# IMPROVING REAL ESTATE MARKET RESEARCH

*Real estate researchers and practitioners need to engage in an exchange that trades market research techniques from academia for data from industry.*

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Real estate market research is a broad term by definition. To the appraiser market research is to identify appropriate comparables for valuation purposes. To the real estate counselor, real estate market research is to be concerned with demand, supply and price or rental rates. To the academic researcher real estate market research is quantitative analysis of demand and supply factors which culminate in an econometric model of the market being studied.

Because of the numerous connotations of the term real estate market research, for purposes of this article it is defined as the study of the economic structure and performance of real estate markets, including the development of theoretical and empirical frameworks or models that facilitate the understanding of how markets work as total systems. To accomplish this, one must understand demand and supply fluctuations and how they jointly determine price and rental rates and the driving forces behind demand and supply and how these forces have behaved historically.

To this definition, we can add that the goals of real estate market research are to understand how markets react to changes in exogenous variables and to forecast market movements with a reasonable degree of success. Understanding market reactions and forecasting likely future movements are the *raison d'etre* of real estate market research.

## Types of Models

We can classify empirical models of real estate markets into two basic types: econometric and judgmental. Real estate market research requires the development and application of both types of models.

### *Econometric Models*

Econometric models can be powerful analytical tools, but they are extremely data hungry. To develop a properly specified econometric model, one must have a sufficient amount of high-quality data. However, the availability of data is a primary binding constraint to the real estate market researcher. Since most real estate is privately owned, information about its performance is difficult to obtain. In research oriented toward evaluating the performance of properties for investment purposes, a classic data problem is that of appraisal-based versus market transaction measures of performance. Problems such as this often are compounded by limited

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time series or cross-section sample sizes, which call for special approaches, such as Bayesian techniques.

Of course, there is danger in building *ad hoc* econometric models that do not have adequate theory behind them. Lack of adequate data can cause variables to be misstated or omitted from *ad hoc* econometric models. Misstated or omitted variables can reduce the value of econometric models in helping to understand and forecast real estate markets. It also is difficult to forecast with econometric models because relationships among variables may change due to fundamental factors that have not been captured fully in the model.

Many econometric models of real estate markets do not employ simultaneous equations that incorporate a price or rent variable because accurate price or rent data are difficult to obtain in sufficient quantity and quality. Despite these pitfalls, econometric models can be useful for quantifying relationships among variables, e.g., office space absorption as a function of employment, population, etc.

*Judgmental Models*

The judgmental model is a less elegant but nonetheless useful alternative to the econometric model. The term judgmental has been applied to the class of models that are based on the analyst's judgment of the quantitative relationship among variables rather than on statistical estimation of relationships. Most often, judgmental models operate within a spreadsheet environment.

For example, the office judgmental model is a simple, step-by-step approach for translating employment forecasts into forecasts for the demand for office space based on employment and space parameters. A judgmental model of demand for office space usually begins with a forecast for employment by industry. To derive the demand for office space, the employment forecast is adjusted according to the percent of office workers within each Standard Industrial Classification (SIC) code, the amount of office space per worker and other parameters.

Similarly, a judgmental model of demand for residential space usually starts with a forecast of the number of households in the region under consideration. The number of households is adjusted to account for several parameters, including owner/renter split, price/income ratio, etc. The end result is a quantitative estimate of the demand for new housing units, given anticipated growth in the number of households and their behavior regarding the demand for housing.

The judgmental model allows the analyst to impose his judgment interactively on the model. If, for example, the analyst believes that the parameters are likely to change in the future, then he can easily change the parameters within the spreadsheet environment. The judgmental model also is intuitive for the layman.

However, judgmental models can be data hungry as well. For example, to derive the best estimates of space per worker in an office judgmental model, large amounts of data specific to SIC code and location often are required.

*Hybrid Models*

Occasionally, hybrid judgmental/econometric models are developed for real estate market analysis. Most often, these hybrid models are judgmental in nature but use some parameters that have been estimated econometrically. This type of hybrid often produces a useful model that can be applied by a broad audience, however, it can be extremely data hungry.

