Concise Review of the Comparable Sales Method

Introduction

The "sales comparison or market approach" to value is in many respects the most fundamental and important of the traditional approaches to valuation. The sales comparison approach is sometimes known as the grid approach, based on the grid used to adjust comparable sale prices. This approach to estimates the market value of a subject property by examining the transaction prices of recent sales (or near the date of the appraisal) of properties similar to the subject property in the same or similar real estate asset market. Steps in the process include:

- Define the market of comparable properties and look for sales
- Screen and select comparable properties or “comps”
- Adjust the comps towards the subject property based on significant differences
- Develop a conclusion of value

History is the demon of the sales approach to value when we wish to know current market value. The older the comparable sales used to estimate value, or the more market conditions have changed since the sale date the less valid is the data for valuation purposes. Thin markets with few transactions that require an appraiser to go back further in time result is a less confident conclusion of value. If interest rates have been rising or falling this also makes the historical data less reliable. Any factor that has suddenly influenced local demand or supply is a problem for this statistically driven approach. The ideal market for the purpose of an accurate valuation is rather homogeneous with many recent comps with stable interest rates and unchanging market conditions. The more unique the subject property, the more difficult it is to apply this appraisal technique.

Defining the market from which comps will be selected

Prior to selecting comparable properties, the analyst must define the relevant market. It is within the market that comparable properties will be sought. For residential property, most appraisers call this the “neighborhood” but such a term is not well suited to shopping centers, warehouses, and office buildings. A market can be defined as a set of properties that would be considered substitutes in the mind of the typical buyer of such property. The typical buyer may be a young couple or an empty nester with no kids or an institutional buyer or even a manufacturing company. Research on the buyer types is essential to start the process. On the supply side it is typical to define the market with geographic boundaries and size ranges as well as price and quality ranges. The more sale observations available the tighter (closer to the subject property) the analyst can define this market.

An alternative approach and more modern approach are simply to start collecting comparable property from as large an area as one would consider substitutes for the subject property, and then sort them on the basis of comparability using a similarity score that includes the distance from the subject property and whether the comp is in a similar school district (if residential), similar city, or county along with features like age and size and general quality. Imagine pulling a matrix with many possible similar property use comps from a fairly large geographic area, two or three miles from the subject property, or

a metro or county, all sales within the last two years. Then these can be sorted by age, size, style, time of sale and distance from the subject to whittle down the list to the most comparable sample. For example, consider the following list of potential comps for a multifamily property.

Exhibit 5-1: Potential Comps based on all sales within 3 miles in the prior 2 years

	Distance from Subject (miles)	Year Built	Size: Sq Ft	Number Units	Sold Date	Class
Subject		1985	150,000	150		B
Comp 1	0.1	1985	114,000	122	3 mo	B
Comp 2	0.15	1986	11,400	14	6 mo	B
Comp 3	0.18	1988	24,700	38	6 mo	B
Comp 4	0.2	1978	45,600	50	7 mo	C
Comp 5	0.21	1976	42,750	42	10 mo	C
Comp 6	0.25	1951	114,000	112	24 mo	C
Comp 7	0.27	1990	142,500	138	22 mo	B
Comp 8	0.27	1991	114,000	132	8 mo	B
Comp 9	0.3	1995	52,250	59	12 mo	B
Comp 10	0.4	1995	74,100	77	14 mo	B
Comp 11	0.52	1995	76,000	82	2 mo	B
Comp 12	0.6	2007	19,000	24	5 mo	B
Comp 13	1	2006	11,400	10	9 mo	B
Comp 14	1.1	2006	7,600	9	12 mo	B
Comp 15	1.3	2006	15,200	17	17 mo	B
Comp 16	1.3	2006	19,000	22	19 mo	B
Comp 17	1.6	2016	26,600	32	2 mo	B
Comp 18	1.9	2017	121,600	132	8 mo	A
Comp 19	2.6	2018	157,700	188	15 mo	A
Comp 20	2.9	2018	199,500	232	19 mo	A
Comp 21	3	2018	23,750	29	12 mo	A

Examine the above list and pick out the best comps. We see the three best comps are #1, 7 and 8 based on distance, age, class, and size range. But the next four best comps are probably 3, 9, 10, and 11. Beyond these, the comparison is harder as the age and or class or size are all fairly different. In fact, the age and class differences might suggest we start with the seven best comps and see how consistently the valuation comes out with these seven. To know whether more comps helps or hurts, the valuation, look at the dispersion of adjusted values for each comp. The closer the cluster of adjusted values, the better the estimate.

What affects market value and price may require an adjustment?

Whatever significantly influences value should be considered as possible adjustments to comp sale prices. For residential we might consider three categories: 1) Fundamental factors inherent in the property itself, 2) Cost and access to capital and market conditions, and 3) Individual buyer and seller circumstances, search costs, tastes, and preferences. Individually unique factors will not be considered

here and were discussed in the first chapter. The focus here is on fundamental factors inherent in the property with a few notes above transactional factors that might impact price.

Fundamental factors:

Time, Market Conditions and Seasonality

Market prices fluctuate over time for three reasons. First, land, except in flood zones has an infinite life and improvements have a relatively long life, which suggests that real estate is durable enough to move with inflation. Inflation is the general rise in prices caused by an increase in the money supply faster than increases in productivity. Real estate will tend to move with inflation over the long run. Second, market conditions reflecting demand and supply can change over time with changes in the economic base of the region, employment trends, new development, or the lack thereof, and such changes will drive prices up or down, beyond inflation. One signal is the months of remaining inventory, MRI. If months of remaining inventory is higher than normal or lower than normal, it will affect prices. What is normal depends on the price range and market, but typically MRI under two months suggests a strong market and upward prices. Two to six months might be normal and above six months might suggest a weaker than normal market and softer prices. An appraiser must monitor and document market conditions and price trends. Other statistics to watch for residential include but are not limited to:

- ✓ Sales Price/List Price Ratio: A ratio of 96% to 98% is normal. Above 98% is rare and suggests a market heating up with rising prices.
- ✓ Days on Market (DOM): Anything under 30 days is considered strong, and prices will be rising.

To adjust a comparable property's selling price for general price trends, one needs an index of the general price trend. There are two ways to do this. One is through an index such as sales price per square foot of living area or rentable area. See Exhibit 5-2 below. Another is through repeat sales. With an index based on all available sales in the local neighborhood, zip code or metro calculated monthly, the adjustment from the date of a sale to the date of the appraisal is the ratio of the two. See for an example, the following pattern for the past 20 months. Now assume that we have some comparable sales which occurred three, six, nine and twelve months ago. We could use the average trends for the past year to make a price adjustment of 4% per year, prorated. A sale from three months ago would be increased by 3/12 times 4% or 1%. A sale that occurred six months ago would be increased by 2%. Note there is always some discretion in how to apply statistics and we see a range of results depending on whether we use the average of the past six months or year or longer. A conservative adjustment would be 4% times 6/12 but 4.5% times 6/12 for the past six months could also be justified.

