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Session 3: Hedonic methods for HPIs

Weekly hedonic house price indices: an imputation approach from a spatio-temporal model

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Since the global financial crisis there is an increased demand for timely house price indices. The aim of this paper is to develop a method for computing hedonic imputed house price indices at a weekly frequency. The hedonic imputation method provides a flexible way of constructing quality-adjusted property price indices using a matching sample approach. At annual frequencies the implementation of the hedonic imputation approach typically entails estimating the hedonic model period-by-period and then using the parameter estimates (i.e., characteristics shadow prices) to obtain the required imputed house prices. Once these imputed prices are available for a matched sample, standard price index formulas (e.g., Laspeyres, Fisher or Törnqvist) can be then used to compute the overall price index. A common approach to control for location in hedonic models has been to include postcode dummies. This may not be feasible at higher frequencies as there may not be enough observations for each postcode and small samples might cause large variability in the shadow price parameters when estimated period-by-period. We develop a spatio-temporal model to obtain the imputed prices. A geospatial spline surface controls for location and is imbedded in a state-space formulation that controls for trends and property quality. The advantage is that the model is parsimonious and shadow price parameters are connected over time while retaining the property that values are not revised as new time periods are added to the data set. We show the spatio-temporal specification leads to a modified form of the Kalman filter and a Goldberger's adjusted form of the predictor to obtain the imputations. Using a recently developed measure of index performance and applying this hedonic geospatial spline/Kalman filter approach to data for Sydney (Australia) we show that it outperforms competing alternatives for computing house price indices at a weekly frequency. Furthermore, we show that weekly house price indices are much more sensitive than annual indices to the choice of hedonic method. Hence the debate over the choice of hedonic method is of greater practical significance for weekly than for yearly or quarterly indices.