



Contents lists available at ScienceDirect

## International Review of Financial Analysis



## The gold price in times of crisis

Jędrzej Białkowski<sup>a</sup>, Martin T. Bohl<sup>b</sup>, Patrick M. Stephan<sup>c</sup>, Tomasz P. Wisniewski<sup>d,\*</sup><sup>a</sup> University of Canterbury, Department of Economics and Finance, New Zealand<sup>b</sup> University of Münster, Department of Economics, Germany<sup>c</sup> FOM University of Applied Sciences, Institute of Empiricism and Statistics, Germany<sup>d</sup> University of Leicester, School of Management, United Kingdom

## ARTICLE INFO

Available online xxxx

JEL classification:

G10  
G11  
G12  
G18

Keywords:

Gold price  
Speculative bubble  
Markov regime-switching ADF test  
Global financial crisis  
European sovereign debt crisis

## ABSTRACT

Motivated by the recent gold price boom, this paper examines whether an asset bubble exists in the gold market. We approximate gold's fundamental value using several econometric models and apply a Markov regime-switching Augmented Dickey–Fuller (ADF) test which has substantial power for detecting explosive behavior. Although our results are sensitive to the specification of the fundamental value, we show that a model accounting for the current European sovereign debt crisis accurately tracks the gold price observed in the market. We also note that inflation in a general commodity price index and gold ETF demand have a potential to explain the price trajectory.

© 2014 Elsevier Inc. All rights reserved.

## 1. Introduction and literature review

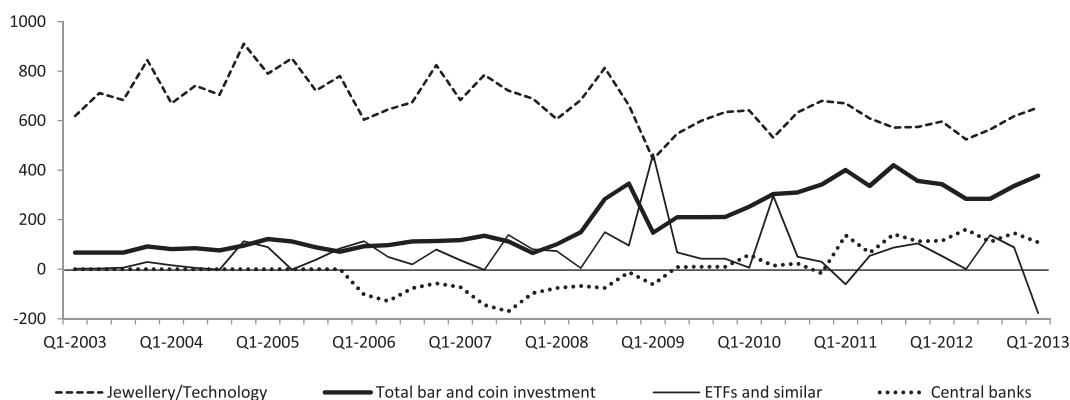
Since 2001, the price of gold has skyrocketed from a level of US\$ 250 per troy ounce to an all-time high of US\$ 1900 in August 2011, before falling substantially to around US\$ 1200 at the end of June 2013. At first blush, this price trajectory may bear a resemblance to a bubble path. In addition, investment demand for gold has increased substantially over the last decade, which attests to the rising interest in gold as a financial asset (see Fig. 1).<sup>1</sup> It needs to be mentioned, however, that the considered period witnessed some extreme shifts in the underlying economic fundamentals, which are bound to affect the intrinsic value of gold. The recent world financial crisis was characterized by crashing real estate and stock market valuations as well as bank failures, while the current European sovereign debt crisis substantially increased the default risk of several countries. At the same time, interest rates on bank deposits were pushed to very low levels. Related to this, central banks have carried out a very expansive monetary policy addressing the refinancing problems of banks and governments, but simultaneously increasing inflation expectations.

In circumstances like these, investment in gold became a rather appealing option, and financial market participants might have increased its portfolio weight significantly. Gold is seen as a globally accepted currency which never loses its purchasing power, and maintains its value even in the face of erosion of the monetary or banking systems. Not surprisingly, gold has a special position among other precious metals. The study of Batten, Ciner, and Lucey (2010) provides only limited evidence that the volatility of the gold market is affected by the same macroeconomic factors as is the case for other precious metals. The risk-mitigating characteristics of gold have been discussed in prior literature, which evaluated the increasingly important role of gold as a dollar hedge (Capie, Mills, & Wood, 2005; Sjaastad, 2008; Tully & Lucey, 2007; Zagaglia & Marzo, 2013), an inflation hedge (Adrangi, Chatrath, & Raffiee, 2003; Blose, 2010; Worthington & Pahlavani, 2007) and a portfolio diversifier (Hillier, Draper, & Faff, 2006; Jaffe, 1989).<sup>2</sup> In addition, gold is regarded as a safe haven in times of turmoil (Baur & Lucey, 2010; Baur & McDermott, 2010; Chan, Trempkaruna, Brooks, & Gray, 2011; Ciner, Gurdgiev, & Lucey, 2013). On the other hand, the recent gold price boom might indicate a speculative bubble. For example, Phillips and Yu (2010) find evidence for a speculative bubble moving from the equity market (up to 2000) over the US housing market (up to 2007) to the crude oil market (up

\* Corresponding author.

E-mail address: t.wisniewski@le.ac.uk (T.P. Wisniewski).

<sup>1</sup> For further information on the global gold market see, for instance, Shafiee and Topal (2010).<sup>2</sup> In the same vein, there is also evidence that gold serves as a store of value against other major currencies (Pukthuanthong & Roll, 2011; Sjaastad & Scacciavillani, 1996).