Exhibit 5-2: Price Trend Index Calculations

Month	Sales Price Per Square Foot	Monthly Change in Percent Annualized	Average Annual Change in Percent	Past
-1	$480.00	2.51%	3.98%	19 months
-2	$479.00	5.03%	3.94%	12 months
-3	$477.00	4.77%	4.55%	6 months
-4	$475.11	5.35%		
-5	$473.00	5.10%		

-6	$471.00	3.94%		
-7	$469.46	-1.38%		
-8	$470.00	6.86%		
-9	$467.33	1.11%		
-10	$466.90	6.59%		
-11	$464.35	3.50%		
-12	$463.00	3.90%		
-13	$461.50	-1.30%		
-14	$462.00	5.22%		
-15	$460.00	5.24%		
-16	$458.00	7.91%		
-17	$455.00	10.64%		
-18	$451.00	-5.30%		
-19	$453.00	5.91%		
-20	$450.78			

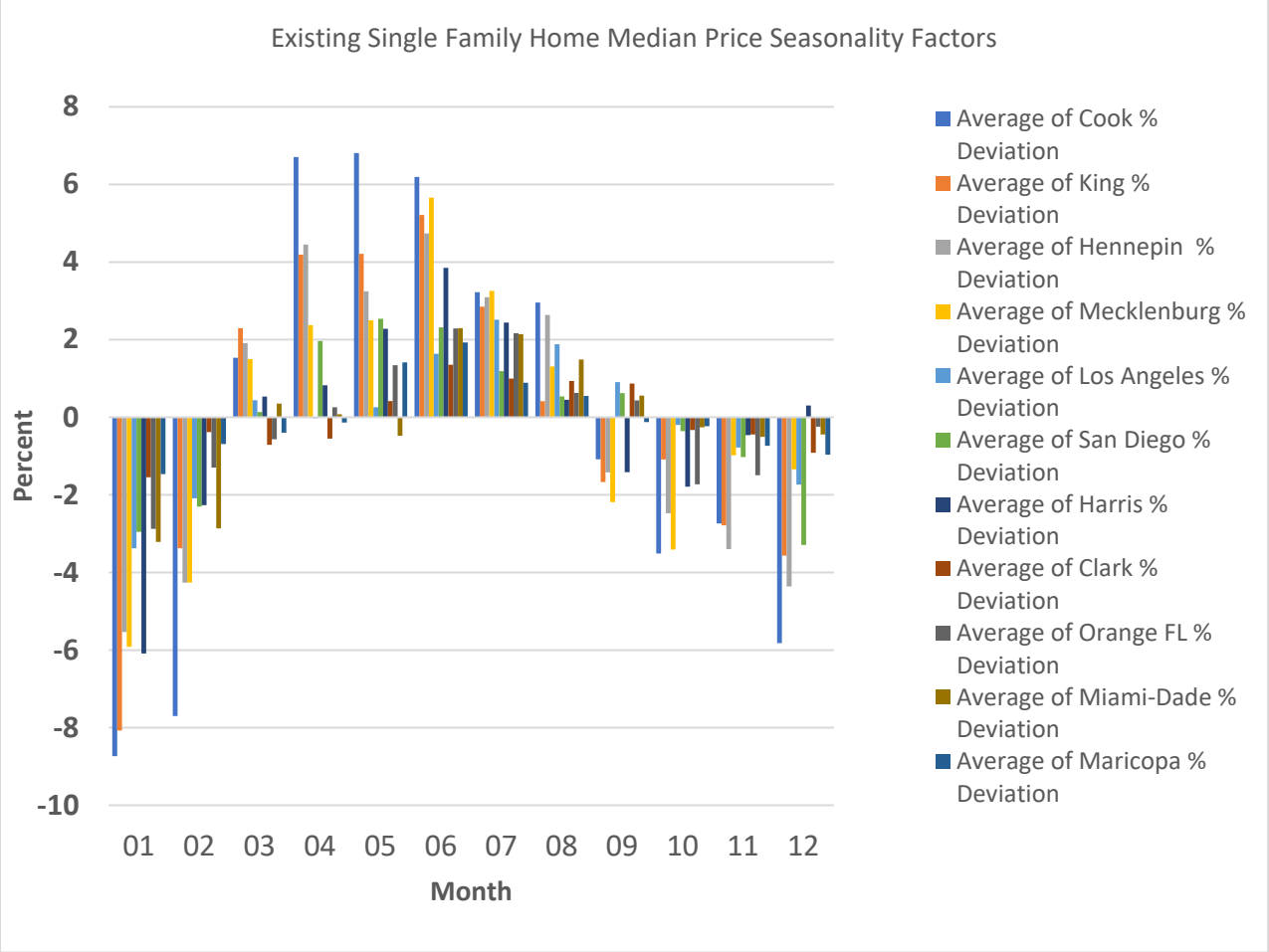
With repeat sales the analyst must collect properties which sold twice. Then using the annual rate of change and over lapping the series we can extract out shorter term trends. This technique is appropriate for long term series but difficult to apply for sales within a year or two of the current date. See Case-Shiller for more on methodology.[1]

Aside from general price trends driven by inflation and changes in market conditions, there will be seasonality. For residential property, seasonality reflects stronger demand and supply (more transaction volume) in the spring and summer, influenced by school cycles and holidays and weather. Few people want to buy a home in December or January in cold climates like Chicago. These are months when prices will tend to run several percent lower than in peak spring/summer months. Each market has a different seasonal pattern, but all residential markets exhibit some seasonality.

Below we calculate the seasonal price variation controlling for size and quality for several counties in the U.S.[2] Note that even in markets with less severe weather we observe seasonality and in markets like Chicago, the price effect is significant.

[1] See Tabl of Contents (spglobal.com) Case Shiller Methodology or 724.pdf (upenn.edu)
[2] See Miller, Sah, Sklarz, and Pampulov, 2013, "Is there Seasonality in Home Prices—Evidence from CBSAs" Journal of Housing Research, 22:1.

Exhibit 5-3: Examples of Consistent Seasonal Price Patterns



Adjusting for seasonality is something which is rare for appraisers in the past, and it helps explain a great deal of appraisal error. If you have a comp that closed on the sale in February in Chicago (Cook County) based on a contract negotiated agreed upon in January and the date of the appraisal is May. It would be appropriate to add several percent to the sales price to answer what it would have sold for in May. Conversely, if you need to value a property in January and your sales are from June, you would need to subtract several percent from the sales price.

