

Could we use correlation to examine panel data with $I(0)$ and $I(1)$ variables? *

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Abstract:

While many studies report correlations between a stationary time series Y_t and a non-stationary time series X_t , Wong and Pham (2025) hypothesized that applying standard regression-based correlation tests in this context may yield

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spurious or non-informative results and conjectured that standard correlation statistics are not suitable for evaluating such relationships. Thereafter, through simulation studies, they find the spurious nature of the correlation and the inadequacy of standard tests in this setting. Thereafter, they developed the estimation and testing theory for the correlation between a stationary Y_t and a non-stationary X_t and proved that the standard correlation statistic cannot be used in this setting and that the resulting test statistic differs from the one used to test the correlation between two random series Y_t and X_t , concluding that the traditional correlation test cannot be used to test for the correlation between a stationary time series Y_t and a non-stationary time series X_t . Nevertheless, as far as we know, no study in the literature has investigated whether a correlation exists between panel data with a non-stationary variable and a stationary variable. This paper investigates the issue.

Keywords: Cointegration, stationarity, non-stationarity, correlation , time series analysis

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