International Review of Financial Analysis xxx (2015) xxx–xxx

Contents lists available at ScienceDirect

International Review of Financial Analysis

Are gold and silver a hedge against inflation? A two century perspective

Georgios Bampinas, Theodore Panagiotidis *

Department of Economics, University of Macedonia, Greece

ARTICLE INFO

Available online xxxx

JEL classification:
C22
C32
C58
G15

Keywords:
Gold prices
Silver prices
Inflation hedge
Time-varying cointegration

ABSTRACT

This study examines the long-run hedging ability of gold and silver prices against alternative measures of consumer price index for the UK and the US. We employ a dataset that spans from 1791 to 2010, and both a time-invariant and a time-varying cointegration framework. We find that gold can at least fully hedge headline, expected and core CPI in the long-run. This ability tends to be stronger when we allow for the long term dynamics to vary over time. The inflation hedging ability of gold is on average higher in the US compared to the UK. Silver does not hedge US consumer prices albeit evidence emerges in favor of a time-varying long-run relationship in the UK.

1. Introduction

Gold and silver have played a major role in the history of money and monetary policy. They have traditionally acted as medium of exchange, store of wealth, and a unit of value (Goodman, 1956; Solt & Swanson, 1981). In contrast to many other multifaceted commodities, they are durable, relatively transportable, universally acceptable and easily authenticated. Gold as the most acclaimed precious metal in human history, still plays a pronounced role as a store of value especially in times of uncertainty. This feature stems from the 'flight to quality' behavior of investors who purchase gold in search for safer assets (Baur & Lucey, 2010). As precious metals represent claims to real rather than nominal assets, under the Fisher's (1930) framework, gold and silver are expected to hedge against inflation.[1] An expected increase in consumer price level may induce individuals to convert their current liquid assets into gold, influencing its price (Fortune, 1987).[2] Therefore, gold and silver prices could effectively gauge inflation expectations since, commodity prices are generally considered to be able to incorporate new information faster than consumer prices (Mahdavi & Zhou, 1997).

To the best of our knowledge, historical data have not being employed so far to examine the long-run (*LR*) hedging ability of gold and silver. This article fills this gap by looking at over 200 years of annually data for the UK and the US gold and silver markets. The renewed attention for the role of precious metals, as fundamental investment strategy against the eroding impact of inflation, further reinforces the goals of this study: (i) assess the historical role of gold and silver prices as a hedge against headline, expected and core CPI measures and (ii) examine the hedging ability of these two precious metals in a time-invariant (TI) and a time-varying (TV) cointegration framework that allows for nonlinear adjustment and the smooth evolution of the long-run relationship.

Laurent (1994) notes that during the 1800 to 1992 period, the price of gold and the general level of prices (wholesale prices) in the US have corresponded quite closely. Jastram (1978) indicates that the study of gold in the US is a logical companion piece to the study of UK, given that economic institutions are akin and common factors influence their commerce and finance. London was the undisputed center of the world capital markets during the gold standard, since the Bank of England could exert a powerful influence on the money supplies and price levels of other gold-standard countries (Bordo & Schwartz, 1994). Moreover, the US has been a prime mover in silver markets since the last quarter of the nineteenth century (Jastram, 1981). Concerning inflation, Siegel (2008) ascertains a similar pattern between the US and the UK consumer price level in the last 150 years, which is characterized by a significant overall inflation until World War II and protracted inflation later. Thus, the UK and the US can be considered as the most preferable cases for examining the historical long-run hedging ability of gold and silver.

Our paper is broadly related to a literature that used cointegration to study the hedging abilities of an asset in the long-run (Ely & Robinson, 1997; Anari & Kolari, 2001). Research into the gold/CPI relationship, though, produced mixed evidence. Garner (1995), Mahdavi and Zhou

* Corresponding author.
E-mail addresses: bampinasg@uom.edu.gr (G. Bampinas), tpanag@uom.edu.gr (T. Panagiotidis).

[1] The proposition that ex ante nominal asset returns contain the market's perception of anticipated inflation rates can be applied to all assets in efficient markets, also known as Generalized Fisher Effect (GFE, henceforth) (see, Jaffe & Mandelker, 1976).