One method to develop seasonal indices is to use price per square foot monthly over about four years of data or more. The geographic area should be as small as possible but ideally large enough to have a dozen or more typical sales each month, thirty or more is ideal. Use a smoothing function, such as a three-month moving average to get rid of some noise. Next, measure the long-term price trend over the entire time period and calculate the average monthly rate of change. Subtract that long term trend from the actual monthly change and chart the residuals. This will give you a pattern from which to calculate monthly seasonality. Generally, we should expect December through February prices to be a few percent below average and May-July to be a few percent above average.

Location: Site value may represent as low as ten percent of the total value of property in locations with elastic supplies of land, and as much as eighty percent in highly sought after locations with great views and inelastic supply (where adding new buildings are extremely difficult). In rare cases, site value may exceed total property value. This would be the situation when the buildings are obsolete and require demolition or when the remediation for asbestos is costly and must proceed prior to demolition or re-use. The variation in site value is dramatic and may range from pennies per square foot for arid and non-farmable land, to less than a dollar present value per square foot for soybean and corn farming, to a few dollars per square foot for wine grapes, to several thousand dollars per square foot for urban high rise commercial uses.

Locational value is not merely the land and site improvements, but also the views, access to employment, schools, retail and recreation, access to waterfront, school quality, city and county, and state government. Location value is also influenced by noise and pollution, from cars and road traffic, plane landing and takeoff routes, green space, and prevailing winds. Among these, significant noise can a substantial negative impact on site value, while school quality can have a very positive impact. Care must be taken to either avoid comps that differ from the subject property in these locational respects or make significant adjustments to the value based on such differences.

One scoring system that tries to measure general access for every location is called "Walkscore", and is easy to look up at www.walkscore.com, a measure of car dependence and locational value. Walkscore and similar measures are legitimate factors to consider in comparing properties locational value, but require some statistical analysis of the values per square foot for different samples observed grouped by walkscore.

Research on water views suggest very strong positive impact on property value.[3] On average historical premiums for ocean and bay waterfront locations have been 45%, 26% for lakefront and 24% for large river views. At the same time topography matters and the ideal view point is well above potential flood levels, but with no view obstructions. At the same time flood risks, when disclosed or apparent, have a significant negative impact, especially when following a major weather event, but these negative effects seem to dissipate with time.

The best way to adjust for location is with paired sales that are similar in all respects except for location. The adjustment might be a percent of the total price. Another method is to use regression coefficients based on a location identifier, discussed in more detail below.

Size: For size adjustments the questions are: 1) how much of the value is inherent in the site versus the improvements? and 2) what is the best unit of comparison? If you are appraising residential property with very similar lot sizes, and not much in the way of landscaping, then one very simple approach is to try using the entire adjusted selling price (after the time and location adjustment) and divide this by your unit of comparison, square feet, square meter most often. In the case of warehousing, cubic foot or cubic meter may be best. Simply take the adjusted selling price divided by the unit of comparison, then adjust to the size of the subject property.

[3] See: Norm G. Miller, Jeremy Gabe & Michael Sklarz (2019) The Impact of Water front Location on Residential Home Values Considering Flood Risks, Journal of Sustainable Real Estate, To link to this article: https://doi.org/10.22300/1949-8276.11.1.84

Size Example 1: You have five good comps and all have similar lot sizes as the subject in a fairly homogeneous development. The adjusted price per square foot is shown along with the size of the comps. After adjustment, we see the prices are fairly tightly clustered. That is what we want, to see all adjusted prices as close as possible. In such a case the simple method works pretty well. In example 2, we will adjust first for land and then try again and see if the results are any better.

	Subject	Comp 1	Comp 2	Comp 3	Comp 4	Comp 5	Hi-Lo Range
Adjusted Selling Price		$ 1,225,000	$ 1,296,000	$ 1,104,000	$ 1,171,800	$ 1,287,600	$ 192,000
Size in Sq Ft	3300	3500	3600	3200	3150	3700	
Price/Sq Ft		$ 350	$ 360	$ 345	$ 372	$ 348	
Difference		200	300	-100	-150	400	
Adjustment		(70,000)	(108,000)	34,500	55,800	(139,200)	
New Adjusted Selling Price		$ 1,155,000	$ 1,188,000	$ 1,138,500	$ 1,227,600	$ 1,148,400	$ 79,200

Note that the high to low range on adjusted prices is now $79,200, versus $192,000 prior to any adjustment.

In example 2, below, we first take the adjusted price and knock off an approximate site value. This is particularly important when the site represents a significant portion of the value, such as sites with great views or when the structure is quite old and adds little to value. Based on a few recent sales where the properties were torn down, we might be able to discern the value of the sites, per square foot in the same market. Keep in mind we need to add in demolition costs as these were an adjustment to the value of the raw site, so this would require separate research. Let us assume that based on property tax assessment records, the value of the sites in our market is around 20% of the total property value. Now we will knock this off of the adjusted selling price and use this lower figure to come up with the new adjusted selling prices.

	Subject	Comp 1	Comp 2	Comp 3	Comp 4	Comp 5	Hi-Lo Range
Adjusted Selling Price		$ 1,225,000	$ 1,296,000	$ 1,104,000	$ 1,171,800	$ 1,287,600	$ 192,000
Building Portion		0.8	0.8	0.8	0.8	0.8	
		$ 980,000	$ 1,036,800	$ 883,200	$ 937,440	$ 1,030,080	
Size in Sq Ft	3300	3500	3600	3200	3150	3700	
Price/Sq Ft		$ 280	$ 288	$ 276	$ 298	$ 278	
Difference		200	300	-100	-150	400	
Adjustment		$ (56,000)	$ (86,400)	$ 27,600	$ 44,640	$ (111,360)	
New Adjusted Selling Price		$ 1,169,000	$ 1,209,600	$ 1,131,600	$ 1,216,440	$ 1,176,240	$ 40,200

We can see that the high to low range reduced further from $79,200 to $40,200 and the cluster of indicated values is much closer. Assuming we were done with all adjustments and that all comps were equally appropriate then the subject property value would be $1,180,576 rounded perhaps to $1,181,000.

In the case of the two examples above, we used a **linear or proportional adjustment** treating all space as equally valuable. There are cases when proportional adjustments are not appropriate. The value influence at the margin is declining and non-linear. For example, a home of 7,000 square feet in a market or neighborhood where most homes are 2,500 to 3,500 may not be worth as much per square foot in this particular market. If this is an essential comp, then the size might be reduced by assuming that anything above 3,500 is worth only 60% as much as the first 3,500. The result would be 3,500 + 60% of 3,500 = 3,500+2,100 = 5,700 square feet. Then you would treat this as equal to a 5,700 square foot home with a proportional adjustment. Another example, would be a three-story home in an area of mostly one- and two-story homes. The second floor may be treated as 85% of the first floor and the third floor treated as 60% of the value of the first floor, and then use this adjusted square footage. How do we know if these subjective guesses work accurately? When the adjusted selling prices are clustered about similar figures then the assumption is valid. When the adjustments result is more price dispersion, then the assumptions need to be tweaked in order to arrive at logical and consistent results. Logic must prevail. For example, a three-story home with an elevator may result in no marginal decline in value at all.

