



Automated Valuation Models: Automation vs. Hybrid Blending Technology and Human Intervention

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Abstract

Automated valuation models (AVMs) are being used more frequently in all phases of lending in the United States. However, there is still a question of acceptance in the secondary market and with the GSE's. While all agree that these products can supply an accurate valuation of a residential property, there is no agreement as to what creates problems for this technology in the market. Rating agencies in the past have feared that a lack of current data causes the model to miss the market turns (either up or down). All agree that the lack of accurate or timely data will create problems with AVM's. If these problems are apparent in the U.S. market where much of the information that feeds the models is readily available, how are these issues solved in countries where the data is less reliable or unavailable for model use?

This paper considers the development of AVM technology and the appraiser's involvement in the automated process; how it is seen by some to address these concerns and add the subjectivity that can not be recognized by today's modeling technology. Others think it adds back the bias that the AVM technology eliminates. This hybrid solution may work well not just in the U.S. but also in countries where the appraiser has learned to work with limited availability of data and rely on his expertise and local market knowledge. While being a stand alone document, this paper is also a supplemental to the document titled "Automated Valuation Models – Past, Present, and Future" that was presented at the ERES conference in June, 2005 in Dublin, Ireland.

Introduction

Technology in the U.S. Mortgage Lending Market

The mortgage lending industry in the U.S. has been traditionally slow to move towards technology changes. Unlike its sister business, retail banking, where there has been quick adoption of statistical modeling for credit card fraud detection, automated banking solutions, and Internet access, mortgage lending has maintained a more traditional approach to business.

Technology adoption in the US mortgage market has typically followed the cycles of interest rate high's and low's. When interest rates are dropping, everything focuses on pipeline management and closing the loans. There is no time for researching new technology and certainly no time for implementation. The last thing that anyone is willing to do is put in new processes that would slow things down, require training, and frustrate employees and borrowers with systems that are not implemented correctly or are unfamiliar to operations.

As interest rates rise, the emphasis switches to operational efficiencies and cost cutting measures. As volume decreases, the business units have more time to focus on how things are being done and how they could be improved in preparation for the next interest rate turn. However, with a slowdown in production, there is also more emphasis on budget and frequently (particularly if this coincides with the end of the fiscal year) there is little money left for technology projects. There never seems to be the right time for technology improvements, which really translates to the fact that it has not been given a high level of priority.

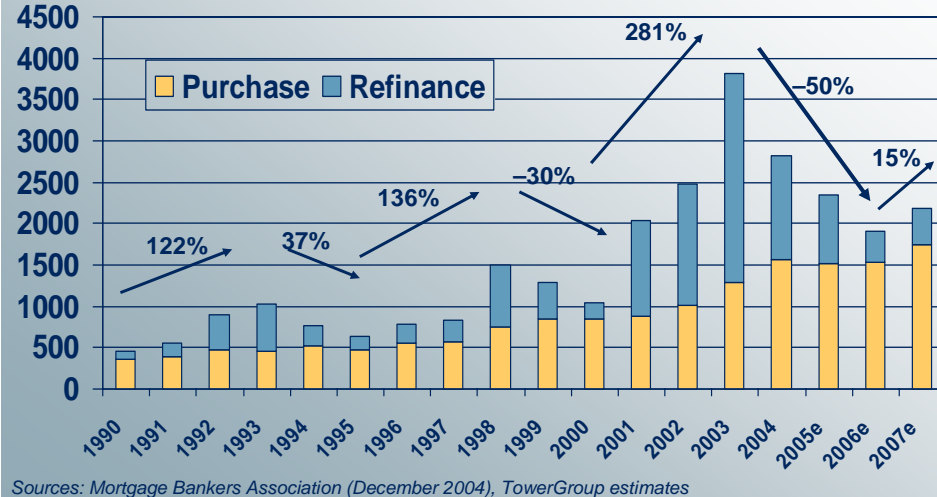
Market Needs Drive the Change

With the advent of Internet immediacy and a hugely competitive lending environment, borrowers came to expect the lending process to be faster and less expensive than before. Pressure to close and fund a loan, whether for purchase of a home, refinance, or tapping into home equity, created a situation that called for more automated systems to speed up the process and allow lenders to lower fees through savings obtained within this new systems environment. The first step was to automate the underwriting process.

