REPORTING THE REGRESSION ANALYSIS

AVT's Workbook 5
Automated Valuation Technologies, Inc.

This introductory workbook was created by Automated Valuation Technologies, Inc. (AVT). The purpose of AVT is to fill the voids in appraisal practice that result from the rapidly changing appraisal environment. Appraisers often find themselves engaged in new activities which require the use of technology that has not yet reached their computer desktops. This is both unfortunate and unacceptable. It is unfortunate because appraisers are not fully effective in carrying out their duties. It is unacceptable because it compromises the vital role appraisers perform in the safekeeping of their country’s greatest wealth: real property. It is AVT’s mission to provide technologies real estate appraisers require to fulfill their duties.

AVT operates under the belief that there is no substitute for the “Neighborhood Appraiser.” Their knowledge of the local market is unique and cannot be duplicated by remote computer analysis. These local appraisers are hardworking and dependable. Without question, these gritty individuals will carry out their duties as long as they have the knowledge, training, and tools to do so.

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David A. Braun, MAI, SRA, has been an appraiser in the Greater Knoxville area, since 1976. He was born in St. Louis Missouri, and later moved to Knoxville, Tennessee. He is a 1976 graduate of the University of Tennessee with a Bachelor’s of Science degree in business administration. David received the Appraisal Institute’s SRA in 1980 and MAI in 1999. David has been appraising most types of properties since 1976. He is also a licensed real estate broker with sales and management experience.

David founded Braun & Associates, Inc. in 1983 in Maryville, Tennessee. Braun & Associates, Inc. is a medium-sized appraisal firm with 12 employees and handles most types of assignments and property types. He is also president and founder of Automated Valuation Technologies, Inc. (AVT). AVT produces unique appraisal seminars and software for the practicing appraiser.

David has had “how to” articles published in the Real Estate Valuation Magazine, The Working RE Magazine, and presented white papers on appraisal topics. He has twice served as President of his local Chapter of the Society of Real Estate Appraisers (now a part of the Appraisal Institute). He has served on the Appraisal Institute’s Instructor Subcommittee at a national level. David is currently an approved Appraisal Institute Instructor and is certified by the Appraisal Foundation as a USPAP Instructor.

David has been a pioneer in developing and reporting the scope of work. He developed and taught the first scope of work seminar, and was the first to use a computer program to aid in the development and reporting of the scope of work. He authored, APPRAISING IN THE NEW MILLENIUM; Due Diligence & Scope of Work.

David has developed numerous applications that run on macros in MS Excel® some of which are free and some are for purchase. These can be found at AVT’s website. He has designed, but did not program other applications such as the “USL Documenter” and the Regression Plus, and the Fusion.

David has made presentations to the Federal Financial Institutions Examination Council (FFIEC), and to the Association of Appraiser Regulatory Officials (AARO) on the topic of scope of work.
FORWARD

After trying several training methods we have concluded that workbooks supplemented with videos is the best avenue for success. This is an inexpensive and flexible learning environment. This is the third of a five part series:

1. An Introduction to Market Modeling
2. Introduction to Regression Analysis
3. Trending Values over Time
4. Extracting Line-Item Adjustment Rates
5. Reporting Your Regression Analysis

The first three workbooks will empower the valuator to form credible value opinions with regression analysis. The fourth workbook explores the phenomena of extracting line-item adjustments. Finally, the fifth workbook shows the valuator how to report the regression analysis.
INTRODUCTION

Some of the questions we will address in this Workbook are:

- What should I have in my work-file?
- What reports are built into the “Regression Plus, for Real Estate Professionals”?
- What addenda might I include in my appraisal report?
- Can I create a USPAP compliant report with Regression Plus?
  - Fusion & USL Documenter
  - Creating a Custom Report

Even if you are on the right track, you’ll get run over if you just sit there. ~ Will Rogers

Once you have completed Workbooks 1 through 4 you are now ready to begin applying regression as an analysis tools into your real estate business. We saw in the previous workbooks that regression is very useful in:

- Forming value opinions.
- Extracting the trend in values.
  - Calculating line-item market condition adjustment on a sales grid based on the trend in values.
- Extracting certain line item adjustment rates.

