Forecasting Metropolitan Multifamily Residential Construction

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Despite their importance as investment vehicles and as housing, very little analysis of multifamily markets has been undertaken to date. The literature that has been produced has, with few exceptions discussed below, focused on the aggregate national market, or occasionally on the regional market. But housing markets are well known to be local and diverse. The purpose of this paper is to examine multifamily markets at a disaggregated metropolitan level.

This paper presents a logarithmic time trend autoregressive model of multifamily housing activity by metropolitan area. The model was estimated using annual 1966-1994 data from 79 U.S. metropolitan areas. The model performed reasonably well, in terms of fit and reasonable forecasting. There were a few markets, notably Las Vegas, for which out of sample forecasts were somewhat implausible.

Metropolitan areas vary greatly in the order of their autoregressive process. Seven metropolitan areas yielded a 0 order process, that is estimates where the autoregressive parameters were not significant at .05 level. Thus, the logarithmic time trend by itself seems to suffice. Over half the cities, 42, had an autoregressive process of order 1; 28 had order 2; and 2 had 3. No metropolitan area had a process order greater than 3. Not surprisingly, given the national time trends presented above, most of these metropolitan areas show secular declines in multifamily output as evidenced by the parameter estimate for the time trend. The average of the 79 time trend parameters is -.043, and the median is -.045. Houston, Tulsa, Shreveport, Oklahoma City, and Peoria were the five lowest, with declines estimated between 11 and 13 percent over this 30-year period. Las Vegas was an outlier in the other direction; this fast growing MSA shows 17 percent growth rate. Other MSAs with above-average growth rates included Orlando (4 percent) Phoenix, Mobile, and Tucson (each somewhat less than 1 percent).

We find that while many metropolitan areas were reasonably correlated with national output and a few were highly correlated, there is no obvious pattern to this correlation and some cities were quite uncorrelated with national output. This confirms the utility of continued work on the desegregated modeling of metropolitan housing markets, especially multifamily.

Our simple forecasting model found that many metropolitan areas had one or two term autoregressive processes, and this information can be used to improve the forecast. A sample forecast is shown with all 79 markets plotted in the paper. The asterisk in the plot is the actual permit data for each year up to 1994, the span of our data. The solid line with no marks on it is the simple time trend estimation. The model is curvilinear because we estimated a logarithmic model then exponentiated back. This not only has the advantages noted above, but has another advantage in that it means we will avoid negative forecasts in future periods. The solid lines with the dots attached are the forecast values from the model, both within period and out of sample (past the dashed line in 1995). In the Albany case, the autoregressive process permits the forecast to track to fit reasonably well; however, in this particular city the autoregressive process is damped by the time we get to the forecast so that it actually does not make a large difference in this particular case for the forecast. Results vary by MSA, however. The dotted lines above and below the post 1995 forecast are a 90 percent confidence interval.

In the great majority of metropolitan areas, even those with higher order terms, by the 1995 plus forecast period the effect of this autoregressive process seems to be dampening down from the 60s and 70s. Perhaps the most intriguing question is whether any unknown structural shifts could push multifamily construction back up off its current low plateau.