Floors: Generally, floors provide different views and as one moves higher in a building, the views tend to be better, especially as they start to peer above the prevailing height of surrounding structures. The typical pattern of value is slightly higher on the very first floor as it allows for easy egress and those concerned with fire risks will pay a premium for such access. Then the value per floor is rather stable until one gets to a height providing views and the very highest floor or penthouse commands a premium based on less noise and the prestige of being on top. Often the penthouse will have extra balcony space or roof access. An example of developing an index by floor is provided later in the text below, see Exhibit 5-5.

Design: Natural light is what most occupants seek, in both residential and commercial property. A LEED (Leadership in Energy and Environmental Design) certified building requires that at least 75% of the interior space have natural light. Surveys of tenants and residents suggest that natural light is among the most important design features, so care must be given to evaluating natural light from windows, ceilings or via reflective design systems. Layout and aesthetics also matter and it is difficult to get agreement on what is great design. For residential, aside from natural light the most commonly high value design element is high or cathedral ceilings.

For commercial property well known architects are one indication of a premium design, but the premium will be subjective. Another quantitative (objective) indication of design emphasis for commercial property is the percentage of leasable space to gross space. Typically, this ratio is 85% or higher but on some buildings with large inside foyers and large open common areas, it can run much lower. With a lower ratio, the interior will be more aesthetically pleasing, but there will be less space available to lease, so the rents per square foot will be higher than average and the total gross revenue may end up being lower. It is not clear whether there is a net positive on the value or not, when the

revenue is lower and sometimes the designs are driven by ego and bragging rights as much as for investment reasons.

Construction Materials: Durability of construction materials affects value as well as the aesthetic appearance and design trends. On the exterior of homes, we see premiums for stone and brick and low maintenance materials, then stucco, and shingle or wood or aluminum siding at the low end. Roofs of tile, slate, copper, or metal are generally preferred to asphalt. On the interior, granite counters, tile floors, hardwoods, contemporary cabinets are preferred to laminated surfaces and carpeted floors. With commercial property, it is similar in pattern; granite, marble, glass is preferred to sheetrock walls and carpet. How these and other finishes affect value depends on the comparable sales selected. If they are similar in age and location, the finishes will often be similar and thus can be ignored. If you adjust for age and quality, you may not need to adjust for materials or outdated finishes. If the age is similar and the construction is not, then a paired sales analysis is ideal but often challenging to find. With data hard to find, the difference in cost times the proportion of economic life already passed is one approach to make an adjustment. Say a finish like granite counters cost $10,000 more than a laminate counter, and we give it a 50-year life, and it is 10 years old. We might then use 80% (from 40/50) of $10,000 as an adjustment assuming it is a highly desirable feature. We could easily justify the entire difference ($10,000) if it is a feature most buyers would want. Installed cost for the difference becomes the maximum for the adjustment.

Roof: For tar and asphalt the most important question is how long does it last and how old is it? Roof values are proportional to economic lives times cost. When comps have different roofs, the cost of each and remaining economic life should be used for comparison. For example, a comp has an asphalt roof that is 15 years old, while the subject has one that is new. With a 25-to-30-year life, we can take 50% of the cost of a new roof and add it to the comp to answer the question of what it might sell for if it had a new roof like the subject property. For more durable roofs, like copper sheeting, the question is are others willing to pay for such a roof with the logic that the more we observe this feature the more important it is. If something is new technology, the analysts will need to guess at how much this feature will matter in the future. For example, solar roofs or satellite dishes. Solar PV roofs increased in demand in areas with high electric rates while satellite dishes were replaced, in most areas, by direct cable or internet feeds, 5G or 6G. It is difficult to know and forecast how important a feature is when new, but the maximum adjustment would be the installed cost. Note also that reflective roofs will be environmentally better for society and provide points in any green scoring system like LEED, discussed more in the section on energy efficiency.

Bedrooms: Bedrooms is a size dimension and thus will be correlated with size. One should not use price per square foot of living area as an adjustment and then also adjust for the number of bedrooms on a price per bedroom basis, as this will double count size. If adjusting for size with the price per living area (after a land allocation or not) then the number of bedrooms requires no adjustment unless unusually high or low. If for example, there is only one bedroom for a comp where two would be normal for the same sized unit, then one might make an adjustment if the subject property has two and if this demising of space would add value. The adjustment would be minor, and the best way to calculate it would be via a regression model that includes both size and bedrooms and then both would have a regression coefficient that includes the impact of the other. If such a model for the market is not available, then a very minor adjustment, equal to the cost of inserting a wall at most, would be appropriate.

Bathrooms: Bathrooms, both full and half, add value at approximately the depreciated cost of the bathroom. If it costs $30,000 to add a full bathroom of typical size and the local market starts to remodel these after 30 years, then it would be logical to take a bathroom of 10 years in age since any remodeling and allow for an adjustment equal to $30,000 times (20/30) for the 20 years of economic life left. The adjustment would be $20,000 added to or subtracted from the comp in order to match the number of bathrooms in the subject property. Note that if the adjusted prices do no move closer, then this adjustment should be tweaked slightly to move them closer together, but such tweaking can occur after all initial adjustments have been made.

Age and Quality: Age and quality are correlated. It is not appropriate to make an age adjustment and quality adjustment, unless these are based on some quantitative system of analysis that includes both measures. Age should be based on time since major remodeling or when built.

Value and age are not linear relationships. There tends to be a new premium for any kind of property of a few to several percent, based on the ability of the first buyer to customize the property. Then the property value will suffer real depreciation at rates which vary from one percent a year to perhaps one and half percent per year.[4] After thirty or so years depreciation rates slow down and so an 80-year-old property and a 90-year-old property may not be distinguishable in terms of quality differences.

If we assume an 80-year economic life for the comp and subject property, and the comp is 60 years old while the subject property is 50 years old, we might add 10% (for the 10-year difference times 1% a year) to the adjusted selling price of the comp and see how well that adjustment works, after all adjustments are made. This may be an over adjustment if none of the properties have been remodeled.

Quality can be inferred by inspections and interior photos as well, reflecting finishing quality. One can deal with feature differences separately or as a group, as suggested above with age. One of the problems with trying to control for quality differences is that most property improvements are done without pulling building permits, so that we often don't know that bathrooms have been rebuilt or kitchens gutted and rebuilt with modern designs and materials. The good news is that research by the author suggests that 80% of the time, property condition is highly correlated with other properties in a neighborhood and so such stealth remodeling influences the value of comps and the subject property equally. The result is that adjustments for quality are not always needed, aside from significant age differences.