As Will Rogers points out it is not enough just to be on the right track, it is time to get moving. For real estate professionals this means using, relying on, and reporting regression analysis.
WHAT SHOULD I HAVE IN MY WORKFILE?

This Chapter mainly applies to real estate appraisers, but a sales agent who utilizes regression analysis as part of a listing tool should also maintain some records until the relationship with the potential property owner ends. What should be in the work-file depends on exactly what you used the regression analysis for; but as a minimum should include the sales used in the regression analysis. Ideally this would be an electronic copy of the Excel file as opposed to a “.pdf” or other file format. You should have the sales in the MLS format with different stages of the scrubbing on multiple worksheets (as I demonstrated in a video on scrubbing). You should also have the Regression Plus file saved. The more comments and discussion you have in the appraisal report, the fewer you need in the work-file, and vice-versa.

The idea is that you could replicate the analysis and explain it to the intended user or third party (such as a court of law or your State Appraisal Commission).

If you rely on the regression analysis when forming your opinions and conclusions then it is a part of the appraisal process. However, if you are performing the regression analysis as a learning exercise, and you are not relying on it, then do not include it in the work-file or the report.

If you intend to use the regression analysis in forming opinions and conclusions, but decide to disregard the analysis because you do not have confidence in it, then do not base your opinions and conclusions on it and do not include it in the work-file or report.
In any case, you should not rely on regression analysis in forming opinions and conclusions until you are competent in using it. USPAP specifically includes “analytical methods” in the Competency Rule (see page U-11 in the 2010-2011 Edition of USPAP). At what point does USPAP declare an appraiser competent to use regression analysis? I am not sure if anyone knows. The State Appraisal Commissions enforce USPAP; so you might ask them directly.

When you do begin to use and rely on regression analysis in your appraisal practice I would suggest describing what you have done to become competent. This would include all seminars that discuss regression, books that you have researched, experience, etc.

In reality, it is all about performing a “credible” appraisal. The higher the due diligence required by the scope of work analysis the more competent the appraiser should be in the analysis techniques relied on to form the opinions and conclusions.
Consider the following situations:

**SITUATION 1**

Jennifer is in the process of studying AVT’s five workbooks on regression. She tests out regression by finding a value on the property she is currently appraising. The regression analysis returned about the same value as her traditional comparison analysis. She did not retain any of the regression analysis (data or regression file). A few days later a reviewer questioned her value. She let the reviewer know that she felt good about it because she performed a regression analysis and it confirmed the value opinion.

**SITUATION 2**

Frank has a lot of training and experience in regression analysis. He performed an appraisal utilizing both the comparative and regression analysis. However, his regression analysis kept coming up out too high based on the sales grid and his experience. He decided not to rely on the regression analysis, but did include it in his work file.
SITUATION 3: Sally is performing an appraisal for a low scope of work assignment. The homeowner has requested a $50,000 first mortgage on a property worth between $200,000 and $300,000. The lender requested an “evaluation” based on a curb-side inventory (inspection) on the subject property. Sally performed a regression analysis which indicated a value opinion of $270,000. She felt good about that but decided not to mention the regression analysis. She also performed a quick qualitative comparison grid. She did not do too much work on it as she already knew the value based on the regression analysis. She did not mention the regression analysis in the report or the work-file.
Discussions:

**SITUATION 1:** Jennifer has now committed the regression analysis as an analysis she is relying on. At this point the reviewer would be within his rights to ask to see a copy of the analysis. This opens a whole can of worms; including whether she was competent to use and rely on regression, did she meet USPAP’s record keeping requirements, and did she meet reporting requirements in the actual report.

**SITUATION 2:** If Frank did not rely on the regression analysis then he should not keep a copy of it in his work-file. Suppose the purchaser or homeowner complains that Frank’s appraisal value opinion is too low. If they officially complained to the Appraisal Commission the commission might ask to review Frank’s report and work-file. The regression analysis in the work-file would support the complainant’s position.

