data point to the current date.

The first method, Visible Equity's default method, uses the average rate of change over the previous year. To calculate the rate of change the most recently reported data point is subtracted from the reported data point one year prior, and the result is divided by 365 days. This produces a daily average rate of change, which is then used to estimate the slope of the index line from the last known data point to the current date. As new data are reported this slope is replaced by the actual results and a new slope is projected using the new daily rate of change.

In certain circumstances this projection method can create changes in value for the same value date depending on when the value is calculated. For example, let's assume we project an index value of 342 for June 2014, for the example referenced earlier in this paper. This equates to a 10.3% (342–310/310) increase from origination. A current value would be calculated as $551,613 ($500,000 + $500,000 x 10.3%). Let's assume that when the actual data are reported the resulting index value is 345, instead of 342. This would equate to an 11.3% (345-310/310) increase from origination. The value for the property would then be updated to be $556,452 ($500,000 + $500,000 x 11.3%). If the value is viewed based on the projected index and then viewed again based on the actual data, there will be a discrepancy as calculated above.

The second method utilizes the average rate of change over the entire history of the index. The difference is calculated in the same manner as first method, but instead of looking at the prior year it looks at the entire history of the index.

The third method utilizes the rate of change over just the prior reporting period (quarterly for FHFA and monthly for FHFA/Case-Schiller Hybrid)

The final method simply uses the last reported data point and does not attempt to project values. It is only updated as the underlying indices are updated.

Documenting the Performance of the Index Method

In this section we present a brief discussion on the performance of the Hybrid FHFA/Case-Schiller index. In order to test the accuracy of the index model, we performed the following blind study. First, we gathered a sample of residential real estate transactions that had at least two known sale dates and sale prices for the same property. The first known sales price and date served as the anchor for the valuation. The second step was to apply the change in the geographically relevant repeat-sales index from the time of the first sale to a date just prior to the second sales date. This step allowed us to create an estimated value for the property in a period just prior to the market's assessment of the property value (via the second sale). We then compared our estimated value just prior to the second sale to the actual sales price in the second sale and computed the difference.

An example makes the study more concrete. Again, consider the hypothetical candidate property in the Los Angeles MSA which sold two years ago for $300,000 and that has a calculated current value of $330,000. Assume that shortly after the valuation was calculated the home sold for $345,000. In evaluating the accuracy of that valuation, we would conclude that our estimated valuation was off by $15,000 or 4.5%, within 5% of the "true" market value.

Figure 2 tabulates summary statistics on the performance of the index method for a sample of over 60,000 properties in the state of Utah that meet the criteria of having sold twice over the past 10 years. We separated the transactions by county in order to highlight the differences in model performance as a function of geography. In the full sample of transactions, the index method determined the value within 20% of the actual sales price with over 80% frequency.

Figure 2

Evaluation of Estimated Home Values using the Adjusted Sale Approach

County	N	Fraction of Observations within 20% of Market Value
Box Elder	1556	85.09%
Cache	4418	79.60%
Davis	5787	87.18%
Salt Lake	23434	71.36%
Summit	2441	70.41%
Tooele	2112	75.00%
Uintah	1079	84.20%
Utah	8952	87.62%
Wasatch	3556	74.41%
Washington	1922	91.88%
Weber	5109	91.89%

Conclusion

Visible Equity utilizes a repeat-sales index method based on FHFA and Case-Schiller data to estimate the current value of residential real estate. This index method is a proven, reliable method for calculating such values, subject to the limitations discussed in the paper. For each candidate property, an address and a starting value/date is necessary to calculate a current value. Once the data are recorded in the Visible Equity database, ongoing values are provided as the underlying indices are updated.