

## Accepted Manuscript

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PII: S0304-4076(16)30149-X

DOI: <http://dx.doi.org/10.1016/j.jeconom.2016.07.005>

Reference: ECONOM 4285

To appear in: *Journal of Econometrics*

Received date: 2 October 2014

Revised date: 14 February 2016

Accepted date: 27 July 2016



Please cite this article as: Sun, Y., Functional-coefficient spatial autoregressive models with nonparametric spatial weights. *Journal of Econometrics* (2016), <http://dx.doi.org/10.1016/j.jeconom.2016.07.005>

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# Functional-coefficient spatial autoregressive models with nonparametric spatial weights

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August 1, 2016

We apply local linear regression and sieve estimation technique to estimate functional coefficients and an unknown spatial weighting function, respectively, via a nonparametric GMM estimation method, where we allow both exogenous and endogenous spatial covariates. A consistency result is derived to support the method. Moreover, a two-step estimator is constructed for the functional coefficients, and under certain conditions, we show that this estimator can be oracle efficient in the sense that its limiting distribution is the same regardless of whether or not the spatial weights are known. Both simulated and real data examples are used to illustrate our theory.

**Keywords:** Conditional Solow economic growth convergence equation; Endogenous spatial covariates; Functional coefficients; Local linear regression; Nonparametric GMM estimator; Sieve estimator; Spatial autoregressive models.

**JEL classification codes:** C14; C21; O47

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\*E-mail address: [yisun@uoguelph.ca](mailto:yisun@uoguelph.ca). The author thank two anonymous referees and an Associate Editor for valuable comments that greatly improved this article. The author also thanks participants of the department seminar at Binghamton University and Tsinghua International Conference in Econometrics at Tsinghua University. This research is supported by the Social Science and Humanities Research Council of Canada Insightful Grant 435-2016-0340.

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