Mortgage Volume Declining: What Next for Underwriting and Home Prices?



Originations
(\$ Billions)



Automated Valuation Models

In the secondary market environment, kept separate from the mortgage origination space due to its need to handle loans on a portfolio basis rather than on a per loan basis, members of the academic community developed a statistical method to determine property values on a portfolio level. This product, known as the Case-Shiller Indices (CSI) was developed by the research principals, Karl E. Case, Ph.D. and Robert J. Schiller, Ph.D. who pioneered the repeat sales technique upon which most modern home price indexes are based. The accuracy of the valuations obtained was measured on a portfolio basis as well, rather than on an individual loan bases. The product was designed to become more accurate the larger the sample size, to handle the needs of the portfolio oriented secondary market. It was then and continues to be heavily used in the Wall Street investment community including the rating agencies.

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While Wall Street was using this valuation technology for analysis and prediction of their portfolio performance, little was being done to address the valuation technology needs of the lending community particularly on an individual loan level.

Introduction of automated valuations for the lending market began its process in 1995. These models were statistically driven experiments that were geared to determining values on an individual property basis rather than the price index models that were being used for portfolio valuation. The theory was that, while indices gave good overall portfolio values, there were inherent inaccuracies on an individual property basis. Developing a property value simply by moving the initial sales price through the index over time was flawed when considering that there may have been improvements to the home, changes in condition, or increases in size that would not be reflected in that value increase calculation. It also became less accurate when used on an individual property basis when the home had not sold for many years so that the index applied to the initial sales price had many shifts over that longer time period.

These new valuation models were designed to pay particular attention to the attributes of the individual property and recent sales in the immediate neighborhood. The challenges in these “hedonic” models became twofold: identification of the neighborhood and identification of the data points that actually had an effect on the property value.

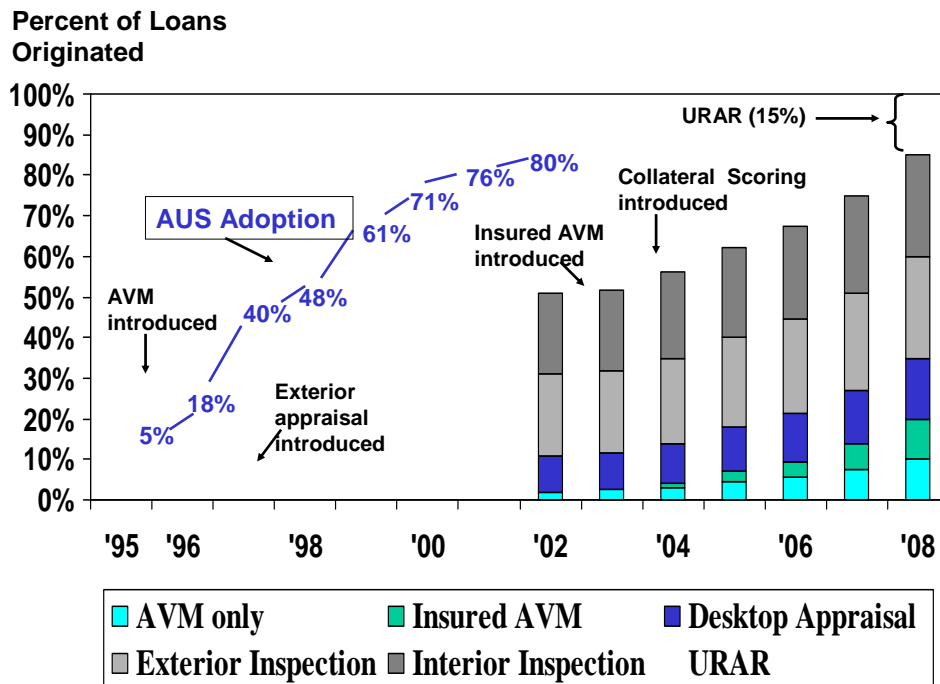
The model development in its initial experimental stages took into account as much information about the property as it could find. The most information rich property data was found on the URAR report – the standard Fannie Mae appraisal report that was used for lending purposes. As models were tested and developed it was determined that there were a handful of data points that when used together became important influencers in the prediction of the property value. Included in this list were: square footage, age, number of bedrooms, number of bathrooms, and total room count. Different modeling techniques used additional or fewer attributes, but these became common in most models. The issue were then the ability to obtain enough data for an adequate sample size to build the models.