*Interpretation*

Whatever type of model is chosen for real estate market analysis, care must be taken when interpreting the results it yields. Industry practitioners and academic researchers alike are skeptical of the analyst who simply cranks through his model and derives a point estimate for a real estate market. Industry practitioners may not understand what is inside the black box, but they know that point forecasts often are wrong, and they liken the practice of forecasting to gazing into a crystal ball. Academic researchers, who understand the workings of the black box, also realize that the probability of a particular point forecast being 100% accurate is quite low.

This by no means implies that market forecasts and analyses using sophisticated models are fruitless exercises. Models should be used in the appropriate context of performing alternative scenario analyses that aim to reduce risk and uncertainty from future market movements. The academic researcher and model-builder knows that the forecast of the dependent variable is only as good as the forecast of the independent variables, which is comprised by the accuracy of the model being used. The model-builder's job therefore is to develop the best possible model for expressing the relationship between the independent variables and the dependent variable (e.g., demand for retail space as a function of population, employment, disposable income, etc.).

A properly specified model then can be used to perform alternative scenario analysis. One can develop the base case forecast from the best available forecast of the independent variables. Because independent variables, such as population and employment, are difficult to forecast with a high degree of accuracy, the next step is to develop a high and a low scenario. A high scenario demonstrates the demand for retail space, given higher than expected growth in population, employment and disposable income. A low scenario shows the likely effect of low growth in these independent variables on the demand for retail space. These analyses establish boundaries around the likely future performance of the market, so the decision-maker can see the likely future movements in the market under a variety of scenarios. These analyses reduce risk and uncertainty on the part of the decision-maker and provide valuable information for the model-builder and market analyst. The layperson or industry practitioner does not usually have the tools necessary to do this type of analysis;

development of such tools therefore can be of great benefit to the decision-maker.

## Submarket Analysis

One of the major drawbacks to the econometric and judgmental models, and indeed to most market analysis techniques, is the difficulty of obtaining, for modeling purposes, adequate data at the subcounty level on critical variables such as employment, population and income. The decennial national census data are available at the block and tract level, but interpolations of the data at the subcounty level by demographic companies usually leave something to be desired. Occasionally, organizations such as local planning agencies estimate population, employment, etc., by census tract between census periods. However, these estimates are not true counts and usually are not made on an annual basis. Some types of real estate data also are not available by subcounty areas.

The problems created by lack of subcounty data and analyses are well known. For example, if one is analyzing the office market in Chicago and data are available only for Cook County, then the analyst may be working at a much too highly aggregated geographic level. An office building located in the North Loop area may be a good investment opportunity, while one in the South Loop area may not. This kind of geographical detail and differential market performance is masked when the analysis can be conducted only with county-level data. As another example, suppose a pension fund was interested in purchasing office buildings in various metropolitan statistical areas (MSAs) and wanted to know which office markets had performed well in the past and which were likely to perform well in the future. Rather than look at aggregate market analyses for 40 MSAs, the pension fund should look at five or six submarkets within each of the 40 MSAs because the individual submarkets might perform differently.

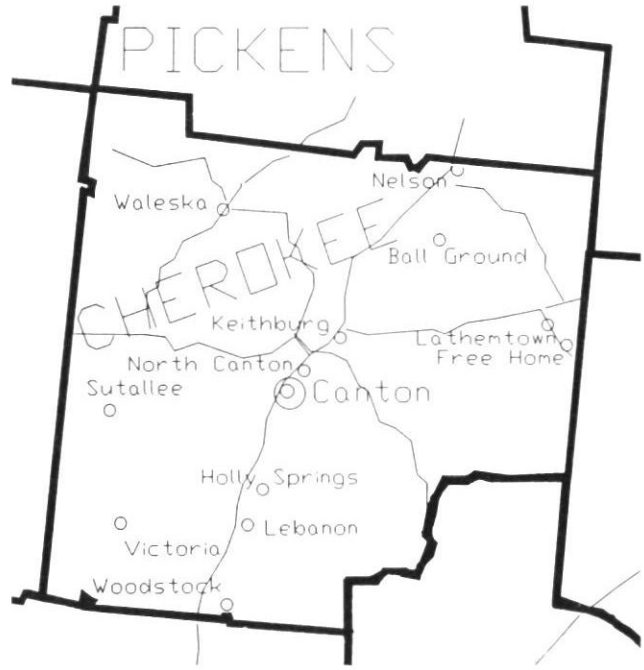
### *Geographic Information Systems*

A new research tool that can facilitate geographically disaggregated real estate market analysis is geographic information systems (GIS). This is a computer-based mapping and data analysis tool that incorporates many layers of data. Usually, the base map for a GIS includes road networks, political boundaries, rivers and other physical features. On top of this base map, one can add population, employment and other socioeconomic and demographic data that have been geocoded down to the zip code or census block level.

