

Chapter 486

Comparables – Sales Price (Old Version)

Introduction

Appraisers often estimate the market value (current sales price) of a *subject* property from a group of *comparable* properties that have recently sold. Since sales data are considered the best evidence of market value, this is the preferred approach to market value estimation when sales data are available. This topic is discussed in detail in Eckert (1990) and we refer you to that text for more details.

This module allows you to select an appropriate subset of your sales database, such as properties in the same area of similar age and size and specify a set of adjustment variables and their corresponding weights and adjustment values. The selected data are scanned to determine those properties (rows of the database) that are most comparable to the subject property. These comparable properties are then used to create an estimate of the market value (sales price) of the subject property.

Technical Details

The market value of subject property is estimated by adjusting the sales prices of comparable properties so that their attributes match those of the subject property. This adjustment may be a dollar amount, such as \$50 per square foot, or a percentage, such as 1.5% decrease for each year since the property was constructed.

This sales comparison method has three general phases:

1. Select a pool of possible properties from a database of recent sales.
2. Rank these properties according to how close they are to the subject property.
3. Adjust the comparable properties so that their attributes match the subject property.

Phase I – Data Selection

The first step is to select a group of properties to work with from the database of sales data. Usually, this step involves selecting properties of similar age, size, and location. The program limits the search for comparables to properties that meet these selection criteria.

We cannot stress too much the importance of finding comparables that are as similar as possible to the subject. This greatly reduces the need for making many (sometimes controversial) adjustments to the sales prices.

Phase 2 – Rank the Properties

A distance measure is used to quantify how close each comparable property is to the subject property. Suppose there are K attributes X_1, X_2, \dots, X_k on which the distance is to be measured. The value of the i^{th} attribute on the j^{th} comparable property is represented by X_{ij} . The distance between the j^{th} comparable property and the subject property is calculated using the Euclidean Distance formula:

$$D_j = \sqrt{\frac{1}{K} \sum_{i=1}^K w_i \frac{(X_{ij} - X_{is})^2}{S_i}}$$

where S_i is the standard deviation of the X_{ij} for a particular attribute and w_i is an attribute importance weight scaled so that they sum to one.

This formula reduces all variables to unit-less index values by dividing each by its standard deviation. This allows us to combine the number of bedrooms (a small number) with the number of square feet (a relatively large number) in one formula. The differences are squared to put negative and positive values on an equal basis.

Note that if all attributes match, the distance will be zero. Typical values will be between zero and five.

Once these distances are calculated, they are sorted from lowest to highest. The properties with the smallest distances are closest to the subject property.

Phase 3 – Adjusting the Sales Price

Finally, an adjusted sales price is computed for each comparable. The magnitude of the adjustment depends on how well the property matches the subject property. There are three steps in this adjustment process:

Step 1 – Sales date adjustment

The sales price of each comparable property is first adjusted to a specified point in time using a monthly percentage adjustment.

For example, suppose the percentage adjustment is set at 0.2% per month, a comparable property sold for \$100,000 in August of 1998, and the property as to be adjusted to August of 2000. The time adjusted sales price would be calculated as:

$$\$100,000(1 + 0.002(24)) = \$104,800$$

Step 2 – Dollar and percentage adjustments

The sales price of each comparable property is next adjusted for differences in other attributes. The adjustments are either dollar (lump sum) or percentage adjustments. The adjustments are made in the same order that they are specified. Hence, if you want to make the percentage adjustments first, you should specify them first.

As an example of a dollar adjustment, suppose that a comparable property has 2,500 square feet while the subject property has 3,000 square feet. Obviously, the value of the comparable property must be adjusted up. The appraiser must set a dollar amount of adjustment for each unit difference. In this example, suppose the appraiser decides to add \$50 per square foot. Since the difference in size is 500 square feet, \$25,000 ($\50×500) is added to the sales price of the comparable property.

As an example of a percentage adjustment, suppose that a comparable property has a quality rating of one while the subject property has a quality rating of three. Obviously, the value of the comparable property must be adjusted up so that it is on par with the subject property. The appraiser must set a percentage adjustment for each unit difference. In this example, suppose the appraiser decides to increase the property value by 2% per one unit difference in quality. Since the difference in quality is two units, the current adjusted sales price is multiplied by 1.04.