**Fig. 1.** Gold demand. Notes: The figure shows gold demand by category (in tonnes). Source: World Gold Council (2013).

to mid-2008). Thus, we ask whether the gold market is another victim of such a wandering asset price bubble.

Consideration of price bubbles is important, as they are usually symptomatic of an inefficient resource allocation and can lead to market crashes that reverberate within the wider society. So far, to the best of our knowledge, the possibility that the gold price may currently exhibit a speculative bubble has attracted attention in the academic literature, but no final conclusion has yet been reached. The present paper aims to extend the existing evidence by applying an econometric technique which allows for early detection of explosive behavior in prices. While the future gold returns may be positive as well as negative depending on the factors that underpin the price formation process, any insights into whether a bubble exists can inform judgments about the likelihood of future dramatic market implosions. For this reason, the conclusions offered are relevant not only to academics, but to decision-makers and investors alike. The inferences may be helpful to gold mine managers who need to make long-term operational decisions that take into account future market prices and given extraction costs. They may also be instructive to investors who contemplate their investment and diversification strategies, as well as their hedging needs. Finally, in view of the results, central banks may consider whether to replenish or monetize their gold reserves, determine the extent of their involvement in gold leasing schemes and frame early monetary policy responses.

Until now, econometric testing for speculative bubbles has mainly been focused on (US) stock markets. [Gürkaynak \(2008\)](#) provides a recent in-depth survey of econometric methods used for detecting asset price bubbles. This survey includes the well-known variance bounds tests, West's two-step method, cointegration-based tests as well as the concept of intrinsic bubbles and methods treating bubbles as an unobserved variable. By contrast, little effort has been made to date in identifying speculative bubbles in the gold price. [Blanchard and Watson \(1982\)](#) draw on runs and tail tests, but are unable to conclude whether the gold price was unjustifiably high between 1975 and 1981, given the caveats of their methodology. [Diba and Grossman \(1984\)](#) investigate the stationarity properties of the gold price for the time period from 1975 to 1983, and find that it was entirely based on market fundamentals.

As shown by [Evans \(1991\)](#), however, the ordinary unit-root and cointegration tests do not allow for the detection of the important class of periodically bursting bubbles. Due to the bursting nature of such bubbles, these tests have a tendency to reject the null hypothesis of non-stationarity in favor of the stationary alternative all too often. Being aware of this critique, [Pindyck \(1993\)](#) draws on the convenience yield approach, and calculates gold's fundamental value based on the present value model for commodities. Running tests of forecasting power, Granger causality, and restrictions of appropriately specified vector autoregressive (VAR) models, [Pindyck \(1993\)](#) finds evidence in

favor of gold price bubbles between 1975 and 1990. In addition, based on a dynamic factor model, [Bertus and Stanhouse \(2001\)](#) focus on the gold futures market, and provide weak support for the bubble hypothesis during notable socioeconomic events in the time period from 1975 to 1998. Finally, [Drozd, Grümmer, Ruf, and Speth \(2003\)](#) make use of a log-periodic power law (LPPL), and detect a gold price bubble, analyzing the interval between 1978 and 1982.

With regard to the recent gold price boom, only a few studies provide preliminary empirical evidence. Drawing again on the LPPL approach, [Drozd, Kwapien, Oswiecimka, and Speth \(2008\)](#) support the hypothesis of a gold price bubble from 2003 to 2008. In particular, they are even able to identify a local bubble on top of a long-run bubble, so that the former is called a "super-bubble". In addition, following [Pindyck \(1993\)](#), [Went, Jirasakuldech, and Emekter \(2012\)](#) build on the convenience yield model, and run the duration dependence test which indicates gold price bubbles in the time span from 1976 to 2005. Unfortunately, their approach suffers from the fact that they cannot conclude when speculative bubbles affected the gold price exactly. [Homm and Breitung \(2012\)](#) use the Supremum Augmented Dickey–Fuller (SADF) test, and find evidence for gold price bubbles between 1968 and 1980 (at the 1%-level) and between 1984 and 2010 (at the 10%-level). However, their methodology only tests for explosiveness in the price time series itself, and does not take gold's fundamental factors into consideration. As a consequence, [Homm and Breitung \(2012\)](#) are thus unable to conclude whether their findings might result from major economic events such as the recent world financial crisis and the current European sovereign debt crisis rather than speculative excess. In a similar spirit, [Baur and Glover \(2012\)](#) also draw on the SADF test, and find evidence of explosiveness in the gold price series without allowing for a fundamental value.<sup>3</sup> Finally, [Lucey and O'Connor \(2013\)](#) use gold's lease rates in order to approximate the fundamental value of gold. Their application of the Markov regime-switching ADF test gives mixed evidence regarding the existence of gold price bubbles.

In order to overcome these caveats, we propose to construct gold's fundamental value making use of its role as a dollar hedge, inflation hedge, portfolio diversifier, and safe haven. Drawing on the deviations of the actual gold price from its fitted value, we then apply a Markov regime-switching ADF test to identify periods that are characterized by explosive behavior. Based on estimated probabilities of being in the possible bubble and the non-bubble regime, this approach thus also allows for the detection of speculative bubbles during the recent

<sup>3</sup> Admittedly, however, in another study [Baur and Glover \(2014\)](#) provide economic reason for their bubble hypothesis by analyzing the activities of fundamentalists and chartists on the gold market. Their empirical results show that both agent types are important in explaining historical gold prices but that the 10-year bull run of gold in the early 2000s is consistent with the presence of agents extrapolating long-term trends, which might have resulted in a non-fundamental price exaggeration.

Download English Version:

<https://daneshyari.com/en/article/5084562>

Download Persian Version:

<https://daneshyari.com/article/5084562>

[Daneshyari.com](https://daneshyari.com)