Next, one can add specific real estate data, such as parcel level data from the county tax assessors' office or proprietary databases of office, commercial or residential properties. Other overlays such as the availability of developable land, the presence of zoning constraints and the nature of other supply side considerations can be added. One can add as many data overlays as desired. The GIS facilitates the combined and simultaneous analysis of all data layers for any goegraphic area. For example, one can analyze and map the correlation between population and employment growth in terms of wealth measures such as per capita income.

**FIGURE 1**

Computer-Generated Map of Transportation Arteries in Cherokee County

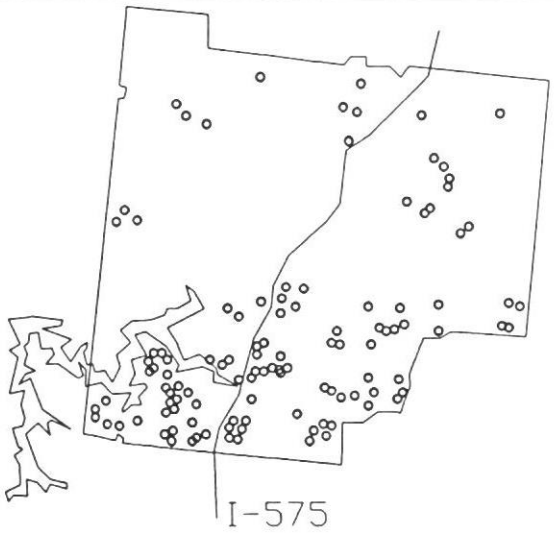



A GIS for residential market analysis in the Atlanta metropolitan area recently was completed. The following discussion describes how GIS was used to analyze the subdivisions in Cherokee County on the northern fringe of Atlanta. Figure 1 is a computer-generated map showing the major transportation arteries and municipalities in Cherokee County. This base map for the Cherokee County GIS was developed using U.S. Census TIGER files, which contain geocoded coordinates for transportation arteries, major political boundaries and physical features such as rivers and lakes. The TIGER files are available on a compact disc for $250 from the U.S. Census Bureau for an entire state. The procedure for entering the TIGER files into a GIS software package is straightforward. Once this data transfer is accomplished, the analyst has a base map of the major transportation arteries and physical features of the area he is analyzing and a geocoded file for matching addresses.

The first set of data overlaid upon the base map of Cherokee County was residential data obtained from DataBook, Inc., a company in Atlanta that collects quarterly subdivision-specific data on the number of housing starts, houses under construction, houses completed and houses occupied (absorption); the presence of amenities (e.g., pool, tennis courts) for each subdivision; and a variety of other variables. Subdivision-specific data for the past 16 quarters were obtained; the location of the subdivision

**FIGURE 2**

Cherokee County Subdivision Locations




was geocoded by writing an algorithm that converted the DataBook map coordinate of the subdivision to a latitude-longitude coordinate; and these data were then entered into a GIS package called GIS-Plus.

Figure 2 is a simple plot of the location of each of the subdivisions within Cherokee County. The lake in the southwest corner of Cherokee County is a major recreational body of water, Lake Allatoona. The plot clearly shows that subdivisions are clustered around the southern portion of the lake and that the preponderance of subdivision development is in the southern portion of the county closest to Atlanta along the I-575 corridor. Few subdivisions have been located in the northern party of the county, which is primarily rural.

Given the geocoded subdivisions within the GIS and the relational database attached to each subdivision, the analyst can make numerous spatial inquiries of the GIS and plot maps showing various features of the subdivisions. For example, if a builder or developer were looking for a good location for a subdivision in a certain price range with a particular amenities package, he could use a spatial query to ask the GIS to map the location of the closest competitors.

