Comparison of Performances of Heteroscedasticity Tests under Measurement Error

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Abstract

One of the important assumptions of the classical regression analysis is homoscedasticity. It simplifies the standard error formulas of the ordinary least square (OLS) estimators and ensures that these estimators are efficient among the other linear estimators. Heteroskedastic errors disturb the efficiency properties of the OLS estimators and the estimated standard errors would be biased and wrong that make inferences misleading. Under the heteroscedastic errors, the OLS estimators could still be unbiased and consistent by weighting the data. However, estimations with errors-in-variables yield biased and inconsistent OLS estimators in either way. Specifically, measurement error on the explanatory variables causes biased and inconsistent OLS estimators that yield mistaken conclusions for hypothesis testing [2]. This study aims to compare performances of mostly used heteroscedasticity tests under the presence of measurement error on either the explanatory and/or the dependent variables. Wooldridge (1996) made theoretical conclusions about the properties of heteroscedasticity tests under measurement error [4]. He did not perform a simulation study. Uyanto (2019) and Adamec (2017) compared the powers of heteroscedasticity tests while comparisons of Adamec (2017) are under different scenarios for the functional patterns of conditional variance [3, 1]. To the best of our knowledge, this paper will be the first study that comprehensively examines the performances of heteroscedasticity tests under measurement error. Preliminary Monte Carlo simulations under different heteroscedasticity forms and sample sizes show that the Goldfeld-Quandt test has better performance when there is no measurement error in the explanatory variable in the simple linear regression model. These results are compatible with Uyanto's (2019) and Adamec's (2017) results. Simulations will be extended to show the performances of the heteroscedasticity tests under the presence of measurement error either the explanatory and/or dependent variables.

Keywords

Heteroscedasticity, measurement error models, error-in-variables, model specification.

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