A Generalized Hedonic Pricing Model: Theory and Applications

一般化ヘドニック価格評価モデル: 理論と応用

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Abstract

We generalize the hedonic pricing model that can be regarded as a baseline to understand house prices. We begin our discussion with Ishijima and Maeda (2012, 2015) who developed a unified theoretical model that bridges the gap between the stochastic discounted cash flow model in the finance literature and the hedonic pricing model in the real estate economics literature.

Their unified pricing model comprises two procedures: (1) the real estate price is the expected sum of discounted rents that will stem in the future along the time horizon. This is a typical stochastic discounted cash flow model in use since the study by Merton (1969) and Lucas (1978) where the stochastic discount factor (SDF) is given by the intertemporal marginal rate of substitution (IMRS), also called the cash-flow pricing kernel. (2) The rent is represented as a linear combination of the attribute prices of real estate. The attributes, such as location, square footage, age of the property and so on, characterize each real estate property and provide some benefits to the residents, tenants, or other users. Hence, the rent is the source of the real estate price and is represented as a typical hedonic model used since the study by Lancaster (1966, 1971). They then showed that the real estate price is represented by a linear combination of attribute prices by imposing two technical assumptions.

Based on the unified pricing model of Ishijima and Maeda (2012, 2015), we develop a generalized hedonic pricing model that incorporates attribute variables of real estate as well as interest rates. To the best of our knowledge, this is the first real estate pricing model that theoretically incorporates interest rates in an affine form.

We then proceed to conduct an empirical analysis to explore the issue of how low interest rates led by the Quantitative and Qualitative Monetary Easing (QQE) introduced by the Bank of Japan (BOJ) stimulate Japanese house prices. Since the introduction of QQE in the beginning of 2013, interest rates of Japanese Government Bonds (JGB) are being lowered more than ever and have even entered into a negative range. We focus on the issue of whether or not QQE stimulates Japanese house prices that are the discounted sum of future rents which comprise the primary portion of the Japanese consumer price index (CPI). By employing the generalized hedonic pricing model, we estimate the Japanese house prices on a quarterly basis from the first quarter of 2006 to the third quarter of 2015, which is 39 quarters in total. Finally, we find evidence that low interest rates under QQE stimulate Japanese house prices with hedonic variables appropriately controlled.

Keywords

Generalized Hedonic Pricing Model, Interest Rates, Japanese House Prices