Figures 3 through 6 illustrate some of the simple spatial analyses that were accomplished with the Cherokee County GIS. Figure 3 is a contour map that shows variations in platted acres per subdivision. The asterisks on the map represent the locations of individual subdivisions. It is clear from this plot that the platted acres per subdivision are higher in the northern, less developed portion of the county. Figure 4 is a contour map of expected lot size which was derived by dividing platted acres per subdivision by number of lots. Once again, it is very clear that the expected lot sizes are higher in northern Cherokee County. These kinds of plots can be useful in analyzing the overall land use pattern in a county, as well as in helping a builder or developer understand how his project fits into the overall spatial pattern.

**FIGURE 3**

Contour Map of Platted Acres Per Subdivision
(July, 1990)


**FIGURE 4**

Expected Lot Size, Cherokee County
(July, 1990)

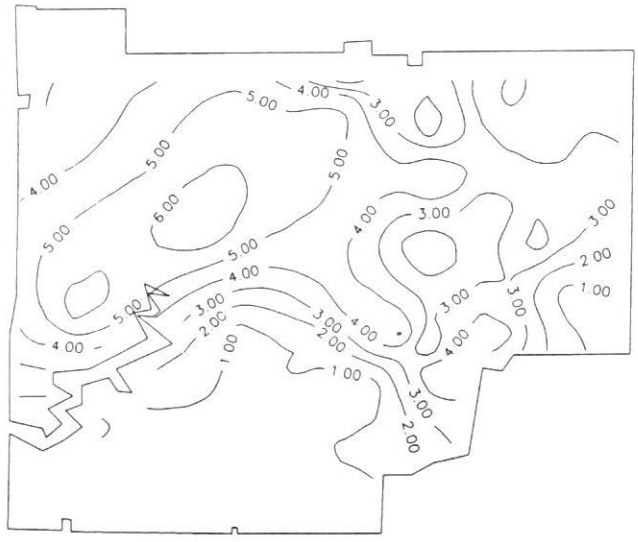


**FIGURE 5**

New Build House Price Spread as % of Highest House Price, Cherokee County (July, 1990)

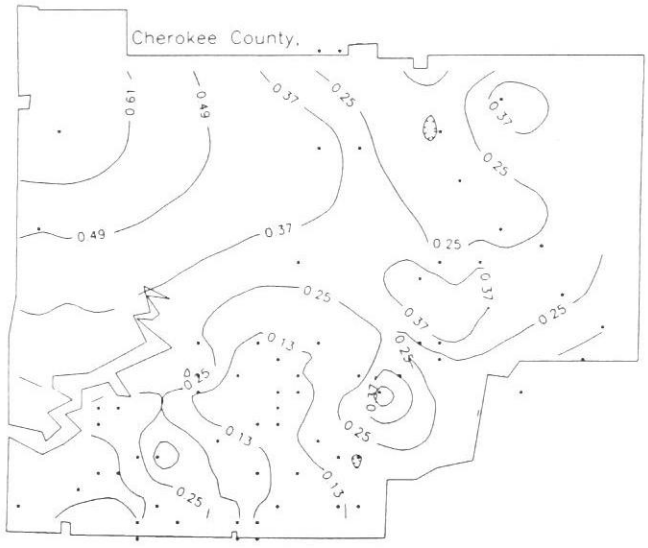



Figure 5 is a contour map of the normalized price spread in each subdivision. Price spread was derived by calculating the difference between the maximum and the minimum house price within each subdivision and dividing that figure by the maximum house price. Figure 5 shows that the average price spread in the subdivisions in the southern part of the county is much lower than the price spread in the northern, much less developed part of the county.

One interpretation of this phenomenon is that, in the more developed southern portion, subdivisions are fairly homogeneous in nature, i.e., the houses are built so they will be fairly close in price. However, in the northern, less developed portion of the county, specialization is more difficult; the subdivisions therefore are developed with a large spread in the price range to serve a thinner market. In other words, because it is more difficult to specialize in the northern portion of the county, subdivisions must include houses with many different price ranges. From the developer's standpoint, a subdivision of houses in different price ranges may be less desirable because the prices of the premium houses will be lowered by the presence of lower priced houses. Because demand is higher and development is greater in the southern part of the county, developers can afford to specialize and build homogeneous subdivisions. This is an untested preliminary hypothesis to explain the spatial price spread phenomenon disclosed in Figure 5.

