

Gaussianity and nonlinearity of foreign exchange rates

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Abstract: In this paper, we test on the Gaussianity and nonlinearity of the foreign exchange rate return series by the Gaussianity test due to Kariya, Tsay, Terui and Li (1994) and by the five well-known nonlinearity tests for stationary time series. The daily returns of the foreign exchange rate we consider exhibit the strong non-Gaussianity or nonlinearity, but a central limit effect is observed with observational frequency longer even under stringent test.

Key words: KTTL test for Gaussianity, exchange rate, nonlinearity tests.

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1 Introduction

In economic time series analysis, Gaussianity is often assumed for modeling and for constructing asymptotic tests such as unit root test, cointegration test, e.t.c. or tabulating their critical points. In particular, in finance it is quite common to develop models and theories under the assumption of Brownianity or Gaussianity and apply them to real data. For example, the Black-Scholes stock option theory assumes that log prices follow a Brownian process or equivalently that returns of a stock follow a Gaussian process and the so-called CAPM (capital assets pricing market) model assumes normality for returns at least in their original forms. Although these theories have been developed in a less restrictive way for normality, most of empirical modelling and many time series tests frequently used for financial series