Parking spaces and garage spaces: Parking spaces have a market value which can vary significantly by location. A single exclusive space in a city like New York may be worth an additional $100,000 US dollars and rent for several hundred dollars per month. In large cities we can gauge the value of parking spaces by comparing new units sold with and without a parking space, or where parking space is an option. In medium and smaller markets, the value will be proportional to the cost to build with some adjustment for wear and tear. In large markets it might also be possible to use the monthly rent on a garage space and capitalize it into value, using a fairly low and conservative discount rate. For example, a condominium has a space within an indoor garage that rents for $300 a month and $3,600 a

[4] Based on research by Bokhari, Sheharyar and Geltner, David, "Characteristics of Depreciation in Commercial and Multi-Family Property: An Investment Perspective" (January 6, 2016). Available at SSRN: https://ssrn.com/abstract=2464164 or http://dx.doi.org/10.2139/ssrn.2464164

year, growing at about 2% per year. With a required yield of 6%, we can derive a cap rate of 3%, based on the Gordon Growth model discussed earlier, and this produces a value of $3,600/.04 = $90,000. The .04 comes from .06-.02, the discount rate less the growth rate. If this seems high, we will know when all adjustments are complete. The lowest value would be $3,600/.06 = $60,000, so that is our min-max range. We can also use regression coefficients on indoor attached parking spaces or garage spaces, as a fairly good indicator of value. See the use of regression models below.

Kitchen Quality and Amenities: If the comps are similar to the subject property in age, then it is unlikely adjustments need to be made for kitchen quality and amenities. The age adjustment, if any, also accounts for general quality differences, so few adjustments are required for a range of minor amenities. At the same time, unusual amenities may require adjustments, such as a walk-in wine cooler or a sauna in an area where few other properties have such an amenity. Since the amenity is rare, it will not require a large adjustment relative to costs. For example, a jacuzzi style hot tub costs $12,500 and 20% of the homes have these. I would suggest an adjustment equal to 20% times $12,500 on average, if any adjustment is made at all.

Energy Efficiency: Energy efficiency and solar photo voltaic (PV) cell systems that produce electricity are important features with a value relative to the cost of electricity. In locations like Hawaii or California where electric rates are high, energy efficiency is much more valuable than in markets like Washington State or Oregon, where rates are low. The upper limit on the adjustment would be the cost to install such a system, net of tax credits and grants. One can also use an income approach and discount the expected savings on electricity. For example, the electric bill, prior to installing PV cells the electric bills averaged $450 per month for a home that recently installed a system that cost $32,500 before tax credits and $25,000 after tax credits. With a conservative discount rate of 4% similar to long term treasury rates, the pay back is under five years, and the present value over 25 years without changing the electric rates is $84,359, well above the cost to install. In this case the maximum adjustment would be $25,000, the net costs to install.

In both residential and commercial markets, we have energy star ratings from the EPA (Environmental Protection Agency) that scale up to 100. A rating of 85 in Atlanta on an office building versus 65 will result in a savings of at least one dollar per year per square foot in energy costs. Such calculations allow for an understanding of why tenants will pay more in more efficient buildings and why occupants should be willing to pay more for a home with lower utility bills. It is fairly easy to install more efficient lighting, have automatic turn off switches, use heat pumps and more efficient appliances and natural air flows with passive design, and manage property for greater efficiency. LEED Platinum buildings are worth more than GOLD which are worth more Silver which are more than certified or non-certified. There is a host of research on the value premiums for more efficient buildings. See the Journal of Sustainable Real Estate, or the Journal of Real Estate Research, or use Google Scholar, and the US Green Building Council to find the latest studies, along with other measures like BREEAM, utilized more in Europe.[5] Past research by the author suggests premiums for more energy efficient and environmental progressive buildings will be ten to twenty percent more than traditional buildings, although in

[5] Journal of Sustainable Real Estate | Taylor & Francis Online (tandfonline.com), USGBC | U.S. Green Building Council, BREEAM USA - BRE Group.

some countries like Germany or States like California, where building codes require more energy efficiency, there will be less premium because all buildings must meet a higher standard.

Ventilation, Heating and Air Conditioning Systems:

Furniture, fixtures, and equipment included:

Pools:

Fireplaces:

Finished basements:

Landscaping:

Transactional factors Influencing value and price:

Credits for repairs:

HOA Fees

Seller financing

Points paid:

FSBO:

Distress Sale:

Adjusting the comps towards the subject property

The analyst is trying to answer the following question: "What would the comp sell for if it were reasonably similar to the subject property?

The types of adjustments may include typically include, at least the following, and several more as mentioned above.

1) Time and season

2) Size
3) Quality
4) Features including lot size
5) Location

There may also be transactional adjustments to a comp price when the financing is unusual or the terms of the sale involved credits to the buyer. For example, the contract price is $900,000 but the seller provided credits to the buyer of 5% of the price for unexpected repairs revealed by inspections. In this case, the adjusted price paid should be $900,000 less 5% or -45,000 for a net price of $855,000. Of course, this presumes the appraiser does research to confirm that the contract price was not actually paid. Instead, a net of $855,000 was paid.

The time adjustment should be made first, after any transactional adjustments to price. Then the size adjustment would typically be next, and together these will bring the adjusted values of the comps much closer.

Time adjustments should be made prior to size or feature adjustments. Time adjustments reflect moving a historic figure to a current figure or the date of the appraisal. Time adjustments are based upon changes in the prices of similar properties from the date of sale until the current date of the appraisal. Prices may have changed because of inflation and or because of changes in the demand or supply conditions within the submarket. Rapid population growth and constrained supply markets can lead to substantial price appreciation even within a year, especially when interest rates seem relatively low. On the other hand, an excess supply resulting from too much building will keep prices below the inflation rate, possibly even negative.

Over the long run real estate values tend to move with inflation, plus or minus some percentage based on the changes in demand or supply in the local market. At the same time, we must recognize that real estate improvements wear out over time and this results in real depreciation. All of these effects should be captured through an examination of the local market price trend data.

Price trends might be identified through repeat sales analysis within the appropriate market, or through the price per square foot of usable space. For example, Exhibit 5-1 below shows the results of finding 5 comps within the appropriate market that have sold recently and then calculating the implied recent price trend.

