World Academy of Science, Engineering and Technology
International Journal of Economics and Management Engineering
Vol:11, No:06, 2017

The Usage of Bridge Estimator for Hegy Seasonal Unit Root Tests

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Abstract : The aim of this study is to propose Bridge estimator for seasonal unit root tests. Seasonality is an important factor for many economic time series. Some variables may contain seasonal patterns and forecasts that ignore important seasonal patterns have a high variance. Therefore, it is very important to eliminate seasonality for seasonal macroeconomic data. There are some methods to eliminate the impacts of seasonality in time series. One of them is filtering the data. However, this method leads to undesired consequences in unit root tests, especially if the data is generated by a stochastic seasonal process. Another method to eliminate seasonality is using seasonal dummy variables. Some seasonal patterns may result from stationary seasonal processes, which are modelled using seasonal dummies but if there is a varying and changing seasonal pattern over time, so the seasonal process is non-stationary, deterministic seasonal dummies are inadequate to capture the seasonal process. It is not suitable to use seasonal dummies for modeling such seasonally nonstationary series. Instead of that, it is necessary to take seasonal difference if there are seasonal unit roots in the series. Different alternative methods are proposed in the literature to test seasonal unit roots, such as Dickey, Hazsa, Fuller (DHF) and Hylleberg, Engle, Granger, Yoo (HEGY) tests. HEGY test can be also used to test the seasonal unit root in different frequencies (monthly, quarterly, and semiannual). Another issue in unit root tests is the lag selection. Lagged dependent variables are added to the model in seasonal unit root tests as in the unit root tests to overcome the autocorrelation problem. In this case, it is necessary to choose the lag length and determine any deterministic components (i.e., a constant and trend) first, and then use the proper model to test for seasonal unit roots. However, this two-step procedure might lead size distortions and lack of power in seasonal unit root tests. Recent studies show that Bridge estimators are good in selecting optimal lag length while differentiating nonstationary versus stationary models for nonseasonal data. The advantage of this estimator is the elimination of the two-step nature of conventional unit root tests and this leads a gain in size and power. In this paper, the Bridge estimator is proposed to test seasonal unit roots in a HEGY model. A Monte-Carlo experiment is done to determine the efficiency of this approach and compare the size and power of this method with HEGY test. Since Bridge estimator performs well in model selection, our approach may lead to some gain in terms of size and power over HEGY test.

Keywords : bridge estimators, HEGY test, model selection, seasonal unit root
Conference Title : ICCESE 2017 : International Conference on Computational Economics, Statistics and Econometrics
Conference Location : New York, United States
Conference Dates : June 04-05, 2017

Open Science Index, Economics and Management Engineering Vol:11, No:06, 2017 publications.waset.org/abstracts/59800/pdf