[2] The theoretical argument developed in Fortune (1987) emphasized the substitution effect rather than the wealth effect. The author developed an equilibrium model, focusing on the US demand side of gold.

http://dx.doi.org/10.1016/j.irfa.2015.02.007
1057-5219/

(1997) and Tully and Lucey (2007) have documented an insignificant *LR* relationship between gold price and CPI, while Gosh et al. (2004) and Worthington and Pahlavani (2007) assert a significant positive relationship in the US.[3] On the other hand, the empirical literature for the hedging ability of silver is less extensive. Adrangi et al. (2003) argue that investment in gold and silver may be reliable inflation hedges in both the short- and long-term. McCown and Zimmerman (2006, 2007) provide evidence in favor of the hedging ability of gold and silver against inflation risk, especially over longer time horizons. Aggarwal and Lucey (2007) study psychological barriers in gold prices. A recent study by Wang et al. (2011) observes that time and market selection are the keys to inflation hedge. They employ a threshold cointegration framework and find that the low cross elasticity, the incomplete price adjustment and the short-run rigidity of the price adjustment between gold price and CPI might eliminate the inflation hedge ability of gold.

The 2007–09 financial crisis, the rise in volatility of commodity prices in conjunction with the tendency of central banks to become net buyers of bullion have revived the discussion on the role of precious metals.[4] In March 2011, Chatham House Gold Taskforce was founded in order to captivate the multiple role of gold (including that of hedge against inflation) as a means of enhancing the performance of the international monetary system.[5] One widely held argument for a renewed role for gold is that its countercyclical qualities can serve as a hedge against specific risks, such as bouts of inflation or financial contagion. However, few would argue that a return of gold as an anchor in the international monetary system is feasible.[6] Nevertheless, from an investor's point of view, an examination of whether gold and silver prices historically maintain their value relative to consumer prices becomes increasingly important for several reasons.

From a practical perspective, many investors hold precious metals over long holding periods. Therefore, it is crucial to examine whether gold and silver prices move together with consumers prices over longer horizons. This applies to both long-term institutional and individual investors, for whom real-term capital preservation is a primary objective. In addition, the puzzling results of previous studies as well as the provided evidence for instabilities in precious metals and goods prices further reinforce the case for employing a time-varying approach (see, e.g., Beckmann & Czudaj, 2013; Batten et al., 2014). In our analysis, the *LR* coefficients quantify the intensity of the relationship between the two precious metals and alternative consumer price measures. Gold and silver could be a poor hedge against inflation in the short-term, but as the investment horizon increases they may provide adequate *LR* hedging properties. Furthermore, while investors and central banks have been buying gold in order to protect themselves against inflation risk, less attention has been given to silver. Silver, as one of the most attractive naturally occurring elements, may also provide inflation hedging properties.[7] Lastly, precious metals and consumers prices are both known to be integrated processes, thus estimating regressions in terms of their first (or higher order) differences implies partial loss of valuable long-run information (Anari & Kolari, 2001).

With these concerns in mind, this study examines the generalized Fisher effect using over two centuries of data for gold, silver and consumer prices. We employ time-invariant and time-varying cointegration analysis, that allows us to utilize the long-run information and account for different regimes. The key findings of the paper are as follows: (i) the real price of gold and silver is stationary when we account for structural breaks, (ii) we get moderate (strong) evidence of time-invariant (time-varying) cointegration between the precious metal prices and alternative CPI's for the US and the UK, (iii) the average *LR* betas for gold are above unity indicating superior hedging ability, (iv) the average long-run beta for gold is higher in the US compared to the UK, (v) more stability is observed in the long-run hedging ability of gold vs expected inflation during the last decades and (vi) the long-run relationship between silver and CPI in the UK emerges only when we consider the case of time-varying cointegration.

The remaining parts are as follows: Section 2 describes the data and Section 3 presents the methodology. The results are discussed in Section 4 and Section 5 concludes.