Exhibit 5-1: Adjusting for Time Using Repeat Sales

Comp	Recent Selling Price	Recent Selling Date	Prior Selling Price	Prior Selling Date	Annual Percentage Change
1	120,000	1 mo. ago	110,000	37 mo. ago	2.94%
2	136,000	2 mo. ago	120,000	50 mo. ago	3.17%
3	124,000	3 mo. ago	106,000	63 mo. ago	3.19%
4	137,000	4 mo. ago	107,000	76 mo. ago	2.08%
5	134,000	6 mo. ago	105,000	102 mo. ago	3.10%
				Average	2.9%

From the above series it looks like the typical price trend in this neighborhood has been a 2.9% annual compounded rate of change, ignoring any improvements, and assuming that real depreciation is similar for the subject property as for the comps. Putting more weight on recent sales an analyst would likely use 3% per year as the appropriate annual adjustment for time. The 3% is prorated for time to handle partial years. For example, a comp selling 6 months ago would be adjusted by adding 1.5% to its selling price.

Another method that does not require repeat sales, but requires a larger sample, would be to use price per square foot trends. For a series of bulk warehouses that all range in size from 300,000 to 500,000 square feet with 28-to-32-foot ceilings in the local market, we observe the following data:

Exhibit 5-2: Price Trends Based on Price Per Square Foot

	Number of Sales	Price Per Sq Ft	Quarterly Trend	Annual Trend
Current Quarter	3	$ 82.00	5.9%	10.4%
One Quarter Ago	4	$ 77.40	2.8%	11.1%
Two Quarters Ago	5	$ 75.30	3.9%	8.2%
Three Quarters Ago	3	$ 72.50	-2.4%	
Four Quarters Ago	7	$ 74.29	6.6%	
Five Quarters Ago	4	$ 69.66	0.1%	
Six Quarters Ago	2	$ 69.60		
		Average	2.8%	9.9%

Based on the above trends, it seems that the appraiser could justify a time adjustment for sales occurring in the past year and a half, by about 10% per year, possibly a touch more based on the recent quarterly sales. This time series method is especially applicable for residential where there are a large number of sales. It is more difficult to apply to warehousing with smaller sales figures, although one might have used a larger geographic market.

Size adjustments are based on units of comparison

Adjust for land

The most common unit of comparison is price per square feet or per square meter in most countries outside the US. Commercial properties may be valued per square foot or value per apartment unit or value per front foot or value per cubic foot of storage space or any combination of such units. The adjustment for size is usually linear so that the time adjusted price is adjusted to answer the question: What would it sell for if it were the same size as the subject property? With a homogenous sample of comps already adjusted for time, size will often explain the next 75% to 85% of the variation in adjusted selling price, thus this is often the single most important adjustment. The following Exhibit 5-3 grid demonstrates this adjustment.

Exhibit 5-3: Size Adjustments

	Time Adjusted Selling Price	Size in Square Ft.	Price/Sq. Ft.	Adjustment	Adjusted Price
Subject		2,350			
Comp #1	489,000	2,050	$238.54	+71,561	560,561
Comp #2	554,000	2,300	$240.87	+12,043	566,043
Comp #3	588,000	2,450	$240.00	-24,000	564,000
Comp #4	515,000	2,150	$239.53	+47,907	562,907

Notice how the adjusted prices are moving closer together from their original sales price. This is what the appraiser wants to see. The closer are the adjusted prices the more confidence the appraiser has that the process was logical, consistent and that there are no hidden value biases from bad measurements or poor-quality data. Quality and feature adjustments should move these adjusted comp prices even closer to one another in a tight cluster.

For single family homes, size adjustments could be based on price per bedroom or price per apartment, but the analyst must be careful not to double count size adjustments. It would not make too much sense to adjust a comp price based on both square feet and the number of bedrooms except on a marginal basis. That is, a 5th bedroom may add some value, but not as much when the extra size has already been accounted for in the square foot adjustment. In such a case the 5th bedroom might be treated as a feature based on the cost of building another wall or two and a door, but little more. Furthermore, if the bedrooms are too small for the market, the extra bedroom may actually take something away in terms of value. Here the analyst must evaluate what the market wants and adjust for size based on observed preferences.

Feature adjustments are based on significant features within either the subject property or the comp that are different from one another. There are at least three approaches that might be used to make feature adjustments. The first method below is a percentage of current cost, based upon how important the feature is to the typical buyers of such property. It requires that the analyst contact contractors and estimate the cost of the single feature. For example, a typical neighborhood fireplace may cost $20,000

new to install when building a similar house. The maximum adjustment will be the cost of the feature in current dollars. To determine the percentage of cost that the appraiser should use in the adjustment process, the appraiser needs to judge how important the feature is to the market of typical buyers in this submarket. A systematic way to judge importance is to ask how many properties of a similar age as the subject property and within the relevant submarket have this feature? The higher the percentage with a given feature the more important the feature and the greater will be the adjustment as a percentage of cost. For example, in the following Exhibit 5-4 we can see that 2nd fireplaces are not that common nor are outdoor in-ground swimming pools, and partial finished basements are rare. A reasonable rule of thumb would be to make the adjustment equal to the percentage of home owners in the neighborhood with this feature times the actual current cost, at least as a starting point.

Exhibit 5-4: Feature Adjustments

	Adjusted Price after time and size	Finished partial basement costs $25,000	2nd fireplace costs $20,000	Small In ground pool costs $25,000	Adjustment for the one feature that differs from the subject property	Newly adjusted price
Subject		Yes	No	Yes		
Percentage with this feature		10%	30%	15%		
Comp #1	560,561	Yes	No	No	None	560,561
Comp #2	566,043	Yes	**Yes**	No	-6,000	560,043
Comp #3	564,000	Yes	No	**Yes**	-4,500	559,500
Comp #4	562,907	**No**	No	No	+2,500	565,407

Adjusting Comp Feature Differences Using Paired Feature Comparisons

A better method then using the percentage of cost is to determine the value of a feature based on paired sales analysis. The problem with this method is that it can be very difficult to isolate the effect of the single feature unless it is the only difference separating it from another comp. Paired sales analysis techniques can be used for feature, location, quality or age and the size of features like the lot or garage or number of bedrooms. This technique is demonstrated below the quality, location, and financing discussion.

Quality adjustments relate to the condition of the improvements. For example, a home with floors finished in higher quality, marble rather than in laid wood or in laid wood rather than carpet or carpet rather than vinyl tiles. A home with granite kitchen counters is likely better quality overall than a home with marble or some artificial material and such quality differences require an adjustment in the price of the comp. Quality adjustments are also required for significant differences in the age of the comp versus the subject property. New property generally commands a premium in the market of 1% to 2% over resales simply because of the “new” condition and the fact that the buyers were able to select much of the finishing (paint, carpet colors, décor) details. So, if one comp were “new” and the subject property was a resale, if would not be a mistake to subtract 1 to 2% from the new comp in order to estimate what it would sell for if it were similar to the subject property. Quality adjustments are difficult and subjective and should not involve more then 10% of the adjusted selling price. Otherwise, the comp is simply not

valid for market value evidence. Quality adjustments are often made last if at all. These will be demonstrated below.

