Abstract: In this article, we investigate the portmanteau tests and the Lagrange multiplier (LM) test for goodness of fit in autoregressive and moving average models with uncorrelated errors.

Under the assumption that the error is not independent, the classical portmanteau tests and LM test are asymptotically distributed as a weighted sum of chi-squared random variables that can be far from the chi-squared distribution. To conduct the tests, we must estimate these weights using nonparametric methods. Therefore, by employing the method of Kiefer, Vogelsang, and Bunzel (2000, Econometrica), we propose new test statistics for the portmanteau tests and the LM test.

The asymptotic null distribution of these test statistics is not standard, but can be tabulated by means of simulations. In finite-sample simulations, we demonstrate that our proposed test has a good ability to control the type I error, and that the loss of power is not substantial.