Advertisement

International Journal of Finance & Economics / Volume 23, Issue 3 / pp. 221-232

RESEARCH ARTICLE

Testing for nonlinear unit roots in the presence of a structural break with an application to the qualified PPP during the 1997 Asian financial crisis

Olivier Habimana, Kristofer Månsson, Pär Sjölander

First published: 29 January 2018

https://doi.org/10.1002/ijfe.1613

PDF

Abstract

This paper applies Monte Carlo simulations to evaluate the size and power properties in the presence of a structural break, for the standard Augmented Dickey-Fuller (ADF) test versus nonlinear exponential smooth transition autoregressive unit root tests. The break causes the tests to be undersized, and the statistical power considerably decreases. Moreover, the effect is intensified in small samples and very much increased for more persistent nonlinear series. As a remedy, we modify the standard ADF and exponential smooth transition autoregressive unit root tests in order to adjust for a structural break. This improves both the power and the size considerably, even though the empirical size still is lower than the nominal one. More persistent series are more affected by structural breaks, and the new tests are most powerful under the existence of a rather persistent nonlinear data generating process (which is an empirically relevant and common type of data generating process). The proposed tests are applied to investigate mean reversion in the real effective exchange rates of 5 East and Southeast Asian countries, taking into account the structural change in exchange rate regime brought about by the 1997 Asian financial crisis. The empirical findings corroborate our simulation results; the modified more powerful tests are able to reject the unit root in all 5 countries, whereas the tests that do not consider the structural break could only reject in one of these cases.

This website utilizes technologies such as cookies to enable essential site functionality, as well as for analytics, personalization, and targeted advertising. You may change your settings at any time or accept the default settings. You may close this banner to continue with only essential cookies. Privacy Policy

Manage Preferences

Accept All

Reject Non-Essential

Dickey, D. A., & Fuller, W. A. (1979). Distribution of the estimator for autoregressive time series with a unit root. *Journal of the American Statistical Association*, **74**, 427–431. https://doi.org/10.2307/2286348

Web of Science® | Google Scholar

Dornbusch, R., & Vogelsang, T. (1991). Real exchange rates and purchasing power parity. In J. Melo, & A. Sapir (Eds.), *Trade theory and economic reform: North, South, and East, essays in honor of Bela Balassa* (pp. 3–24). Cambridge, MA: Basil Blackwell.

Web of Science® | Google Scholar

Hegwood, N. D., & Papell, D. H. (1998). Quasi purchasing power parity. *International Journal of Finance and Economics*, **3**, 279–289. https://doi.org/10.1002/(SICI)1099-1158(199810)3:4<279::AID-IJFE83>3.0.CO;2-K

Web of Science® | Google Scholar

Kapetanios, G., Shin, Y., & Snell, A. (2003). Testing for a unit root in the nonlinear STAR framework. *Journal of Econometrics*, **12**, 359–379. https://doi.org/10.1016/S0304-4076(02)00202-6

Web of Science® | Google Scholar

Klau, M. and Fung, S., 2006. " The new BIS effective exchange rate indices." *BIS Quarterly Review*, March: 51–65. Bank for International Settlements. http://www.bis.org/publ/qtrpdf/r_qt0603e.pdf

Google Scholar

Lee, D. J., & Son, J. (2013). Nonlinearity and structural breaks in monetary policy rules with stock prices. *Economic Modelling*, **31**, 1–11. https://doi.org/10.1016/j.econmod.2012.10.018

Web of Science® | Google Scholar

Lumsdaine, R. L., & Papell, D. H. (1997). Multiple trend breaks and the unit-root hypothesis. *The Review of Economics and Statistics*, **79**(2), 212–218 http://www.jstor.org/stable/2951453

Web of Science® | Google Scholar

This website utilizes technologies such as cookies to enable essential site functionality, as well as for analytics, personalization, and targeted advertising. You may change your settings at any time or accept the default settings. You may close this banner to continue with only essential cookies. Privacy Policy

Manage Preferences

Accept All

Reject Non-Essential

Nelson, C. R., & Plosser, C. (1982). Trends and random walks in macroeconomic time series. *Journal of Monetary Economics*, **10**, 139–162. https://doi.org/10.1016/0304-3932(82)90012-5

PubMed | Web of Science® | Google Scholar

Ohara, H. I. (1999). A unit root test with multiple trend breaks: A theory and application to US and Japanese macroeconomic time series. *The Japanese Economic Review*, **50**, 266–290. https://doi.org/10.1111/1468-5876.00119

Web of Science® | Google Scholar

Patterson, K. D. (2012). *Unit root tests in time series, volume 2*. Palgrave Texts in Econometrics: Palgrave.

Google Scholar

Perron, P. (1989). The great crash, the oil price shock, and the unit root hypothesis. *Econometrica*, **57**, 1361–1401 http://www.jstor.org/stable/1913712

Web of Science® | Google Scholar

Perron, P. (1997). Further evidence on breaking trend functions in macroeconomic variables. *Journal of Econometrics*, **80**, 355–385. https://doi.org/10.1016/S0304-4076(97)00049-3

Web of Science® | Google Scholar

Perron, P., & Vogelsang, T. J. (1992). Nonstationarity and level shifts with an application to purchasing power parity. *Journal of Business and Economic Statistics*, **10**, 301–320. https://doi.org/10.1080/07350015.1992.10509907

Web of Science® | Google Scholar

Pradumna B. Rana 1998. The East Asian financial crisis—Implications for exchange rate management. EDRC Briefing Notes, Number 5, October. Asian Development Bank. https://aric.adb.org/pdf/edrcbn/edrcbn05.pdf

Google Scholar

This website utilizes technologies such as cookies to enable essential site functionality, as well as for analytics, personalization, and targeted advertising. You may change your settings at any time or accept the default settings. You may close this banner to continue with only essential cookies. Privacy Policy

Manage Preferences

Accept All

Reject Non-Essential

Sollis, R., Leybourne, S. J., & Newbold, P. (2002). Tests for symmetric and asymmetric nonlinear mean reversion in real exchange rates. *Journal of Money, Credit, and Banking*, **34**, 686–700 http://www.jstor.org/stable/3270738

Web of Science® | Google Scholar

Zivot, E., & Andrews, D. W. K. (1992). Further evidence on the great crash, the oil price shock and the unit root hypothesis. *Journal of Business and Economic Statistics*, **10**, 251–270 http://www.jstor.org/stable/1391541

Web of Science® | Google Scholar

Citing Literature

Download PDF

ABOUT WILEY ONLINE LIBRARY

Privacy Policy
Terms of Use
About Cookies
Manage Cookies
Accessibility
Wiley Research DE&I Statement and Publishing Policies

HELP & SUPPORT

Contact Us
Training and Support
DMCA & Reporting Piracy
Sitemap

OPPORTUNITIES

Subscription Agents

This website utilizes technologies such as cookies to enable essential site functionality, as well as for analytics, personalization, and targeted advertising. You may change your settings at any time or accept the default settings. You may close this banner to continue with only essential cookies. Privacy Policy

Manage Preferences
Accept All
Reject Non-Essential

Copyright © 1999-2026 John Wiley & Sons, Inc or related companies. All rights reserved, including rights for text and data mining and training of artificial intelligence technologies or similar technologies.

WILEY

This website utilizes technologies such as cookies to enable essential site functionality, as well as for analytics, personalization, and targeted advertising. You may change your settings at any time or accept the default settings. You may close this banner to continue with only essential cookies. Privacy Policy

Manage Preferences

Accept All

Reject Non-Essential