Location and views may require adjustments. Similar to quality adjustments views and lot size may result in different values. Ideally a paired sales analysis is used to make such adjustments. In some cases it may be possible to aggregate data and look at the relationship between price and a single variable. For example, the following data is based on a lakefront view in a homogeneous condominium development. Adjusting for differences in views based on the percentage of total price may be possible with such analysis. An index of the floor value is shown in Exhibit 5-5 relative to the average floor value for the entire building with or without a lake view or a city view.

Exhibit 5-5: View and Floor Level Adjustments

Floor Number	Lake view Average Sales price per square foot	Index of the lake view floor value	City view Average Sales price per square foot	Index of the city view floor value
Bottom floor	$440	1.16	$440	1.26
Floors 1-5	$320	0.842	$320	0.914
Floors 6-10	$320	0.842	$320	0.914
Floors 11-15	$320	0.842	$320	0.914
Floors 16-20	$340	0.895	$320	0.914
Floors 21-25	$376	0.989	$320	0.914
Floors 26-30	$440	1.16	$360	1.03
Above 30-40	$500	1.32	$460	1.31
Top floor (penthouse)	$640	1.68	$600	1.71
Average	$380	1	$350	1

Notice that the bottom floor appeals to some buyers, perhaps those with a fear of fire and being trapped. The top floor also commands a significant premium independent of whether it is the number 40 floor or simply the penthouse. This could be the value of having no noise from above and or simply vanity value where the buyer can say “I live on the top” or “I live in the Penthouse”. In any case, the appraiser needs to be aware of these value differences and make adjustments to reflect the subject property circumstances.

Simple Example of the Market Approach Using Paired Sales Analysis

To gain some further understanding of the paired sales analysis technique as used in the market comparison approach, it will be useful to walk through a simplified example valuation. Exhibit 5-6 presents such an example valuation of a single-family home.

In this example the appraiser has identified four factors or criteria that could influence the market value of houses like the subject house. Other features will be assumed to be similar among the subject property and comparable sales. These are:

- Date of the transaction
- Age of the house
- Number of bedrooms in the house
- Size of the garage

The appraiser has also obtained information on six recently completed sales of homes similar to the subject house in the same neighborhood. In theory, the greater the number of comparable sales transactions the better will be the statistical support for the value conclusion. However, in practice as one expands the pool of comparable sales one must "reach" farther afield, looking farther back in time or to properties that are less and less comparable to the subject so six is not a bad number. Typical appraisers like to use between five and ten good comps in narrative reports, and never less than three even on form reports, although the minimum number of comps is generally considered three.

For each of the comparable sales transaction or comp, the appraiser has found out not only what the consummated sales price was, but also the characteristics of each of the houses and transactions according to the four factors listed above. The six comps have been selected by the appraiser so that they present sales that can be paired for comparisons which allow the isolation of the effect of each of the four value-influencing factors noted above.

The appraiser arranges all this market information in the "market data grid" shown in Exhibit 5-7. The grid allows a ready comparison of the subject house to each of the similar properties that recently transacted and for which we know the transaction price. The subject house is a 5-year-old, 3-bedroom house with a 1-car garage. The comps vary in these characteristics, and their transactions took place at different times. Of the six comparable sales, one took place very recently, and so is classified as being "current" as far as the date of the transaction. The other five comps took place at times varying from three months to one year ago. The six comps also vary in age from 5-years to 15-years, and they have either 3 or 4 bedrooms and garages for either 1 or 2 cars. The transaction prices ranged from $103,000 for comp #2 to $133,000 for comp #3.

Exhibit 5-7: Sales Comparison Approach, Market Data Grid

	Subject	Sale 1	Sale 2	Sale 3	Sale 4	Sale 5	Sale 6
Price		$1,230,000	$1,030,000	$1,330,000	$1,230,500	$1,050,000	$1,035,000
Date	Current	Current	6 mo ago	1 yr ago	3 mo ago	6 mo ago	3 mo ago
Age	5 yrs old	10 yrs old	10 yrs old	10 yrs old	15 yrs old	5 yrs old	15 yrs old
Size	3 BR	4 BR	3 BR	4 BR	4 BR	3 BR	3 BR
Garage	1-Car	2-Car	1-Car	2-Car	2-Car	1-Car	2-Car

The classic method of accomplishing such a sophisticated sales comparison valuation is to apply the "comparative analysis" or "paired data set analysis" approach in order to adjust the prices of each of the comps to account for the differences between it and the subject property. Such analysis is traditionally accomplished and presented through the use of a market analysis "grid", or chart listing the subject property and comps along one dimension, and their value-influencing or price-influencing factors along the other dimension. The cells in the matrix show the value of each comp regarding each factor, and the corresponding price adjustments. An example of such a market adjustment grid is shown in Exhibit 5-8. Here, the prices of the comps are adjusted using a pair wise comparison for each characteristic that affects value.

Exhibit 5-8: Sales Comparison Approach, Comparative Analysis Adjustment Example

	Subject	Sale 1	Sale 2	Sale 3	Sale 4	Sale 5	Sale 6
Price	?	$1,230,000	$1,030,000	$1,330,000	$1,235,000	$1,050,000	$1,035,000
Date	Current	Current	6 mo ago	1 yr ago	3 mo ago	6 mo ago	3 mo ago
Adjustment	#3 v #1	0	-$50,000	-$100,000	-$25,000	-$50,000	-$25,000
Adjusted Price		$1,230,000	$980,000	$1,230,000	$1,210,000	$1,000,000	$1,010,000
Age	5 yrs old	10yrs old	10 yrs old	10 yrs old	15 yrs old	5 yrs old	15 yrs old
Adjustment	#4 v #1,3	20,000	20,000	20,000	40,000	0	40,000
Adjusted Price		$1,250,000	$1,000,000	$1,250,000	$1,250,000	$1,000,000	$1,050,000
Size	3 BR	4 BR	3 BR	4 BR	4 BR	3 BR	3 BR
Adjustment	#6 v #1,3,4	-200000	0	-200000	-200000	0	0
Adjusted Price		$1,050,000	$1,000,000	$1,050,000	$1,050,000	$1,000,000	$1,050,000
Garage	1-Car	2-Car	1-Car	2-Car	2-Car	1-Car	2-Car
Adjustment	#2, 5v #1,3,4,6	-50000	0	-50000	-50000	0	-50000
Adjusted Price		$1,000,000	$1,000,000	$1,000,000	$1,000,000	$1,000,000	$1,000,000
Net Adjustment		-230,000	-30,000	-330,000	-235,000	-50,000	-35,000

Gross Adjustment		270,000	70,000	370,000	315,000	50,000	115,000
Value Indication	$1,000,000						

Value Indication: $1,000,000

Note that it is rare in real life to have all the adjusted comps come out at exactly the same value but this is to show an idealistic result after analysis.

