Compartmentalising Gold Prices

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Abstract

Deriving a functional form for a series of prices over time is difficult. It is common to assume some linearly estimable form for prediction purposes. While this can produce accurate short run forecasts it fails to identify longer trends and patterns that may exist in financial data. Particularly troublesome is the potential for chaotic behaviour which can look like standard autocorrelation. Also, components of a price's behaviour may not be linear or may be unable to be structured well in a stationary series. Recently, more research has been devoted to whether or not a series of prices exhibits deterministic behaviour, instead of some type of Brownian Motion (regular or fractal). This research suggests that some time series data may pass typical tests for randomness where randomness does not exist. Given the breadth of current research, the most logical and reasonable beginning assumption for modeling a time series is that data probably exhibit both deterministic and random components. This paper will make use of the techniques of spectral analysis and the Hurst Exponent to measure the level of long-run dependence in the price data of gold. This technique will allow for the separation and quantification of how large the deterministic and random components of gold prices are.

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JEL Classification: C5, G1, L1

1. Introduction

When modelling price movements, it is common to use a random walk framework. The random walk assumption limits modelling changes in prices over time primarily to using auto regressive and moving average processes. While this technique offers strong short-term forecasting, it cannot offer much of a description about how and why prices are changing over time, aside from correlation to past prices. Since ARIMA (Auto-Regressive Integrated Moving Average) models remove elements of long-term relationships in order to make the data stationary, we lose quantification of the long-run elements in a time series

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