

The Effect of Alternative Estimators of the Time-Varying Hedonic Model with Spatial Errors on the Revisions of the Computed Hedonic Imputed Price Index

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Hedonic regressions have a theoretical foundation along the lines discussed in [1] and [2] which implies appropriately derived econometric models should have hedonic coefficients that evolve over time. To implement theoretically consistent econometric estimation a rolling-window approach has been recommended in the hedonic price index literature. Recent work by [3] has demonstrated the predictive power (in terms of Mean Square Prediction Error) of the rolling-window approach is dismal when compared to a time-varying hedonic model where the evolution of the parameters obeys a flexible but specific stochastic process. The estimator of the hedonic parameters used in [3] is a Kalman Smoother, and therefore, the time series of estimates of the hedonic parameters changes when a new time period is observed. This revised set of parameter estimates will lead to a revised set of imputed prices which will result in continuous revisions of the resulting housing price index. One alternative to avoid this continuous revision is to use Kalman filter estimators instead; however, this will come at some cost (in Mean Square Error terms). The paper has several aims. First, I present the alternative estimators for this model (i.e. based on the use of the forward filter only (KF) and on the forward and backward filter (KS)). Second, I decompose the possible sources of revisions to the resulting time series of estimates resulting from the use of each estimator. These include changes induced by the differences in the conditioning set between KF and KS, as well as those induced by restrictions on the variance-covariance of the model, such as time-invariance of the spatial correlation parameter. Third, I study the loss in prediction ability in the imputation process and the effect on the computed hedonic imputed price indices under a number of scenarios. These include the polar cases of continuous revision (use of KS only) vs. no-revision (use of KF only) and a range of mixtures of KF with revisions at regular intervals based on one or both sources of revisions (ie conditioning set or covariance parameter invariance). The computations will be obtained using data from a town in the state of Queensland, Australia.

References

- [1] Diewert, W.E. (2003), "Hedonic Regressions: A consumer Theory Approach" in R.C. Feenstra and M. D. Shapiro (eds), *Scanner Data and Price Indexes*, NBER Conference on Research in Income and Wealth. Studies in Income and Wealth, vol. 64. Chapter 10, pp. 318-348. The University of Chicago Press.
- [2] Hill, R. J. and D. Melsner (2008), "Hedonic Imputation and the Price Index Problem: An Application to Housing," *Economic Inquiry*, 46:4, pp. 593–609.
- [3] Rambaldi, A. N. and D.S. P. Rao, "Hedonic Predicted House Price Indices Using Time-Varying Hedonic Models with Spatial Autocorrelation," School of Economics Discussion Paper No. 432 July 2011, The University of Queensland. Australia.