Department of Economics and Finance

GOLD AND SILVER AS SAFE HAVENS:

A FRACTIONAL INTEGRATION AND COINTEGRATION ANALYSIS

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Abstract

This paper investigates whether gold and silver can be considered safe havens by examining their long-run linkages with 22 stock price indices. More specifically, the stochastic properties of the differential between gold/silver prices and 22 stock indices are analysed applying fractional integration/cointegration methods to daily data, first for a sample from January 2010 until December 2019, then for one from January 2020 until July 2022 which includes the Covid-19 pandemic. The results can be summarised as follows. In the case of the pre-Covid-19 sample ending in December 2019, mean reversion is found for the gold price differential vis-à-vis BEF, BSE, CAC, DOW, KLS, KS1, MXX, N100, NAS, NYA and SP5 and for both differentials vis-à-vis CAC, KLS and N100, i.e. the evidence is mixed on whether these precious metals can be seen as safe havens, though it appears that this property characterises gold in a slightly higher number of cases. By contrast, when using the sample starting in January 2020, the evidence in favour of gold and silver as possible safe havens is pretty conclusive since mean reversion is only found in a single case, namely that of the gold differential vis-à-vis NZX.

JEL Classification: C22, C32, F30, F36, G01, G15

Keywords: gold and silver, hedge, safe heave, fractional integration and cointegration

1. Introduction

This paper investigates whether gold and silver can be considered safe havens by examining their long-run relationship with 22 stock price indices. For our purposes, assets are defined as safe havens if they are not linked in the long run to stock prices and thus protect investorsô wealth from movements in financial markets over long time horizons. This is a more general definition than others previously adopted in the literature which focused instead on crisis periods only and distinguished between weak and strong safe havens requiring no or negative correlation with stock prices respectively during episodes of financial turmoil; moreover, a perfect negative correlation is said to characterise a hedge since in such cases a portfolio including both types of assets will have a zero variance around the mean return (see Coudert and Raymond, 2010).

A number of studies focus on the short-run links between gold and financial assets and report mixed results. For instance, Jaffe (1989) argued that gold is an effective hedge, whilst Johnson and Soenen (1997) concluded that this is the case only intermittently, and Taylor (1998) also found an episodic role as a hedge but only against inflation. Baur and Lucey (2010) provided evidence that in the US, UK and Germany during times of financial turbulence gold is a hedge for stocks (i.e. it is negatively correlated) and it is also a safe haven in the short run (i.e. the sum of the coeffi

$$(1 - B)^d = \sum_{j=0} \binom{d}{j} (-1)^j B^j = 1 - d B + \frac{d(d-1)}{2} B^2 - \ldots$$

and thus, x_t can be expressed in terms of all its history.

In the empirical application discussed in the following section, x_t in (1) are the errors in a regression model that includes an intercept and a linear time trend, i.e.,

$$y_t = \quad + \quad t + x_t, \qquad t = 1.2, \ldots, \tag{2}$$

where y_t stands for the gold (silver) price-stock price differential (in logs) and

Limited), RUT (Russell 2000), SP5 (S&P 500), STO (Santos Limited) and XAX (NYSE AMEX Composite Index). The source is Yahoo Finance for all series. Standard methods have been used to calculate missing values.

We estimate the following regression model:

$$y_t \;=\; \quad + \quad t \;+\; x_t, \qquad (1 - B)^d\, x_t \;=\; u_t, \qquad t \;=\; 1.2, ... \qquad (5)$$

where u_t is I(0) or a short-memory process.

Tables 1 - 4 display the estimates of d along with the 95% confidence bands for the differencing parameter for three different specifications, namely i) no deterministic terms, i.e. imposing Ŭ= ɓ = 0 in (5); ii) only a constant, i.e., ɓ = 0 in (5); and iii) a constant and a linear time trend. The coefficients in bold are those from the model selected in each case on the basis of the statistical significance of the regressors. It is assumed that the error term u_t in (5) is weakly autocorrelated. However, instead of imposing a standard ARMA model specification we follow the exponential spectral approach of Bloomfield (1973) which is very suitable in the context of fractional integration.

INSERT TABLE 2 ABOUT HERE

Next we investigate whether the relationships of interest were different during the Covid-19 pandemic by redoing the estimation over the period from January 2020 to June 2022. These results are reported in Tables 3 and 4 for the differentials with respect to gold and silver respectively. In contrast to the previous period, mean reversion is not found in any case for the silver differentials whilst it only occurs vis-à-vis NZX in the case of gold; in all other cases the estimates of d are equal to or higher than 1. It is clear therefore that during the pandemic both precious metals considered could very effectively be used as a safe haven.

4. Conclusions

This paper analyses the stochastic properties of the differential between gold and silver prices in turn and 22 stock price indices using fractional integration methods. The aim is to establish whether gold and silver can be considered safe havens in the sense that there exist no long-run linkages with stock prices and thus these assets are insulated from stock market developments; the analysis is carried out for both a pre-Covid sample and for the pandemic period to establish whether gold and silver can be seiffeeesilver ones previously obtained by other researchers such as Baur and McDermott (2010), Coudert

Table 1: Estimates of d for the GOLD differential. Sample ending in Dec. 2020

Series	No terms	An intercept	An intercept and a linear time trend
AOR	0.97 (0.93, 1.03)	**0.96 (0.92, 1.01)**	0.96 (0.92, 1.01)
AXJ	0.93 (0.87, 1.02)	**0.96 (0.92, 1.01)**	0.96 (0.92, 1.01)
BFX	0.97 (0.91, 1.00)	**0.95 (0.91, 1.00)**	0.95 (0.91, 1.00)
BSE	0.98 (0.94, 1.03)	**0.96 (0.91, 1.00)**	0.96 (0.91, 1.00)
BVS	1.00 (0.95, 1.05)	**0.98 (0.93, 1.03)**	0.98 (0.93, 1.03)
CAC	0.97 (0.93, 1.03)	**0.95 (0.90, 1.00)**	0.95 (0.90, 1.00)
DOW	0.98 (0.94, 1.03)	0.95 (0.90, 1.00)	**0.94 (0.90, 1.00)**
GDA	0.99 (0.93, 1.02)	**0.97 (0.93, 1.02)**	0.97 (0.93, 1.02)
GSP			

Table 2: Estimates of d for the