Step 3 – Estimate the sales price

Once the adjusted sales prices of the comparables have been calculated, the sales price of the subject property can be calculated. NCSS can calculate four different estimates:

1. **Closest.** The adjusted sales price of the closest comparable (using the Euclidean distance) is used as the estimate of the subject sales price.
2. **Least Absolute Dollar Change.** The adjusted sales price of the property that had the least amount of adjustments in absolute dollar amounts is used as the estimate of the subject sales price.
3. **Simple Average.** The average adjusted sales price of the closest four or five properties is used as the estimate of the subject sales price. It is hoped that averaging will help remove the influence of any anomalies that might occur with a single sale.
4. **Weighted Average.** A weighted average of the adjusted sales price of the closest four or five properties is used to estimate the subject sales price. The weights are based on the distances between the subject property and comparable property. Specifically, the weights are calculated using the formula:

$$W_j = 100 \left(\frac{5 - D_j}{5} \right)$$

with negative weights being reset to zero.

Data Structure

Each column of the spreadsheet (database) represents a variable and each row represents a property. The selection variables can be text or numeric, but the sales adjustment variables must be numeric. You must include a sales price variable and at least one adjustment variable.

Comparables is an example of such a dataset. This dataset contains fifty-one rows, of which only a few are displayed here. There are also other variables that are not displayed here.

Note that the sales date is in the format YYYYMM. Also, the indicator variable, Subject, at the right-side of the database indicates which rows are to be treated as subjects (no-blank) or as comparables (blank).

Comparables Dataset (Subset)

PropID	Neighborhood	SalePrice	SaleDate	SqFt	LotSize	Subjects
A-1	AAA	71589	199801	1165	4670	
A-2	AAA	50535	199907	735	3805	
A-3	AAA	134644	199902	2488	5249	
A-4	AAA	156865	199903	3149	4394	
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.
Subject1			199906	965	5502	1

Example 1 – Comparables Study

This section presents a tutorial of a comparables study conducted on the Comparables dataset. The appraiser limits the analysis to those properties in neighborhood 'AAA' that were constructed from 1970 to 1980.

Setup

To run this example, complete the following steps:

1 Open the Comparables example dataset

- From the File menu of the NCSS Data window, select **Open Example Data**.
- Select **Comparables** and click **OK**.

2 Specify the Comparables – Sales Price (Old Version) procedure options

- Find and open the **Comparables – Sales Price (Old Version)** procedure using the menus or the Procedure Navigator.
- The settings for this example are listed below and are stored in the **Example 1** settings file. To load these settings to the procedure window, click **Open Example Settings File** in the Help Center or File menu.

Selection Tab

Indicator Variable.....	Subjects
Report Variables.....	YearSold
Label Variable.....	PropID
Selection Variable 1.....	Neighborhood
Selection Range	AAA
Selection Variable 2.....	YearBuilt
Selection Range	1970 to 1980

Adjustment Tab

Adjustment Variable 1.....	Quality
Distance Weight.....	1
Amount (\$ or %).....	3%
Adjustment Variable 2.....	Sqft
Distance Weight.....	4
Amount (\$ or %).....	\$50
Adjustment Variable 3.....	LotSize
Distance Weight.....	2
Amount (\$ or %).....	\$5
Adjustment Variable 4.....	Bedrooms
Distance Weight.....	1
Amount (\$ or %).....	\$400

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Sale Date Variable.....SaleDate
Date Format.....YYYYMM
Date Adjustment.....0.01
Current Date.....1999-10

Reports Tab
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Distance Report.....Checked
Comparables Report.....Checked
Settings Report.....Checked
Show Dollar Signs.....Unchecked
Show Commas in Dollars.....Unchecked
Show Column Separator = |.....Checked
Estimation Method.....Weighted Average
Per Distance Report.....10
Per Comparables Report.....8
Per Page.....4
Used in Averages.....5
Dollars.....0
Distances.....3
Percents.....0
Means.....1
    