Neighborhood identification was also seen as a means to gain accuracy in predicting property value. Debates and testing formed around the differences in doing radial searches for comparable properties as opposed to using other means of neighborhood identification such as census tract, zip code levels, and similarity in sales trends.

AVM Market Adoption – A Slow Process

The use of automated valuations was a difficult sell during market introduction. The target market was a lending community not used to statistical products being part of an operations solution. The automated underwriting systems were a direct translation of manual into automated processes. The initial AVM products were considered to be “black box” technology with no ability to look into the box to see what was going on. The standard appraisal form was easy to understand and there were systems in place for underwriting and appraisal review for accuracy. The statistical models had no allowance for such review techniques and accuracy was measured in statistical terms by the models themselves using “confidence scores”. Despite presentations, explanations, and training, the client had little comfort in the accuracy of the valuation predictions.

AUS and AVM Product Introduction.



Sources: TowerGroup, OFHEO, MorTech

Statistical modeling was finding its way into the loan process and the previous “black box” concept was not as threatening. Many lending institutions began to bring statisticians on staff and involved them in the discussions with the AVM product vendors. More products became available on the market and continual model improvement began to produce increases in accuracy

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and ability to deal with the less robust property data outside California. Freddie Mac made their AVM (Home Value Estimator) available to the market. Things opened up a bit for AVM use – but the GSE’s and the secondary market were still not willing to accept automated valuations in place of appraisals for the first mortgages (Freddie Mac would allow use of their HVE product but not other commercial products.)

As statistical methodology became more relied upon, automated valuations were better understood. Lenders were unable to use them for secondary market transactions, but found that they worked well enough to be used for internal purposes, either in a quality control environment as an appraisal review tool, or for funding on high quality loans that were kept within the institution such as home equity lending.

AVM Development “Across the Pond”

At the point that the automated valuations began to become a more popular product in the market, at least for low risk and home equity lending, the technology was also increasing in other countries. In the UK, there was experimentation going on as well, both with US based companies who had a presence in the UK market and with companies based there who had picked up the idea and decided to run with their own version. Interest also began in Germany and Ireland, each having its own form of the technology based on what information it had to work with.

The development of the automated valuations in other countries is an experiment that has yet to truly move into US territory but there will be much to be gained when it does. Each country has its own version of public records with a different set of information available. While the US versions of these statistical products could not be deployed successfully with the data available in other countries, these new products were built with a creativity that brings new life to the solution. They did not have the broad base (or the same fields) of data to build from, so they set about using what they had which ranged from property footprint to extensive property recordings and built models that have been proven to be highly predictive and successful in their own markets. It would appear that this creativity has identified predictive patterns that could also work to improve models in the US.

The Hybrid Product – Designed to Fill in the Comfort Gaps

To add additional comfort to the valuation, vendors have begun to supply hybrid and/or complementary products such as AVM's with photos of the property (to determine condition), or an interior or exterior inspection by an appraiser, real estate agent, or property inspector.

The most recent product grouping that appears to be gaining in acceptance is the use of an appraiser along with an automated valuation. Depending on how the product is implemented, it can be considered as an “appraiser assisted AVM” or an “AVM assisted appraisal”. These are products that take varying forms:

AVM with a desk review

The purpose of this type of product is to just give an additional check on the valuation to see if it makes sense. The appraiser is supplied with the AVM and considers the value based on his knowledge of the area and possible additional brief research to determine whether the value is acceptable. It is the most limited form of the hybrid products being done, and is truly an “appraiser assisted AVM” in its purest form. Some vendors who supply this product also allow the appraiser to upgrade to an abbreviated appraisal product, such as a “drive by appraisal” if they do not agree with the value.

The value of this process is to include a level of professional expertise to the automation and supplies an alert if the value is way off the mark. It will typically not provide a value difference or alert to property specific subjective issues unless the appraiser coincidentally knows something about the property or has very specific neighborhood knowledge. It would be an obvious advantage to use this product in conjunction with an appraiser local to that market to take full advantage of the appraisal expertise.