Figure 6 is a three-dimensional plot of average subdivision price, created using the software package Surfer. Plots such as this can help the builder or developer locate his or her subdivision within an optimal price gradient and help academic researchers understand the gradient.

Using the GIS system for Cherokee County, and ultimately GIS systems for other counties in Atlanta, a real estate researcher can define residential market areas in terms of functional economic areas rather than in relation to political or other boundaries. Simply by drawing lines on the computer screen, one can divide the county into as many market areas as desired. Then, using the relational database with the subdivision-specific data, one can conduct historical analyses of development trends and forecast future development trends.

Figure 7 shows the total number of housing permits issued in the Atlanta 18-county metropolitan area over the past 20 years. Since 1986, the trend in the number of permits (and absorption) clearly has been down. However, there have been many niches of opportunity for builders and developers in the Atlanta housing market during this time period. Figure 8 identifies some of these niches. The niches were spotted by sorting DataBook data by county and price range and querying the GIS to determine which price ranges and which counties had increased the most in absorption over the past several quarters. Of most interest in Figure 8 is that the leading market niches, by price range and location, occur in different counties and in most price ranges. This illustrates the importance of disaggregated submarket analysis. Lenders in Atlanta also are very interested in how research can help them make sound lending decisions which avoid overbuilt situations. Such analysis can be carried further with other dimensions such as amenities, type of house and architectural features incorporated into the analysis.

**FIGURE 6**

Midway Price for New Subdivisions

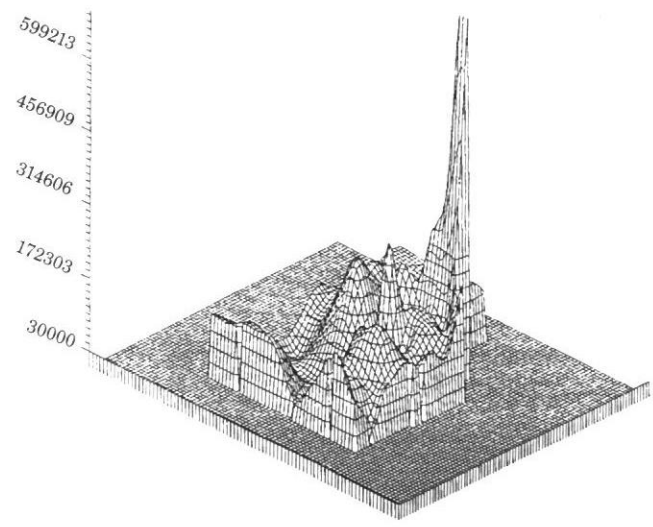
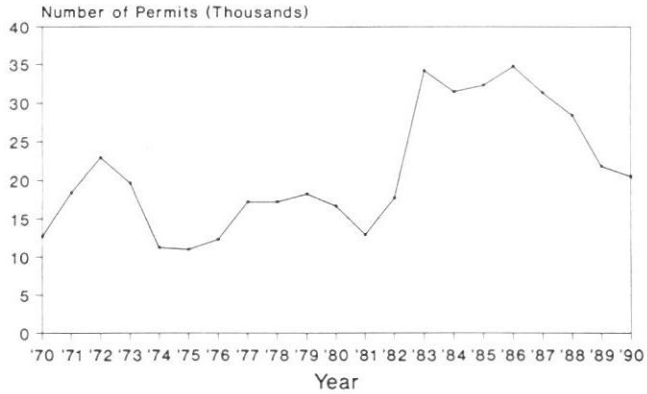


**FIGURE 7**

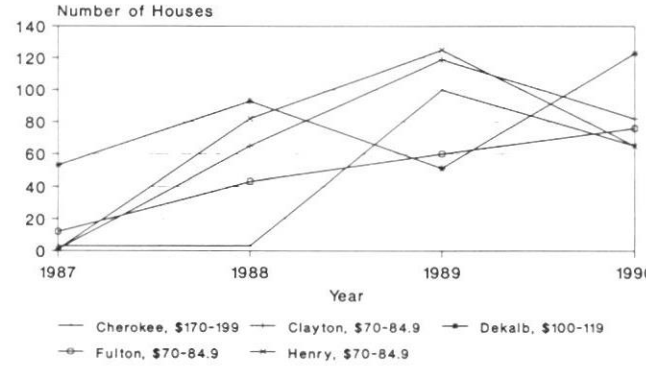
Single Family Building Permits
1970–1990, Atlanta Metro Area