**SITUATION 3:** If Sally relies on any analysis (regression in this case) to form her opinions and conclusions the she must include the analysis in either her appraisal report or work-file depending on the type of report format used.
WHAT REPORTS ARE BUILT INTO THE REGRESSION PLUS?

The Regression Plus has several analyses which it has some associated built in reporting features. None of these features are intended to make the Regression Plus a USPAP compliant appraisal report. The Fusion application combines the Regression Plus report with the USL Documenter to create a USPAP compliant appraisal report. The reporting built into the Regression Plus include:

1. The regression analysis
2. The Market Condition Analysis (Value Trending) report
3. The Manual Line-item adjustment report for the market conditions
4. The regression and the market conditions report can be printed out together.

For Number (1) above simply click on “File” then “Print Report”, “Copy Report” or “Print Preview”.

For Number (2) above simply click on “Valuation”; then “Market Conditions Analysis”; then “Print MCA Report”, “Copy MCA Report” or “Print Preview”.

For Number (3) above simply click on “Valuation”; then “Market Conditions Analysis”; then “Print Regression with MCA Report”, “Copy Regression with MCA Report” or “Print Preview (Regression with MCA)”.

For Number (4) above simply click on “Valuation”; then “Manual Adjustment Report”; then “Print Manual Adjustment Report”, “Copy Manual Adjustment Report” or “Print Preview”.

These reports are adequate for a listing analysis for sales agents, but for appraisers should be considered report addendum or as information to be stored in the work-file.

I suggest that instead of printing these reports out directly, that they be copied into Word or other word processor so that additional formatting can be added, such as inserting page breaks. In this way the line item adjustment report (number 3 above) can be included in the report.

Any of these reports might be appropriate as an addendum to an appraisal report. They were designed to meet USPAP’s requirements for a “Summary” report format as an addendum. They do have comment areas allowing them to be expanded to a “Self-contained” report format.
CREATING A USPAP COMPLIANT APPRAISAL REPORT

The Regression Plus application, by itself, does not provide a USPAP compliant appraisal report. It does produce a report that can be inserted into your forms report or commercial narrative. However, AVT does provide a way to produce USPAP compliant appraisal reports for low to medium scope of work assignments that do not require a cost or income approach. The Fusion application “fuses” the Regression Plus and the USL Report Documenter program to create a USPAP compliant appraisal report. The USL Report Documenter is a stand-alone program that was developed to provide some addenda or the complete supplements required by USPAP. This product was developed and is owned by AVT (the makers of Regression Plus).

Since the USL Report Documenter was already in use there was really no need to combine the two programs into one, forcing users to purchase both. So, one way to produce a USPAP compliant appraisal report is to purchase both the Regression Plus and the USL Report Documenter. The Fusion application is a free download.

Another way to create a USPAP compliant appraisal report is to create one with your residential form software, or narrative report. Simply create a template that has everything you need in it. Then add the regression Plus report. You can also add the USL Documenter.

In some form packages you can copy these reports directly into a “multi-page” addenda sheet. However, most of the time you will have to convert the printout into a “.pdf” format and then insert the addenda into the report. Many of the residential form packages have a .pdf grabber so you will not need a full version of Adobe PDF Writer. Simply copy and paste the addenda from the Regression Plus and the USL Documenter for commercial reports being done in a word processor. Be sure to use the “copy
command” as opposed to actually selecting the information and copying it as some formatting is automatically completed for you when using the copy command. This command is found by clicking “File” or “Valuation” then “Market Condition Analysis”.

