

TESTING FOR SERIAL CORRELATION OF UNKNOWN FORM IN COINTEGRATED TIME SERIES MODELS

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Abstract. Portmanteau test statistics are useful for checking the adequacy of many time series models. Here we generalize the omnibus procedure proposed by Duchesne and Roy (2004, *Journal of Multivariate Analysis*, **89**, 148–180) for multivariate stationary autoregressive models with exogenous variables (VARX) to the case of cointegrated (or partially nonstationary) VARX models. We show that for cointegrated VARX time series, the test statistic obtained by comparing the spectral density of the errors under the null hypothesis of non-correlation with a kernel-based spectral density estimator, is asymptotically standard normal. The parameters of the model can be estimated by conditional maximum likelihood or by asymptotically equivalent estimation procedures. The procedure relies on a truncation point or a smoothing parameter. We state conditions under which the asymptotic distribution of the test statistic is unaffected by a data-dependent method. The finite sample properties of the test statistics are studied via a small simulation study.

Key words and phrases: Vector autoregressive process, cointegration, exogenous variables, kernel spectrum estimator, diagnostic test, portmanteau test.