```

3 Run the procedure

- Click the **Run** button to perform the calculations and generate the output.

Settings Report

Settings Report for Subject = Subject1

Selection: **Selection**
Variables: **Criterion**
 Neighborhood: AAA
 YearBuilt: 1970 to 1980

Adjustment Variables	Adjustment Value	Weight	Mean	Standard Deviation	COV
SaleDate	1%				
Quality	3%	1	2.2	0.7	33
SqFt	\$50	4	1869.2	1001.3	54
LotSize	\$5	2	5018.2	1153.3	23
Bedrooms	\$400	1	2.5	1.2	47

Of the 50 properties on the dataset, 1 was a subject property and 37 were excluded by the selection variable(s), leaving 12 comparables for consideration.

This report gives the settings you used to create the report. It is provided to let you document how the options were set. It also supplies summary statistics about the adjustment variables used in the analysis. The Mean, Standard Deviation, and Coefficient of Variation are computed on the [rows selected for analysis](#).

Distance Report

Distance Report for Subject = Subject1

PropID	Distance	SalePrice	Quality	SqFt	LotSize	Bedrooms
Subject1			2	965	5502	2
A-14	0.240	88474	2	1309	6484	2
A-8	0.394	78728	2	1181	5350	4
A-1	0.484	71589	1	1165	4670	1
A-2	0.568	50535	2	735	3805	2
A-9	0.579	95660	1	1653	5715	1
A-10	0.597	50902	2	779	3745	2
A-15	1.083	60007	3	963	3506	3
A-3	1.503	134644	3	2488	5249	3
A-7	1.765	127109	3	2419	4086	3
A-13	2.866	168715	2	3202	6720	1

This report displays the values of the adjustment variables for the comparable properties that met the selection criterion. Note that the subject property is displayed first.

Distance

This value is the Euclidean distance, D , between the subject property and the comparable property. Values near zero are close. Values near five are very different.

Comparative Sales Price Report

Comparative Sales Price Adjustment Report for Subject = Subject1

PropID	Subject1 Value	A-14 Value	\$Adj	A-8 Value	\$Adj	A-1 Value	\$Adj	A-2 Value	\$Adj
YearSold		1997		1996		1995		1996	
Comparability		92%		87%		84%		81%	
SalePrice		88474	6193	78728	3149	71589	15034	50535	1516
Quality	2	2	0	2	0	1	2599	2	0
SqFt	965	1309	-17200	1181	-10800	1165	-10000	735	11500
LotSize	5502	6484	-4910	5350	760	4670	4160	3805	8485
Bedrooms	2	2	0	4	-800	1	400	2	0
Net \$Adj.			-15917		-7691		12192		21501
Sum \$Adj.			22110		12360		17159		19985
Adj Sales Price	73197		72557		71037		83781		72036

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Comparative Sales Price Adjustment Report for Subject = Subject1 (Continued)

PropID	Subject1 Value	A-9 Value	\$Adj	A-10 Value	\$Adj	A-15 Value	\$Adj	A-3 Value	\$Adj
YearSold		1995		1996		1997		1994	
Comparability		81%		80%		64%		50%	
SalePrice		95660	2870	50902	2036	60007	3000	134644	10772
Quality	2	1	2956	2	0	3	-1890	3	-4362
SqFt	965	1653	-34400	779	9300	963	100	2488	-76150
LotSize	5502	5715	-1065	3745	8785	3506	9980	5249	1265
Bedrooms	2	1	400	2	0	3	-400	3	-400
Net \$Adj.			-29239		20121		10790		-68876
Sum \$Adj.			38821		18085		12370		82177
Adj Sales Price	73197		66421		71023		70797		65768

This report displays the values of the adjustment variables for the comparable properties that met the selection criterion. Note that the subject property is displayed first.

Comparability

This is an index that shows how close the comparable is to the subject. It is computed using the formula:

$$W_j = 100 \left(\frac{5 - D_j}{5} \right)$$

When the value is negative, it is reset to zero.

This value is used to compute the weighted average estimate of the sales price.

Net \$Adj

This row gives the net change in the price between the original sales price and the final adjusted sales price.

Sum |\$Adj.|

This row totals the absolute values of the dollar adjustments that are made. It is sometimes used as an indicator of how close the comparable is to the subject property. Unfortunately, its value depends on the order in which the variables are specified.

Adj Sales Price

The adjusted sales price is given in this row. The first column provides the estimated sales price of the subject property.