2. Data

The empirical analysis is conducted using annual data on consumer prices, gold prices and silver prices in the UK and US over the period 1791 to 2010.[8] The sample period for silver prices starts in 1792 for both countries. The inflation series are obtained from Reinhart and Rogoff (2011) (RR series).[9] Gold and silver prices are obtained from Officer and Williamson (2011) and the Kitco Metals Inc, respectively.[10] Following Bekaert and Wang (2010), the precious metals prices were converted into local currency (USD $ and GBP £ per ounce), therefore, their hedging ability may also be due to currency movements, rather than to changes in their prices per se. The data (in logarithms) for the US and the UK are presented in Figs. 1 and 2, respectively. An initial observation suggests that gold, silver and consumers price data went through many shifts over time, in both countries. We observe that for long periods in the 19th and 20th century gold and silver prices remain constant, reflecting the nominal price rigidity under periods of *monometallic* or *bimetallic* regimes.

In order to extract expected CPI measures, we employ two methodologies: the linear Hodrick and Prescott (1980, henceforth *HP*) filter and the asymmetric band-pass filter proposed by Christiano and Fitzgerald (2003, henceforth *CF*).[11] Each of these filters produce a long-term trend component of a series that may then be used to examine the long-run relationship of the historical prices of gold and silver and the expected consumer price level.[12]

We employ two different estimates for core CPI: the exponentially smoothed core inflation estimator proposed by Cogley (2002) and a wavelet method proposed more recently by Dowd et al. (2011).[13] The latter compares the wavelet-based core measures against a number of alternative measures (including Congley's low pass filter) and conclude that the former generally performs better. We utilize both the single

[3] See also Chua and Woodward (1982), Kaufmann and Winters (1989) and Tkacz (2007) who document a positive relationship between gold and inflation in the US.

[4] Speaking in the Financial Times before the G20's core reform agenda in Cannes, Robert Zoellick, the president of the World Bank, has stated that a new monetary system should 'consider employing gold as an international reference point of market expectations about inflation, deflation and future currency values' (see, Zoellick, R. 'The G20 must look beyond Bretton Woods II', Financial Times, 7 November 2010).

[5] Between 1929 and 1931, Chatham House convened a special Study Group having John Maynard Keynes as a member, in order to examine the problems arising from the post-war international monetary settlement, which contributed to the Great Depression and ultimately led to the suspension of the Gold Standard by the British government in September 1931. Available at: http://www.chathamhouse.org/publications/papers/view/178235.

[6] The term anchor refers to whether gold has a role in being tied to or linked with the expansion or contraction of the global monetary base.

[7] The time period that central banks viewed silver on par with gold as a reserve can be traced back to 1923. The St Louis Fed's report on this issue is available at: http://fraser.stlouisfed.org/docs/publications/FRB/pages/1920-1924/43097_1920-1924.pdf.

[8] A detailed description of the data is given in the Appendix.

[9] Note that the base of the CPI was set to 100 in 1791.

[10] http://www.measuringworth.com/gold/ and http://www.kitco.com.

[11] For the HP method, we follow Ravn and Uhlig (2002) by setting the penalty parameter equal to 6.25, for annual data.

[12] Ash et al. (2002), using long annual data, evaluate the usefulness of HP-filtered time series as a proxy for rational expectations applying a battery of tests for rationality. From their analysis of the US inflation data, they conclude that over the long period of 120 years the HP filter is weakly rational, being unbiased but inefficient. Orr et al. (1995) and Martin and Scarpetta (1999) also proxy inflation expectations with the HP filter. Smant (1998) argues that the HP filter generates a price series which is consistent with price expectations formed rationally indicating that HP filter incorporates a substantial element of 'perfect foresight' price expectations.

[13] Wavelet analysis involves the application of successive approximations to remove more and more high-frequency detail, or noise, and so help reveal an underlying signal (or shape) of the data. The procedure for the selection of plausible wavelet-based measures of core inflation is described in Dowd et al. (2011, pp. 521–522).

Please cite this article as: Bampinas, G., & Panagiotidis, T., Are gold and silver a hedge against inflation? A two century perspective, *International Review of Financial Analysis* (2015), http://dx.doi.org/10.1016/j.irfa.2015.02.007