Decoupling Land Values in Residential Property Prices: Smoothing Methods for Hedonic Imputed Price Indices

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Abstract: A property is a bundled good composed of an appreciating asset, land, and a depreciating asset, structure. The motivation to separate the value of the land and structure components of property prices includes a range of needs such as those of tax authorities, climate adaptation research, and national accounting. Recent approaches to disentangling these two assets have been based on employing non-linearities and a construction price index as an instrument. This study proposes to identify them by treating them as two unobserved components of the property price, each with a unique mapping to intrinsic hedonic characteristics and different dynamic behaviour. The estimation approach uses a modified form of the Kalman filter. One advantage of the model estimation strategy is that the estimated components and derived indices are less influenced by the composition of sales at any given period even when the model is estimated at higher frequencies (e.g. monthly instead of quarterly). The algorithm is simple to implement and we demonstrate, using three datasets representing different urban settings in two countries, that the method produces land value predictions comparable to the state valuer's assessments, and price indices comparable to recently published alternatives that rely on exogenous non-market information to disentangle land values. Our monthly indices are smoother than the quarterly counterparts produced by alternative methods.