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Error Correction Models with Neglected Asymmetry

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Extended Abtract

Following the seminal work of Engle and Granger (1987), much research effort has been devoted to the analysis of cointegrating relationships and their associated error correction representations. The vast majority of published work in the field maintains the assumption that the cointegrating vector is unique and that it is linear. Recently, an innovative literature has departed from this view to consider the situation in which the cointegrating vector is asymmetric or nonlinear and may differ across regimes Shin et al. (2014).

This paper investigates two contentions that have been made in the literature on asymmetric cointegration: (i) that long-run asymmetry can confound efforts to test for a stable cointegrating relationship if the test assumes long-run symmetry (Schorderet, 2001); and (ii) that mis-specifying an asymmetric long-run relationship as symmetric can profoundly bias the dynamic parameter estimates in the associated error correction model (Shin et al., 2014). To date we are unaware of any published research that elaborates upon the nature of the biases and distortions imparted in this manner.

We run a series of Monte Carlo experiments and evaluate the performance of the well known residual-based Engle-Granger test as well as PSS bounds test (Pesaran et al., 2001) on cointegration under various nonlinear and linear data-generating processes. Additionally, the performance of standard Wald tests on long-run symmetry as well as short-run symmetry are analysed. The importance of our findings is illustrated in the case of the asymmetric unemployment-output relationship in the USA. By means of dynamic multiplier analysis we illustrate the effects of mis-specifying the long-run relationship on the dynamic parameter estimates.

Our major findings are: (1) The PSS bounds test is robust against mis-specification of the short-run dynamics as long as the functional form of the long-run relationship is correctly specified. (2) Both the Engle-Granger as well as PSS tests do not detect hidden cointegration in case the DGP is nonlinear in the long-run parameters but a restricted linear model is estimated, instead. (3) The Wald test on long-run symmetry performs reasonable in small samples and is robust against mis-specification of the short-run dynamics. (4) The Wald test on short-run symmetry performs well as long-as the short-run dynamics are correctly specified, and it is robust against mis-specification of the long-run relationship. (5) Our application illustrates that neglecting existent long-run asymmetry profoundly biases the long-run parameter estimates, and

non-consideration of short-term asymmetries has substantial implications in terms of bias for the estimated dynamics.

JEL Classifications: C22, C51, C52.

Key Words: Asymmetric Cointegration, Asymmetric Error Correction Models, Nonlinear ARDL, Model Mis-specification and Bias, Monte Carlo Simulation.

REFERENCES

References

Engle, R. F. and C. W. J. Granger (1987). Co-integration and error-correction: Representation, estimation, and testing. *Econometrica 55*(2), 251–276.

Pesaran, M. H., Y. Shin, and R. J. Smith (2001). Bounds testing approaches to the analysis of level relationships. *Journal of Applied Econometrics 16*(3), 289–326.

Schorderet, Y. (2001). Revisiting okun's law: An hysteretic perspective. Mimeo, University of California San Diego.

Shin, Y., B. Yu, and M. Greenwood-Nimmo (2014). Modelling asymmetric cointegration and dynamic multipliers in a nonlinear ardl framework. In W. Horrace and R. Sickles (Eds.), *Festschrift in Honor of Peter Schmidt: Econometric Methods and Applications*. New York: Springer Science and Business Media.