ATTOM DATA SOLUTIONS

ATTOMIZED AVM™

WHITE PAPER

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INTRODUCTION

ATTOMIZED AVM™ is a new AVM, focused on providing lender grade AVM results with increased transparency and robust statistical procedures. ATTOMIZED AVM™ is a collaboration between ATTOM Data Solutions and AVM Analytics. This white paper explains the core concepts and functionality of ATTOMIZED AVM™.

DATA AND COVERAGE

ATTOMIZED AVM™ is driven by ATTOM Data's nationwide residential property and sale database. Valuations are limited to single family homes, condominiums and small multiple family (fewer than 5 units) properties. Mobile homes are not valued and sales of mobile homes are excluded from the sales transactions databases so that they do not bias value estimates of the included home types. ATTOMIZED AVM™ provides valuations on over 80 million homes across all 50 states. Valuations cover 2,194 U.S. counties, containing 98% of the U.S. population.

Individual value estimates rely on highly localized and recent sales transaction data, therefore capturing the micro-location deviations in the local real estate market. With a few exceptions for rural areas and others with low sale activity, all transactions used in the valuation models have occurred within 12 months of the AVM valuation date.

VALUE ESTIMATES

AVM values are estimated in multiple ways, including:

1. **Robust statistical models**
2. **Market metrics derived from small clusters of similar properties**
3. **Ensemble (value blending) approaches**

For properties that are able to be valued with more than one method (68% of the 80+ million) we use a cascading model selection algorithm to choose the modeling approach that is most accurate in the geographic area surrounding the individual property. As an example, if properties in ZIP code 90210 show the best results (AVM value is closest to known sale price) with valuation method type A, then all properties in that ZIP code are valued with method A.

Both point values as well as value ranges are provided for each and every property that is valued. Value ranges are developed through a statistical bootstrapping approach that allows for asymmetrical ranges around each point value to be provided. These ranges simulate the likely values that would occur if a different set of sales in the local neighborhood had transpired. In other words, the bootstrapping approach shows how dependent the point estimate of home value is on the particular sample of sales that did occur.

CONFIDENCE SCORE AND FORECAST STANDARD DEVIATION

Every property receives a unique confidence score. This confidence score represents the precision of the AVM estimate and measures the deviation between the range of values and the point value itself. To provide the most transparent measure of variability in the estimates, we provide the larger of differences between the low and high value and point estimate. The low and high values represent a 68% confidence range around the point estimate given the set of values generated in the bootstrapping process. In this way, asymmetrical distributions of potential values are conservatively represented by the confidence score.

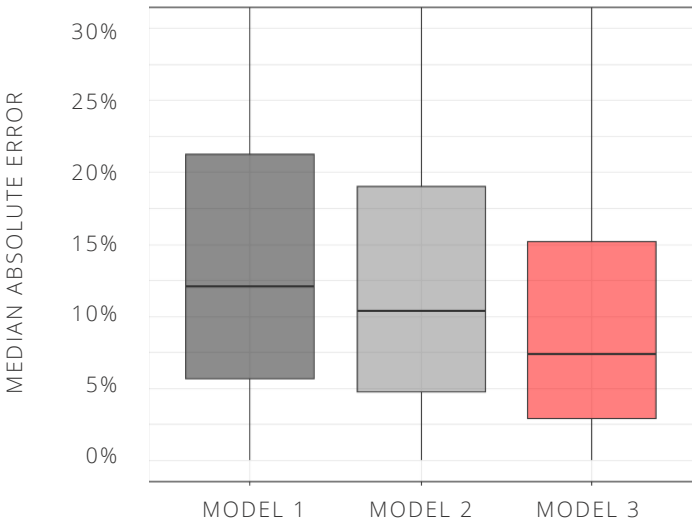
Confidence scores are calculated as 100 minus the forecast standard deviation, where the forecast standard deviation is the greater of the difference between the low range and the high range value and the point estimate divided by the point estimate. This is an industry-standard way of computing confidence scores.

ACCURACY

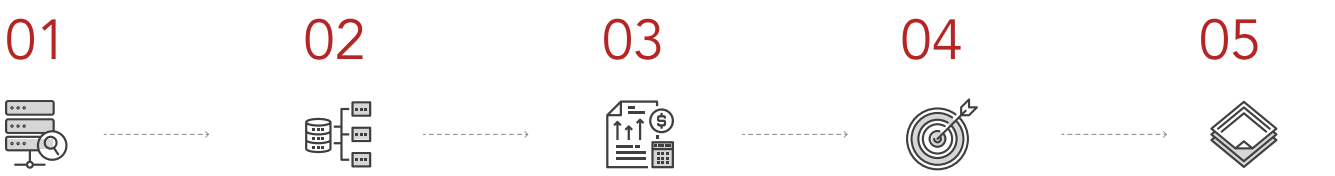
To gauge the accuracy of ATTOMIZED AVM™ we have compared our AVM values to actual sale prices over a recent three month period. The median difference between our values and the sale price was 7.3%, meaning that one half of all valuations are within 7.3% of the sale price of the property. Additionally, 60.5% of valuations are within 10% of the sale price and 83.3% within 20%.

MEDIAN ABSOLUTE ERROR	7.3%
VALUES WITHIN 10% OF SALE PRICE	60.5%
VALUES WITHIN 20% OF SALE PRICE	83.3%

The chart below highlights the overall distribution of the absolute differences between our AVM values and observed sale prices. The left two columns show error distributions for two of our individual models within the AVM, while the right hand (red) column shows the improvements – down to 7.3% median error – as a result of our model cascade.