*Source: U.S. Census Bureau*
*Based on 18 County MSA*

**FIGURE 8**

Greatest Absorption Increases
(by Price Range and County)




*Based on ten-county metro area*

Good time series data on population and employment by subcounty area would be very valuable for the Cherokee County GIS. One future area of research is to explore the feasibility of obtaining subcounty data from state and local authorities in the Atlanta area to input into the GIS. Some states already publish employment and other key data by zip code for certain time periods.

## Translating Academic Research To Practical Application

No matter how elegant and rigorous the model or market analysis, the application is severely limited if the translation is not made to the industry practioners' level. At the present time there are compelling reasons to make this translation and bridge the gap between academic research and industry application.

From the academic perspective, there are signs that some business schools (where most academic real estate departments reside) may be recognizing the need to place more emphasis on research that benefits industry practitioners. In the 1950s, the Carnegie Commission issued an unflattering report of business schools, portraying them as nonrigorous institutions that conducted little sophisticated research. Undoubtedly influenced by this, business schools became more research-oriented institutions that emphasized the publication of formal studies in academic journals.

In a more recent report on business schools, Porter and McKibbin (1988) released the survey results of top corporate executives on the relevance of business school research. They noted that the vast majority of CEOs of major corporations believe the research conducted in business schools is irrelevant to them and to their business activities. In other words, the pendulum has swung too far in the other direction over the past two decades, to the point where business school research stresses rigor at the expense of relevance.

From the industry perspective, new regulations mandate that market analysts and appraisers incorporate better market research into their analyses and reports. Therefore, industry practitioners have an increased need for advanced market research techniques and models. Since industry practitioners require more sophisticated analytical techniques and models for market analysis and academic researchers need more data to test and refine their models, the atmosphere is conducive for a fruitful exchange of market analysis for industry data.

Putting more advanced analytical techniques and models into the hands of industry practitioners will significantly improve the level of rigor of real estate market research performed by industry practitioners. For example, industry appraisers often focus narrowly on the micromarket for a particular property and pay only lip service to the larger issues of the local and regional economies and the specific demographic and economic variables driving the demand for and supply of particular types of real estate. More advanced analytical techniques and market models will help appraisers understand the larger picture and improve the valuation process. A leading regional appraisal company in the nation recently established a wholly owned subsidiary that performs sophisticated market research using judgmental and econometric models. The appraisers in this firm are required to submit their work to the inhouse subsidiary for a thorough market analysis and absorption study (if needed) before they give final valuations. In short, one way to help remedy the lack of data available to academic real estate researchers is to assist industry practitioners with their real estate market analysis and research in exchange for data that will improve research models and techniques.

## Summary And Conclusion

Real estate market research often has a different meaning to the industry practitioner and the academic researcher. It is hoped that these differences will diminish as industry practitioners utilize more sophisticated market research techniques and as academic researchers begin to translate their advanced techniques into useful applications for industry. This development will be mutually beneficial; industry practitioners will be able to utilize academic research techniques and models to improve their market analyses and forecasts, and academic researchers will obtain better data to improve their market research techniques.

Real estate market researchers must focus more directly on submarket analyses because submarkets can vary substantially within an MSA or region. It is difficult, however, to analyze markets at the subcounty level because of the paucity of data. GIS is a tool that can help with subcounty analysis and with the quantification analysis of location factors as they influence real estate.

The current environment is fruitful for academia to exchange its advanced market research techniques for databases from industry. Business schools have been criticized for producing research that is irrelevant to industry needs; real estate departments in business schools can help alleviate this situation by developing techniques that can be readily adopted by industry practitioners to improve their market research. On the other hand, industry practitioners are being encouraged to improve their market research techniques. They can help accomplish this by allowing real estate researchers in academia to use the data they collect for refining research techniques. The idea of exchanging market research techniques and models for industry data is logical.

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