An Inquiry of the Impact of Flood Risk on Housing Market with Enhanced Geographically Weighted Regression

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Abstract : This study aims to determine the impact of the disclosure of flood potential map on housing prices. The disclosure is supposed to mitigate the market failure by reducing information asymmetry. On the other hand, opponents argue that the official disclosure of simulated results will only create unnecessary disturbances on the housing market. This study identifies the impact of the disclosure of the flood potential map by comparing the hedonic price of flood potential before and after the disclosure. The flood potential map used in this study is published by Taipei municipal government in 2015, which is a result of a comprehensive simulation based on geographical, hydrological, and meteorological factors. The residential property sales data of 2013 to 2016 is used in this study, which is collected from the actual sales price registration system by the Department of Land Administration (DLA). The result shows that the impact of flood potential on residential real estate market is statistically significant both before and after the disclosure. But the trend is clearer after the disclosure, suggesting that the disclosure does have an impact on the market. Also, the result shows that the impact of flood potential differs by the severity and frequency of precipitation. The negative impact for a relatively mild, high frequency flood potential is stronger than that for a heavy, low possibility flood potential. The result indicates that home buyers are of more concern to the frequency, than the intensity of flood. Another contribution of this study is in the methodological perspective. The classic hedonic price analysis with OLS regression suffers from two spatial problems: the endogeneity problem caused by omitted spatial-related variables, and the heterogeneity concern to the presumption that regression coefficients are spatially constant. These two problems are seldom considered in a single model. This study tries to deal with the endogeneity and heterogeneity problem together by combining the spatial fixed-effect model and geographically weighted regression (GWR). A series of literature indicates that the hedonic price of certain environmental assets varies spatially by applying GWR. Since the endogeneity problem is usually not considered in typical GWR models, it is arguable that the omitted spatial-related variables might bias the result of GWR models. By combing the spatial fixed-effect model and GWR, this study concludes that the effect of flood potential map is highly sensitive by location, even after controlling for the spatial autocorrelation at the same time. The main policy application of this result is that it is improper to determine the potential benefit of flood prevention policy by simply multiplying the hedonic price of flood risk by the number of houses. The effect of flood prevention might vary dramatically by location.

Keywords : flood potential, hedonic price analysis, endogeneity, heterogeneity, geographically-weighted regression
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