Time Zone Group 3 - B
Micheal Lucky (smgmol56@gmail.com)
Yonas Menghis Berhe (yonix500@gmail.com)
Boluwatife Adeyeye (adeyeyebolu027@gmail.com)
Muhammed Jamiu Saka (sakasim_jay@yahoo.com)
Sola-Aremu Oluwapelumi (solaaremu.pelumi@gmail.com)

Exogenous variables and their contributions to improving forecasts

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Introduction

Exogenous variables are required in the computation of a dependent variable in a regression model. These are also regarded as independent variables. This means that exogenous variables are present in a regression model because they hold a significant position required to evaluate a possible estimate for the dependent variable. While it is important to note that the type of exogenous variable selected for a model will depend largely on the context and purpose of investigation, this article seeks to highlight four exogenous variables that can be used to improve forecasts. Each variable will be described and scenarios will be included to foster proper understanding.

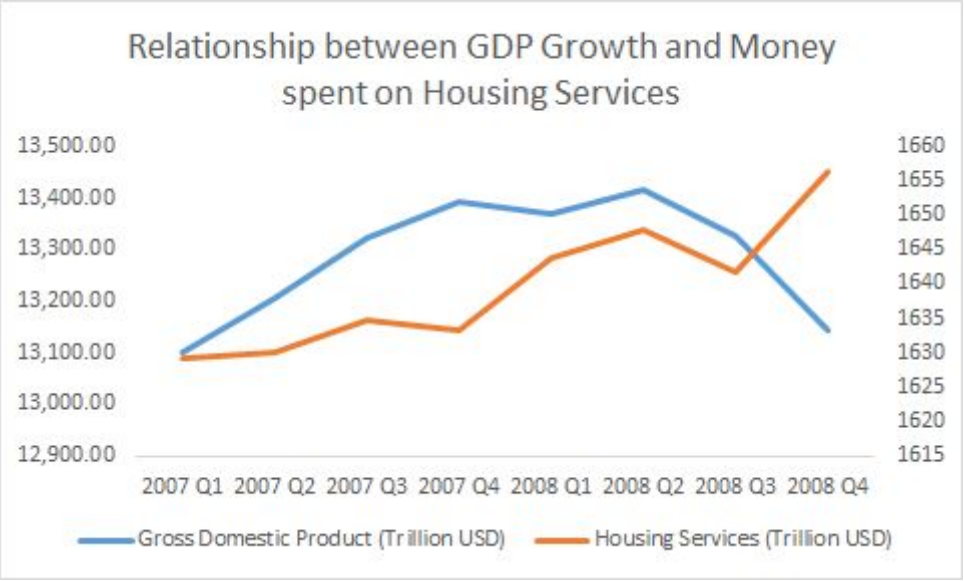
Types of Exogenous variables

1. Time Series Variables

These are variables that are observed sequentially overtime. They are not necessarily in a defined order but are usually recorded at regular intervals such as daily, weekly, monthly and so on. Examples are; Stock prices, weather forecasts, traffic count, Gross Domestic Product.

Using the Case Shiller index as a case study, it is obvious that certain time series variables will be useful in predicting the Case Shiller index. Since the Case Shiller index is used in tracking home prices, then it logically infers that factors that influence demand (home purchasing power) of owners will also influence the Case Shiller index since the price is a reflector of forces of demand and supply.

Time series variables such as the Gross Domestic Product of the United States are useful in the evaluation of home price movements because a consistent rise in GDP reflects a rise in overall economic productivity which implies more funds for individuals who are employed. When this occurs consistently, there will be a corresponding rise in home prices due to an increase in the purchasing power of the residents within the country. This is certain to affect the Case Shiller index obtained. The table below demonstrates a positive significant relationship between changes in GDP and changes in the amount of money spent on housing services in the United States for the period shown.



Source: Valadez, R. M. (2010)

From the following data sources: BEA's Table 1.5.6. Real Gross Domestic Product, Expanded Detail, Chained Dollars [Billions of chained (2005) dollars] Seasonally adjusted at annual rates

Retrieved: 2/12/2010 Last Revised on January 29, 2010

2. Qualitative Variables

Certain variables that cannot be expressed numerically are equally important when making forecasts. These variables are usually used when there are no quantitative data available for a regression model. This is very important when evaluating a new strategy that involves human perception. For example, if a company introduces a new product to a new market, the company would likely do a check on how her customers perceive the product. Variables such as color, taste, size, quality are drivers of how much customers are willing to buy a product. However, such a perception cannot be

directly measured quantitatively. Measurements are practically done through interviews, questionnaires and/or practical observations.

3. Cross-Sectional Variables

These are variables that are measured just once in the present. An example could be the average salaries of entry-level employees within a particular industry. Such variables can be correlated with other fundamental, significant variables in order to generate an appropriate forecast. A practical example of a cross-sectional variable is the mortgage lending rate which has a strong correlation with home prices. This can be demonstrated with the housing bubble during the 2007-2008 global financial crisis. When the mortgage rates were reduced in order to make homes affordable for middle-income earners, there was a positive shift in demand and this led to an increase in home prices. This is also noted to have an effect on the Case Shiller index measured for the crisis period.

4**. Stochastic Error Variables**

Research has proven that simple linear regression models provide good estimates for the average value of the dependent variable. However, this is insufficient for forecasting the specific value for a dependent variable which lies within the same population and has a value different from the mean value. In order to curb this irregularity, a Stochastic Error Variable is usually introduced into the model as a non-systematic component designed to cater for the omitted or neglected variables which may affect the value(s) of the dependent variable but are not (or cannot be) included in the regression model.

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