Watch Reporting Videos

Go to www.AVTtools.com then “Products”. Watch the related videos on reporting for:

Regression Plus

USL Documenter

Fusion

Also, print out any sample reports while you are in the “Products” area.
Regression analysis, like any other analysis, is used to aid the analyst in reaching a conclusion. Because of the subjective nature of real property this conclusion is the analyst’s opinion; it is not a fact. All analyses have three basic steps:

1. Research
2. Analysis
3. Conclusions

ACCURACY vs. CREDABILITY

Report writing for regression analysis is basically the same as any other appraisal. The goal is to make the valuation analyst’s conclusions worthy of belief. If the analyst has done a “good” job then consider this the time to point that out in the report. The first step is to convince the user of the report that the due diligence you achieved was appropriate for the assignment. The analyst has met his due diligence when the pertinent information (opinions & conclusions) in an appraisal meets or exceeds the practical demands (the penalties inflicted by an incorrect conclusion or opinion) of the problem being solved or decision being made for a particular class of intended users. Remember, the analyst is not implying that his conclusion is a statistical certainty; he is only providing an opinion. Scope of work reporting is all about explaining what the analyst’s opinion is based upon.

In scope of work reporting the goal is not to prove that your conclusion and opinions are “accurate”; only that they are worthy of belief.
Let’s consider the scope of work for regression analysis in terms of:

- Forming an opinion of the property’s value
- Forming an opinion of the trend in values
- Extracting line-item adjustment rates

Forming an opinion of the property’s value

Here is an example of what might be reported for the opinion of the final value:

The Direct Sales Approach to Value was performed by a straight-line multiple linear regression analysis. Regression analysis is a mathematical process that was put forth in the late nineteenth century. It identifies and measures relationships between a property’s components and its value. Collectively, these relationships represent a “market model”. This market model is used to form an opinion of the subject property. The predictive power of the model can be measured by how well it predicted for the individual sales used. The sales were found by the appraiser in the local MLS. 42 sales were used in the analysis. This analysis is based on the following property characteristics; the gross living area, the date of sale, the age of the property, type of car storage, (etc.). The resulting model is applied to the sales and compared to the actual sales prices resulting in the “residual” for each of the 42 sales. The model had an average absolute residual of 6.4%. Ninety percent of the sales had average absolute residuals of 12.3% or less. The subject is very similar to the sales used. When applying the market model to the subject property it indicates a value of about $230,000. This value indication is considered to be very meaningful based on the number of comparable sales used, the reasonable residuals, and because the sales are very representative of the subject property.
Forming an opinion of the value trend

Here is an example of what might be reported for the opinion of the trend in values:

The trend in values was found by performing a straight-line multiple linear regression analysis. This method is typically one of the most reliable methods of trending values over time. It basically adjusts the sales (excluding the market conditions) and then trends the resulting values over time. Then a four test process is applied to the analysis: (1 The P-factor is considered to see if a straight-line relationship exists between the dates and value; (2 A trend test is applied to see if a curvilinear relation exists, (3 Charting the adjusted values of the sales over time; and (4 The P-factors of the MCA ranges are considered. In this case the analysis indicates that there is a curvilinear relationship between the date and values. It indicates a sharp decline in values over the past six months.
Extracting line-item adjustment rates

Here is an example of what might be reported when forming an opinion of the line-item adjustment rate for the gross living area:

_The line-item adjustment rate for the gross living area was extracted from the market by use of a straight-line multiple linear regression analysis. The sales were found by the appraiser in the local MLS. 42 sales were used in the analysis. This analysis is based on the following property characteristics; the gross living area, the date of sale, the age of the property, type of car storage, (etc.). The resulting model is applied to the sales and compared to the actual sales prices resulting in the “residual” for each of the 42 sales. The model had an average absolute residual of 6.4%. Ninety percent of the sales had average absolute residuals of 12.3% or less. The market derived by the regression analysis indicates a line-item adjustment rate of $42.00. This is considered to be very meaningful based on the number of comparable sales used, the reasonableness of the residuals, and because the gross living area is a dominant variable. In addition the coefficient had a very low P-factor, and the trend-analysis testing did not indicate a curvilinear relationship to value._

Summary:

Remember the goal is not to convince the user that your opinions and conclusions are accurate, it is to convince the user that you did every step of the appraisal process appropriately; from understanding the user’s problem, to performing the appropriate scope of work, to reconciling all methods and approaches into a final opinion.