

Could the panel regression be used to examine the relationship between $I(0)$ and $I(1)$ series? *

Wing-Keung Wong

Department of Finance and Big Data Research Center, Asia University
Department of Medical Research, China Medical University Hospital, Taiwan
Business, Economic and Public Policy Research Centre,
Hong Kong Shue Yan University
The Economic Growth Centre, Nanyang Technological University

Minh Tam Pham

Department of Finance, College of Management, Asia University

March 1, 2026

Abstract:

We have read many papers in the literature and found that some papers report results of regressing a stationary time series on a non-stationary time series (we call it the IOI1 model). Wong, Pham, and Yue (2024) have examined

*The first author would like to thank Robert B. Miller and Howard E. Thompson for their continuous guidance and encouragement. The first author would also like to thank George Edward Pelham Box and Gregory C. Reinsel for teaching him time series analysis. This paper was done when the first author visited the Business, Economic and Public Policy Research Centre and The Economic Growth Centre, Nanyang Technological University in 2025. This research has been supported by Asia University, China Medical University Hospital, Hong Kong Shue Yan University, Nanyang Technological University, Research Grants Council (RGC) of Hong Kong (project numbers 12502814 and 12500915), and the Ministry of Science and Technology (MOST, Project Numbers 106-2410-H-468-002 and 107-2410-H-468-002-MY3), Taiwan.

whether regressing a stationary time series, Y_t , on a non-stationary time series, X_t (that is, $Y_t = \alpha + \beta X_t + u_t$) could get any meaningful result. To do so, they first conduct a simulation and find that regressing a stationary time series on a non-stationary time series could be spurious. Thereafter, they have developed the estimation and testing theory for the *I0I1* model and find that the statistics T_N^β for testing $H_0^\beta : \beta = \beta_0$ versus $H_1^\beta : \beta \neq \beta_0$ from the traditional regression model (we call it *IOI0* model) does not have any asymptote distribution with $E(T_N^\beta) \rightarrow \infty$ and $Var(T_N^\beta) \rightarrow \infty$ as $N \rightarrow \infty$, and thus, it cannot be used for the *I0I1* model. Nevertheless, as far as we know, no study in the literature has investigated whether we could use the panel regression to examine the relationship between a stationary series and a non-stationary series. This paper investigates the issue.

Keywords: Cointegration; stationarity; non-stationarity, panel regression

JEL Classification: C01, C15, C22, C23