Spurious periodicities in cliometric series: simultaneous testing

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Abstract

In this paper we revisit the methodological aspects of the issue of spurious cycles: using the well-established clinometric data, we apply an empirical strategy to identify spurious periodicities and cross-validate the results. The analysis of cyclical fluctuations involves numerous challenges, including data preparation and detrending. As a result, there is a risk of statistical artifacts to arise: it is known that summation operators and filtering yield a red noise alike spectral signature, amplifying lower frequencies and thus, longer periodicity, whereas detrending using differencing yields a blue noise alike spectral signature, amplifying higher frequencies and thus, shorter periodicity. In our paper we explicitly address this issue. In order to derive the stationary signals to be tested, we perform outlier adjustment, derive cycles from the series with the asymmetric band pass Christiano-Fitzgerald filter using the upper bands of the Kuznets and the Juglar cycles as cut-offs, and obtain detrended prefiltered signals by differencing the series in the absence of fractional integration. Afterwards, we simultaneously test whether the spectral densities of filtered and detrended prefiltered signals are significantly different from the spectral density of the related noise. The periodicities from the Kuznets range were not simultaneously significant, and thus are likely to be spurious; whereas ones of the Juglar and Kitchin ranges were simultaneously significant. The simultaneous significance test helps to identify spurious periodicities and the results, in general, accord with the durations of the business cycles found in other works.

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