Explanation of Adjustments: Consider first the effect of the date of the transaction. As the real estate market changes over time market values change. Market values may have risen or fallen or remained the same since the time of the past transactions in the grid. In this case we note that comps #1 and #3 are identical in all four of the characteristics that affect value except the date of sale. Comp #1 is current, whereas comp #3 took place one year ago. Comp #1 sold for $1,230,000 whereas comp #3 sold for $1,330,000. Thus, based on the paired data set analysis procedure we can apparently attribute this $100,000 difference in price to the date of the sale. The market for this type of house has been declining at the rate of $100,000 per year. On this basis we adjust the prices of the comps to reflect this effect. Comp #3's price is adjusted down by $100,000 to make it reflect the current market rather than the (apparently stronger) market of a year ago, when it sold. On this basis comps #2 and #5 are adjusted down by only $50,000, as they sold only a half-year ago, and comps #4 and #6 are adjusted down by $25,000 to reflect their sales dates one-quarter year prior to the present.

Note that in the comparative analysis grid the comps prices are always adjusted toward the subject property, never the other way around. The adjustment process is necessarily rather crude and simplistic. There will not always be pairs of sales that are exactly identical on all the important dimensions except one. More typically the appraiser will have to use subjective judgment, and trial and error, to make the necessary adjustments. In this example, however, to illustrate the concept of the paired data set comparison, the value indication from the comparable sales data is very clear.

Using Linear Programming to Make Grid Adjustments

The appraiser might consider several passes at the adjustments such that the final adjusted sales prices of the comps are fairly close using similar size and feature adjustments. When solving for several features, one approach is to use linear programming. This can be done with the Solver function in Excel. The objective function is to minimize the difference between all adjusted comps. I would average them together and then minimize the difference between the adjusted comps and this average. I would allow solver to make the adjustment that achieves this result on age, size, and each feature. I might also consider inserting minimum and maximum values for each adjustment such that negative feature values are not allowed, unless this is a reasonable result for such a feature. This range will require some judgement by the appraiser or external analysis. The result of using solver is that we might get a better overall result, with the adjusted sales prices closer together, as they should be. The technique requires some experience with solver.

Automated Valuation Models (AVMs) Using Grid Emulation

Automated valuation is possible with a combination of regression techniques and linear programming, whereby a system code is written to emulate the behavior and adjustments of the appraiser. Such an approach is highly transparent as the reviewer can see exactly the process by which value is derived. It is subject to flaws without expert application. Typically, adjustments come from regression coefficients generated by running a large sample of nearby properties, with some tweaks using linear programming to minimize dispersion on adjusted prices, so some experience with regression is appropriate to deal with correlation among all adjustment features including size and age. If two variables measure the same thing and both are in the same model trying to solve for price, then the coefficients should only be used in a grid that considers the same variables. For example, if you include square feet of living area in a model, but not bedrooms you will get a higher regression coefficient then if you did include bedrooms as well. When you include bedrooms and size, then you have another proxy for size and the regression coefficient will only calculate the marginal effect on price, not the total effect. If you only had bedrooms or only had square feet of living area, then you would not have this over lapping proxy effect. Care must be taken not to include two variables with such high correlation as to measure the same impact on value. One more example, may be property condition and age. If you make adjustments for both variables, separately, you may be double counting the effect of quality on price. Hybrid models that start with a suggested computer application solution, tweaked by an experienced appraiser, are likely in the future, allowing more efficient appraisal output and higher income for appraisers. At the same time, we will need fewer appraisers with greater output from a smaller set of professionals.

Consistent and Supportable Grid Adjustments for Residential Property

For the purist, we might ask what a comp would sell for, if it were identical to the subject property, but there are endless subtleties that could affect the price of any given property and we will always miss some of these nuances, known in statistics as omitted variables. Omitted variables are factors the appraiser does not observe or chooses to ignore based on the insignificant influence on value. In theory, omitted variables do not bias an appraisal if they affect the properly symmetrically, that is, balanced in terms of both positive and negative effects. Again, one way to determine if the adjustments are consistent is to look at the adjusted values of the comps. The closer they are to the same figure the more likely we nailed the adjustment process. Yet, there will always be dispersion because all properties can sell over a range of prices, not a single point and no two buyers or sellers will derive exactly the same estimate of value in their own mind. More unique property will be more difficult to pinpoint in terms of market value estimates.

Reconciliation of Market Value Evidence

After adjusting the comps and deriving the indications of value for the subject property the appraiser needs to weigh the evidence and derive a final conclusion of value. In placing more weight on some comps and less on others the appraiser is suggesting more or less comparability. If there are only three comps any weight more than 50% then the conclusion places unreasonable reliance on one comp. Any weight less than 10% means the comp is not a valid comp. So, for only three comps we should see weights of 10% to 50% on each where the sum is 100%. Where there are more than three comps, as is highly desirable, there should be an even lower maximum weight on the adjusted prices, in order to properly include the full spectrum of market indications of value.

A simple grid Exhibit 5-9 illustrates this process of deriving a final value conclusion.

Exhibit 5-9: Reconciliation of Adjusted Market Prices for Micro-Condomimums

	Adjusted Sales Prices	Quality of Comp	Weight
Comp #1	$240,364	Fantastic	40%
Comp #2	$244,617	Great	25%
Comp #3	$244,801	Good	20%
Comp #4	$244,600	Fair	15%
Indicated Value	$242,950 say $243,000		

Different appraisers may have put different weight on each comp with a slightly different conclusion. There is no way to avoid this judgment process with the result that different opinions of value sometimes end up in court battles.

Conclusions

The sales comparison approach to value requires a fair amount of statistical expertise and judgment to do well. Compilating data and sampling is the first step in the process, and there is always a trade off in terms of going back further in time withing a narrowly defined geographic area (the geographic market) or broadening out geographically and not going back in time as far. A similarity score of the comp with the subject property can be developed in order to rank comparability. This is simply a matter of considering some distance measures of time of sale, age, size, features and weighing them to generate a score of comparability.

While three comparable sales are considered the minimum, several comparable sales are appropriate when possible and as many as thirty would not be unreasonable. More than thirty sales are required to generate reliable price trends over time so that sales comp prices can be adjusted to the current time, if that is the date of the appraisal. If an appraisal is back dated, one might use some sales data after the sale, unless it is part of a legal dispute over what an appraiser did, and in that case, one should only use the same information as was available to the appraiser without post date data.

The adjustment process starts with time adjustments, then size, then features including location as one possible feature adjustment. There are several methods to derive adjustments including pairs sales, regression coefficients, or the percentage of owners that have such a feature and the cost new less some wear and tear adjustment. Adjustments to selling prices is an iterative process whereby one wants to observe several comps when fully adjusted at very similar values.