Journal of International Money and Finance 58 (2015) 98–109

Contents lists available at ScienceDirect

Journal of International Money and Finance

journal homepage: www.elsevier.com/locate/jimf

Trends and cycles in historical gold and silver prices

Luis A. Gil-Alana [a,*], Goodness C. Aye [b], Rangan Gupta [b]

[a] Faculty of Economics and I.C.S., University of Navarra, Edificio Amigos, E-31080 Pamplona, Spain
[b] University of Pretoria, Pretoria, South Africa

ARTICLE INFO

Article history:
Available online 14 August 2015

JEL Classification:
C22
Q02

Keywords:
Gold and silver prices
Cycles
Persistence
Long memory

ABSTRACT

The study proposes an alternative modelling specification for the real prices of gold and silver that allows the long run trend and cyclical behaviour to be modelled simultaneously by incorporating two differencing parameters in a fractional integration framework. However, we also consider the separate cases of a standard I(d) process, with a pole or singularity at the zero frequency and a cyclical I(d) model that incorporates a single pole in the spectrum at a non-zero frequency. We use annual data spanning from 1833 to 2013 for gold and 1792 to 2013 for silver. Based on the more flexible model that permits a pole at both zero (trend) and non-zero (cycle) frequencies, we find that in general the estimates associated to the long run or zero frequency appear to be above 1 in case of gold and below 1 for silver, while the order of integration associated with the cyclical frequency is slightly above 0 in the majority of the cases in the two series. Further, higher orders of integration are associated to the long run component compared with the cyclical one. The implications of these findings are highlighted.

1. Introduction

Commodity prices are generally known to be very volatile leading to uncertainty over future revenue and cost streams. This consequently inhibits planning, deters investment and hence acts as a drag on

* Corresponding author. Tel.: +34 948 452 625.
E-mail address: alana@unav.es (L.A. Gil-Alana).

http://dx.doi.org/10.1016/j.jimonfin.2015.08.003
0261-5606/

future growth and poverty reduction prospects. The recent global economic and financial crisis which led to significant increase in commodity prices between 2003 and 2008 has renewed interest in modelling commodity price behaviour. The real prices of energy and metals more than doubled in five years from 2003 to 2008, while the real price of food commodities increased by 75% (Erten and Ocampo, 2013). When the global economic growth slowed down, this led to diminishing demand pressures on commodity prices. However, commodity prices have started to recover very fast, and this has been attributed to the rapid growth of the emerging markets and dramatic increase in worldwide demand for commodities.

Given the swings in prices, the need to model the trend and cycle behaviour of metal prices in general and gold and silver prices in particular cannot be overstressed. They are important for both the producing and consumer countries and for both private firms and the government. For the producing countries especially in developing countries, export earnings from metals are often the main source of revenue for many governments. The revenues may either come from direct ownership of resource extraction companies or the tax revenues and royalties obtained from private firms. For the consumer countries, they are a key input factor in many industries and hence drastic price increases can affect these industries negatively through higher input costs.

Further, precious metals are considered as leading indicators of inflation or as a variable which can transmit the outlook of monetary policy to the economy. In other words, the pro-cyclical character of the demand for precious metals has underlined their roles as safe-havens against inflation and stores of value and may provide important information as to where the real economy is heading (Baur and Lucey, 2010; Gil-Alana et al., 2015). Thus, precious metals offer valuable diversification opportunities to investors and serve as monetary medium when the market is uncertain (Arouri et al., 2012; Batten et al., 2010; Harvey et al., 2012). Precious metals in general but gold and silver in particular have multiple industrial and investment uses. They can be used as storage of value, reserve for money issuance, anti-inflation shelter and financial instrument among others (Baur and Mcdermott, 2010; Shafiee and Topal, 2010).

Overall, the dynamics of gold and silver prices have implications for investment decisions, profitable capacity expansion and economic planning. Fluctuations in these prices may have a major impact on overall macroeconomic performance and living standards in these countries, hence justifying the need to understand their trend and cycles. Thus, the current work displays a new modelling framework for trends and cycles incorporating different degrees of persistence at each component by means of fractional differentiation. In other words, the main objective of the paper is to present a new time series modelling for gold and silver prices taking simultaneously into account the main two features of the data which are its dependence and its cyclicity.

A number of studies have modelled the trend and cycle features of commodity prices using methods which range from informal graphical inspection of the data to rigorous statistical decomposition techniques and recently to fractional integration. Focussing on this latter approach, the results are mixed. For instance Arouri et al. (2012) used several parametric and semiparametric methods including ARFIMA-FIGARCH model and found strong evidence of long memory in the daily conditional return and volatility processes of four precious metals: gold, silver, platinum and palladium. Uludag and Lkhamazhapov (2014) used a similar approach as Arouri et al. (2012), and found evidence of anti-persistence in spot returns and a lack of long memory property in gold futures returns. They concluded that long memory is a true feature of the data and not due to structural breaks. Gil-Alana et al. (2015) analysed the persistence properties of five metal prices – gold, silver, platinum, palladium, and rhodium – within a fractional integration framework while accounting for structural breaks. In general they find evidence of long memory behaviour and hence strong dependence across time in the precious metals examined.

From a cyclical viewpoint, Cuddington and Jerrett (2008) use band-pass (BP) filters to search for evidence of super cycles in price of six base metals traded in London Metal Exchange (LME) – aluminium, copper, lead, nickel, tin, and zinc. They find considerable evidence of three past super cycles in real metal prices, defined as cyclical components with expansion phases from 10 to 35 years. They also show that the amplitude of the super cycles is large with variations of 20 to 40% above and below the long-run trends.

Harvey et al. (2012) disentangle trend and cyclical components for relative commodity prices using new and ultra-long aggregate commodity prices, covering the period 1650–2010. Employing