VALUATION PROCESS



To provide some insight on the AVM process, the following outlines the process used to value a typical home with ATTOMIZED AVM™.

1. Find 'comparable' sales. We begin by selecting a set of about 100 comparable sales based on the geographically nearest and most recent (within one year) sales of homes of the same type. When we are not able to identify a minimum of 15 comparable properties we extend the time horizon back to 24 months from the date of value; adjusting for changes in market conditions with a highly local (sub-ZIP code level) home price index. This feeds our model with additional market data that generates more accurate valuations.

2. Employ valuation models: Multiple valuation models use these 100 sales to create an estimate of value for the home. Through the use of robust statistical metrics and clustering algorithms, many of the 100 initial comparable sales are down weighted or eliminated due to dissimilarity with the subject property or other issues with the sale. Not all properties are valued with all models as use of particular models is determined based on local data.

3. Determine precision of value estimate(s): For each valuation model, we then estimate 1001 'bootstrapped' values. Bootstrapped values are value estimates generated by randomly re-sampling the initial set of comparables. We use this bootstrapping process to determine how sensitive our value estimates are to a particular set of sales having occurred. Or, in other words, we seek to answer the question: What would the value look like if a different combination of properties had sold in the neighborhood during the past year?

We then rank the 1001 estimated values from low to high. The median (or middle – 50th percentile) value is our estimated AVM value. We also use the 16th and 84th percentile values as the low and high end range of the value estimate. This process occurs for each valuation model that is performed on the property.

4. Determine the Confidence Score: Next, we look at the percentage difference between the low (16th percentile) and high (84th) values and the median value estimate. We take the larger of the two (the FSD Max) and subtract from 100 to create a confidence score. By taking the larger of the two, our confidence score accounts for skewed distributions of values and offers a conservative measure of our confidence in the AVM value.

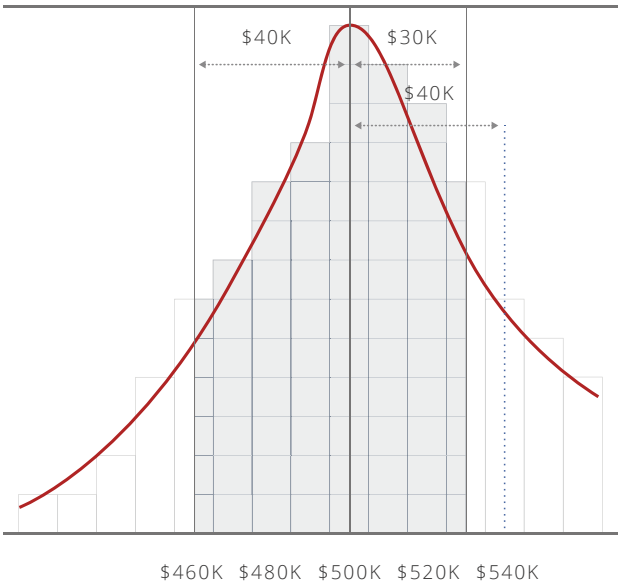
5. Choosing a model: Prior to valuing properties each cycle, we conduct regular AVM accuracy tests where we compare our AVM values to the actual sales prices of properties that recently sold (see the accuracy test on Page 2). Using this information, we then employ a cascading method to determine which of the valuation models is the most accurate in each subject's neighborhood. The value from the most accurate local model becomes our estimated AVM value, along with its respective low and high values, FSD and confidence score.

VALUATION AND CONFIDENCE SCORE EXAMPLE

To put our methodology into practical terms, suppose we are valuing a home at 123 Main Street, Somewhere, ST 12345. Our model begins by selecting up to 100 comparable properties with a minimum of 15. We employ our robust statistical models and determine that this property has an AVM value of $500K, an FSD Max of 0.08, with a confidence score of 92%. We calculate our confidence score using FSD Max as follows:

Confidence Score = 100 – (0.08 x 100) = 92

In this case we calculated a 92, or 92% for our confidence score. This tells us that we can expect a property to sell at a price within 8% of the property's estimated value, either above at $540K or below at $460K. If our confidence score was 90% we would expect it to sell within 10%, or using the same AVM value, above at $550K or below at $450K.



This means that the greater the FSD, the range of probable sales price will be wider, and the confidence score will be lower. Conversely, with a lower the FSD, the range of probable sales price will be narrower, and the confidence score will be higher. What our confidence score communicates is that we are confident we've estimated the value of the home within a percentage of the sales price. So a confidence score of 92 means we are confident that our estimated sale price is within 8% (100 - 92) of the true market value.

PROPERTIES WE DON'T VALUE

There are several property types we intentionally don't value, and don't include in our comparable selection. We eliminate these property types for two reasons. First, these property types have a negative impact to the predictive value of other homes. Second, these property types require different data and modeling and don't belong in an AVM for standard single family residences.

1. Mobile homes: In the case of mobile homes, a two bedroom two bathroom home should value lower than a standard fixed foundation of the same configuration.

2. Multi-million dollar homes: These properties often have unique features or locations that influence the value, making comparable selection impossible.

3. Homes on farm or agricultural land: In this case, the land and its use influence the value of the home because they are sold as a single unit of real property. Because of this, the valuation requires data and modeling from similar comparable properties.

4. Multi-unit homes: These properties rely on rental data to determine value because they are most typically investment properties that are under multi-tenant lease. As such, they require different data and modeling to derive a value.

FOR MORE INFORMATION CALL 800-462-5125

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