AVM with additional comps

This is an additional step forward to the AVM with desk review. It requires the appraiser to do additional research and add on comparable properties that supply back up to the automated value. As many AVMs supply sample data, but not actual comparable properties in their reports, this process supplies true comparables. The appraiser has access to databases such as MLS (Multiple Listing Service) that are not typically accessible to the AVMs. This actually can be the best

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source of data in a local area and the appraiser access to it is a valuable addition. Along with comparable sales, the MLS also supplies homes currently listed for sale which provides an upper limit to value for the subject property. Again, local appraisal expertise can be valuable to identify the best comparable properties in a given neighborhood

AVM with appraiser adjustments

Here the product switch can be made from an “appraiser assisted AVM” to an “AVM assisted appraisal”. This more extended process typically requires an adjustment grid where the appraiser is able to consider subjective attributes about the subject property and make adjustments to the base AVM value. It is particularly relevant when the property being valued has extreme positive or negative influences that can’t be recognized in the automated process. Examples of this are view properties, external issues such as busy street or commercial locations, locations adjacent to freeways, power lines, or railroad tracks, or additional improvements such as pool, guest house, or other valuable external structures.

The process of including the appraiser to address adjustments greatly extends the use of AVM technology and addresses one of the major concerns in the market regarding the AVM being unable to calculate subjective property attributes.

AVM with an inspection and photo

Again, an additional step further, this additional add on to the base AVM now requires field work, which will add on time to the process and therefore, not be instantaneous. It can be used on its own without any appraisal expertise, or in conjunction with an appraiser having the ability to adjust the value to recognize things discovered in the field inspection such as condition and external issues as mentioned above.

Used by itself, this product gives the ability to provide an “administrative” review to the AVM rather than involving an appraiser. Frequently, valuation products, including full appraisals, are passed through a rules based checklist review provided by an underwriter or other trained professional who is not an appraiser. The AVM with inspection and photo gives a reviewer (appraiser or otherwise) the ability to know something about the property through a photo and typically some form filled out in the field that asks specific questions about the property and its location. Frequently the field work is done by an inspector, real estate agent or general field person who is prompted for information based on the field notes form he is given so the

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information may be limited or not as accurate, depending on the training and market understanding of the individual.

Desktop valuation with AVM engine

Least likely to be seen in the US market is the product that is supplied data by an appraiser. With this model, the appraiser reviews the available sales and provides the most comparable properties to the AVM which then calculates the value of the property based on this input. This approach can be the best or worst approach for a variety of reasons.

One view is that the better the data input with regard to similarity in both objective and subjective attributes, the more accurate the value that is produced by the AVM. Therefore, if an appraiser is entering the best comparable data available, it should produce the most accurate value.

On the other side of that opinion is the view that the AVM, regardless of its inadequacies some of the time, is an unbiased report of the value. By adding the appraiser back into the mix, the possibility of bias is reintroduced into the process. One advantage is that, while the appraiser is adding comparable properties, he is not making adjustments – the valuation engine is determining the way the comparable data should be handled. However, the process is based on the assumption that what the appraiser is entering are truly comparables. The value can be influenced, similarly to the appraisal process, by the inclusion of superior properties either with regard to the property itself or the location or external influences.

Hybrid Products Moving into Europe

Just as AVM technology created interest abroad, now that they are being used more frequently in lending, the same discomforts are being voiced and additional checks are being considered for implementation. Lending operations in the UK are using AVM technology for reviews of individual loans and portfolios as well as using them for secondary loans, very similar to what is being done in the US. The same questions are being asked with regard to accuracy and ability to improve on the process with local expertise. While no specific hybrid products have entered the market, discussions will soon lead to creativity and products will become available.

There are lenders in the UK who are interested in creating their own hybrid products by running an AVM and assigning it to an internal or external valuer for additional information or validation. Typically market need creates products and offerings will come into being through developed

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partnerships with the appraisal community and the AVM vendors. It is an excellent opportunity for professional organizations such as RICS (Royal Institute of Chartered Surveyors) to become involved, educate their members, and provide a means to be involved in the technology. As yet the Appraisal Institute in the US has not taken advantage of the opportunity to benefit their membership to any great extent.

An interesting internal system being used at a lending organization in Poland is a version of the desktop valuation with an AVM engine. The engine is supplied information regarding the subject and comparable properties chosen by a valuer analyst. The comparable properties are supplied through an internal database that places them on a map for the analysts' review and then calculates the value for the subject based on the choices made. While they did not consider the technology to be an automated valuation, it certainly supplies all of that functionality given the properties to be used in the analysis. Without seeking to build an automated valuation as such, they have taken what they considered to be the most important parts of the process and automated the rest for a combined process that works quickly and seeks to include subjective information through photos and field notes.

