Chapter 24
A Genetic Algorithm– Based Multivariate Grey Model in Housing Demand Forecast in Turkey

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ABSTRACT

Housing sector is commonly considered as a very strong economic industry in terms of both its contribution to creating employment and its impact on other associated sectors. By means of its featured characteristics, the sector also plays an important role on economic growth and development of emerging countries. In this respect, any evidence that determines factors affecting housing investments and future demand behavior may be remarkably valuable for monitoring possible future excess supply and deficits. This chapter attempts to determine factors affecting housing demand in Turkey during a sample period of 2003-2011 using a genetic algorithm-based multivariate grey model. Housing demand forecasts are also employed until the year 2020. Results reveal that several factors including M2 money supply, consumer price index and urbanization rate have an impact on housing demand. According to housing demand forecasts, a significant housing demand increase is expected in Turkey.

INTRODUCTION

Nowadays, housing investments have been emerged as one of the most valuable components of housing sector by substantially increasing capital flows along with financial globalization. Indeed, housing investments assure the development of all other sectors which provide various inputs to the housing sector. Since the multiplier effect of housing expenditures is relatively high, a possible increase in this entry will automatically accelerate the growth of other sectors with an increase on the demand for some products (e.g. home appliances, furniture, home textiles, etc). Housing sector is adopted as a leading sector by courtesy of dominant domestic capital production, higher employment potential and more frequent input-output association with other sectors such as manufacturing (Fitöz, 2008). Moreover, earlier studies (Greenwood & Hercowitz, 1991) highlight the importance of housing market in the economy as a significant indicator of consumer expenditures and social welfare.

The number of studies concerning the housing industry have been significantly increased with the most recent global economic events such as housing price balloons occurred in South Asian countries and the United States. In this respect, a more comprehensive investigation of the Turkish housing market is intensively required. An earlier survey (Kargi, 2013) that examines housing market in Turkey and its impact on the Turkish economic growth for the sample period 2000-2012 suggests that enlargement of housing loans volume and housing expenditures are considerably sensitive to Gross Domestic Product (GDP). Additionally, any housing price balloons are observed during the sample period. Specifically, housing loans enlargement and housing expenditures are in line with GDP until the third quarter of 2008 and they are also significantly sensitive to GDP decline after that period. In this circumstance, price inflation would be unavoidable since a relatively high demand depending on a GDP increase and economic stability and a possible supply contraction due to the behavior of interests. In the light of this progress, the major objective of this chapter is to examine housing demand forecast in Turkey and to determine how the housing supply should behave to avoid both price inflation and inactive housing problem. The study also investigates the share of the housing industry in GDP and the ranking of the housing investments in other fixed assets investments such as manufacturing and transportation. For these purposes, a housing demand forecasting will be employed using the housing demand data of the Housing Development Administration in Turkey during the sample period from the implementation of 2003 Urgent Action Plan declared by the current Turkish government to the present.

Time series analysis has always been a relatively popular topic for researchers both in the past and at present. However, the lack of ability of conventional analysis methods to forecast time series that are not smooth leads researchers to employ various forecasting models that have different mathematical backgrounds including artificial neural networks, fuzzy predictors, evolutionary and genetic algorithms. Statistical and artificial intelligence-based approaches are considered as the two main techniques for time series analysis in the existing literature. Nevertheless, both techniques require higher mathematical background and more complex data. In some circumstances, researchers can make future decisions regarding their predictions with a relatively simpler datasets. In this study, predictions for future periods of basic indicators between the years of 2003-2014 related to the housing demand and its determinants in turkey is aimed to make by using of the Grey Forecasting model (GM), being a branch of grey system theory and a beneficial when dealing with prediction by minimum data according to Ju-Long (1982).

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