Summing up the pluses and minuses

There are arguments against all types of these products. In particular, the appraisers object to "signing off" on a statistical valuation that was determined without their involvement. The statisticians object to the appraiser hand picking the sales data as they feel that this will insert the very bias that the AVM in its truly automated form serves to provide. However, this type of combination product – statistical modeling blended with some form of human interaction – is seen as a bridge to a faster and less expensive method of valuing property for lending purposes than full appraisals, but eliminates some of the risk introduced in an AVM when the subjective issues are not addressed.

Freddie Mac has been reviewing the use of appraiser assisted AVM products and has set up guidelines for this combined product's use. These guidelines are specific as to the product, the appraiser experience and training, as well as the loans that will be able to be included in the program. Appraisers must be trained in the understanding and use of automated valuations. The loans acceptable for use with these products will initially be low risk with regard to FICO score and loan to value. Many in the industry see this as the first real step to secondary market acceptance of AVM products and will eventually lead to full AVM acceptance without appraiser

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involvement. This is not Freddie Mac's stated objective but the industry is hopeful that further acceptance for AVM's is the direction that it will go.

One of the growing concerns for the GSEs and the regulators in the US is the lack of understanding that lenders may have about how and when the AVM they are using is effective. They are concerned that adequate product testing is not being done and that these products are being used improperly as a result. Freddie Mac's interest in accepting the hybrid products can be seen as an attempt to eliminate this issue by requiring some lenders who are interested in using AVMs to use it in some combination with appraisal expertise. In this way, the lender has some protection against using the AVM improperly. This is particularly important with smaller lenders and community banks, where, due to size and lack of internal resources, they are unable to put the AVM products through their paces properly.

Since these hybrid products are new to the industry there are issues with standards that will need to be addressed as they mature. One of these issues is the lack of product standards. There are currently no standard forms that the industry can rely on particularly as they reach the secondary market. Each vendor or lender is able to develop their own opinion as to what field information should be gathered if there is an inspection, what information should be displayed if there are comparable properties added or adjustments made, and what information the appraiser should be considering with regard to the AVM value. As the hybrid products become more popular, the less effective processes and information will fall by the wayside and the market needs will drive how these product reports will look.

Appraisers who are on the leading edge of the profession see the hybrid products as an advantage, providing them an entrance into the AVM portion of the business. Previously the automated products were considered by the appraisers to be a threat to their business, taking away a portion of their work – typically the most profitable portion. The automated valuations are best used on the standard properties in homogeneous neighborhoods and this is the type of work that appraisers have been able to produce quickly for the same reasons that the AVM provides an accurate value – availability of good detailed data, recent sales, uncomplicated properties.

With the advent of the hybrid products, appraisers can now break into this market and supply their clients with an automated product quickly with the additional advantage of local expertise. However, there are few products that are available directly into the appraisal community. The

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most prevalent hybrid product currently is supplied by an appraisal management company that offers and AVM reviewed by an appraiser who can add information and improve the value. This product is not offered to the appraisers for their own marketing, but instead is offered to the management company's customer base and uses the appraisers on their fee panel to provide the local expertise. This exposes appraisers to the concept, but does not give them a product the appraisers can provide directly to their clients. Appraisers are beginning to look for what products are out there that they can use in their own marketing efforts. Only a few products are currently available and have not been extensively marketed into the appraisal community as yet. Market acceptance and demand for the product by the lending community should change this situation, but uniformity of product will become more important if the appraisal community at large is to become involved.

Automated Valuations – Today's Issues

As the lending market pushes forward with technology, the use of AVM's increases. Increased use of statistical modeling to measure and predict for successful business strategy has become the way business is being done. These statistical valuation products have continued to improve, each in its own way, with better modeling and data handling resulting in higher hit rates and improved accuracy.

As data improves both in the US and abroad, the automated valuation products will become one of the preferred ways of valuing property for lending purposes. The expansion of these products into foreign markets will continue to encourage new ways of looking at the modeling methods and what additional statistical and geospatial inputs will improve predictive results.

Automated valuation products have now come into their adulthood stage, bringing with it responsibilities that will be required for market share to increase. These responsibilities come in the form of a broader view of client needs which translates to industry standards.

Lenders are comfortable with the technology and are pushing at the secondary market for increased acceptance and replacement of the traditional valuation products. The competitive market demands a level of cost and time savings that is best accomplished by using these products more frequently and in additional ways than is currently accepted. When used in the quality assurance capacity, as a back up for other valuation techniques, or as a prequalification tool, the lender is taking on minimal risk. However, increasing use in the first mortgage market

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and then passing those loans on to the investment community takes on another level of risk that must be carefully considered. The use of hybrid AVM products may be a good step in the direction of understanding and eliminating risk while still taking advantage of the lower costs and fast turn times that automated valuation technology provides.

With increased use comes increased attention. That includes attention from the regulatory agencies that measure the safety and soundness of lending practices. As more creative valuation practices come into use, there are expectations that lenders and AVM vendors take on responsible measures similar to what is expected in other areas of the lending institutions. The regulators and businesses, such as the mortgage insurance companies, that take on the burden of problem loans are requiring documented policies with regard to AVM accuracy testing, guidelines around product use, measurement of risk, and industry standards.

Lenders and the regulatory agencies are forcing these issues. Regulators are interested in setting requirement for product testing and rules governing and documenting use. Lenders have to answer questions and document files to prove they are not taking on additional risk through elimination of more traditional products in favor of statistical methodology.

One of the industry groups that has been formed in the US to address these issues and work on setting standards is the Joint Industry Task Force on AVM Standards. Membership is all inclusive intending to bring in anyone interested in participating in the standards formation. Lending institutions, GSE's, mortgage insurance organizations, professional organizations such as the Appraisal Institute, and the AVM vendors themselves have all been invited to participate and expand participation to others who would be relevant to the discussion. Subcommittees have been formed to work on terminology, testing, confidence scores and standards, all in an effort to build structure around the concept without inhibiting the creativity and improvement of the individual products. It is believed that working towards this common goal will create a new level of product acceptance and comfort that will allow for increased product usage.

There has also been discussion in the UK around AVM standards, lead by the vendors in the hope that setting standards will increase product use. The lenders, mortgage insurance groups, and the vendors have been considering a consortium similar to the Joint Industry Task Force in the US to provide an open communication within all groups interested to work together for the industry needs in this regard. There has been no official formation of the group as yet.

Conclusions – Everyone Can Learn from the Process

Since so much of the banking/lending community is global, it will not be difficult to take advantage of sister organizations and related lending operations in the US and abroad who have climbed the AVM learning curve already. However, it is imperative to understand that, while the process of implementation and use may be similar, the underlying data, statistical analysis and product development may be very different based on each culture's housing market, data availability, and purchasing patterns. What makes a model work well in one country may be very different in other places. Development in the US has become very standardized and considered by those in the US vendor market to be the "way it is done". While there are lessons here for the development market outside the US, there is also an exciting creative atmosphere in the UK and other countries for similar products but with a fresh eye to the data and modeling techniques.

Standard setting at the onset of market introduction and use of automated valuation models was not even a consideration at the time, but could have gone a long way to move the U.S. products toward easier industry acceptance. This is a responsibility that should be shared by a variety of members in the lending community, similar to what the Joint Industry Task Force is working to accomplish now. Any of the individually affected groups attempting to build standards without input from the others would miss important input that is vital to the process. It would serve lending communities in other countries well to consider the process and bring on some formal structure early in the process.

In addition, as models are brought to market, it would be well advised to keep a broader view of the market needs, not just for the initial lender client, but what will also work for the secondary market and regulatory agencies. The AVM products combined with appraiser expertise can bring an advantage to the market as long as they are deployed keeping efficiencies in mind. Without the time and cost savings, the clients perceive that there is no added value from including the appraiser in the process. If the appraiser involvement serves to raise the cost of the automated product and add on substantial additional time then the advantage is lost.

Automated valuations continue to interest the lending and secondary market communities due to their obvious cost and time savings. The investors are beginning to accept these products and it is assumed that this will open the door to AVMs in general. Investor acceptance in the US will lead to investor acceptance elsewhere as this group is becoming increasingly international in scope.

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Additional expertise can be an advantage as well. It will remain to be seen if the appraisal community will make the adjustments necessary to successfully establish a niche in the AVM market. The opportunity is there if they care to take it.

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