Using the Econometric Model in the Analysis Geopolitical Issues of Gold

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Published: May 2018

Abstract

Gold is a much sought after resource in the modern world economy. Until the previous decade, the 10 countries were thought to hold the maximum reserves of gold. Our study extends the Geopolitical Issues of Gold on commodity prices of gold (in USD and EUR) by investigating the spillover between them. First, we study appropriately the statistical analysis of the world mine reserves of gold during the period 2011-2016, by region. This paper contributes to the existing literature by presenting an advantageous and a new frequency approach based on the econometric and political analysis. Using monthly data for gold prices from July 1979 to December 2016, we find that gold (in USD and EUR) has a high degree of interaction during the study period. This paper analyzes the causal direction of the correlation between gold prices in USD and EUR and examines the theoretical and empirical relationships between them.

Keywords: Gold geo-politics; Political analysis; Econometric.

1. Introduction

Gold is considered the world’s most strategic commodity and, therefore, its price is strategically more important than those of other commodities. The technology revolution that has occurred since 2000, accompanied by the boom in international trade, has led to the characterization of gold as a global commodity with high volatility. Gold is known as the most strategic metal because a shift in gold price generates a parallel shift in other metal prices. In the last decade, these commodity prices were not determined by basic market supply and demand. Indeed, the US crisis in 2002 generated a simultaneous expansion in gold indices. The boom cycle of these indices continued until the first quarter of 2008. However, due to the subprime and economic crises in the second half of 2008, the expansion has been reversed. Further, the price of gold declined in the second half of 2008, from 30$ to 20$ per kg. These related price changes were observed again in 2009, corresponding with the global economic recovery. The rising price of gold indicated the start of a new boom cycle for this commodity. More recently, from 2012 through 2014, we observed another dramatic decline in gold prices from 60$ per kg to 40$ per kg.
In addition, gold is considered as a tool for hedging against inflation. Indeed, when the prices of commodities rise, investors anticipate a rise in inflation. Thus, policymakers tighten monetary policies by hiking interest rates. Such reactions compel all economic agents to be vigilant about gold price changes. More specifically, policymakers closely watch the gold price because it is an indicator of the suitability of monetary policy. We note that research on commodity markets, especially the gold market, has evolved. The literature related to the gold market started by studying markets efficiency, in line with neoclassical finance (e.g., [1, 5, 6]). At the same time, researchers have been interested in the price of gold and its impact on economic activity (World Gold Council 2013). Moreover, in line with the emergence of behavior finance, the literature has focused on the relationship between gold with the stock market. Further, gold is considered as an asset for portfolio diversification (see, [9, 10]), while forecasting the price of gold using dynamic model averaging (see, [12]).

Research in this area has evolved in order to explore the main fundamental drivers of each market. Therefore, gold prices, and their relationship with some macroeconomic factors, are analyzed. Some researchers consider gold a dollar hedge (see, [7, 12]), others consider it an inflation hedge (see, [2, 8]). More recently, few studies have focused more on the relationship between the gold market and other commodity markets (see, [14, 15]). Some of these works explain the relationship between these markets, without the use of noise traders, a fundamental aspect of finance. Further, some key issues have not been discussed by the literature, including whether there is strong linkage between the gold (in USD and EUR) markets, whether this linkage evolves across a timescale (short-and long-term interactions), and how the markets influence each other. These outstanding topics are of crucial and practical significance for further recognizing the features of commodity markets, for forecasting their price volatility and to address some important issues such as hedging strategies. Moreover, our work is related to this recent strand of research (trade noise), and focuses more on the relationship between gold (in USD and EUR) markets, with a new econometric-geopolitic approach. With this technique, we complete previous studies, simultaneously analyzing the co-movement measure and direction of causality between these markets. Further, we decompose the interaction between gold (in USD and EUR) prices across different frequencies, allowing the investigation of different transmission channels during period 1979-2016.

Our study extends the literature on commodity prices of gold (in USD and EUR) by investigating the spillover between them. First, we study appropriately the statistical analysis of the world mine reserves of gold during the period 1979-2016, by region. In that period Europe & Eurasia has the highest proven gold reserves in the last two decades. Over the previous decade, proven gold reserves of all regions show a decrease, however, the highest increment has been in the case of Asia Pacific. This is primarily due to increase in Russia's proven gold reserves, which are claimed to be the largest in the world. Russia holds 1,208,2 tonnes of gold, which represents 12.2% of its reserve. Russia has doubled its gold reserves in recent years and is likely to keep buying. Second, few studies have appropriately analyzed the linkage between these two prices (gold in USD and EUR), and a better understanding of the transmission mechanisms between them could be very useful for monetary authorities, investors, and traders. Third, the empirical results permit this study to address some important issues such as hedging strategies, and forecasting for traders.

From an empirical perspective, this paper contributes to the existing literature by presenting an advantageous and a new frequency approach, the econometric and political analysis. Using monthly data for gold prices from July 1979 to December 2016, we find that gold (in USD and EUR) has a high degree of interaction during the study period. Compared to the previous literature, particularity of our paper is analyzing the causal direction of the correlation between gold price (in USD and EUR). Indeed, the economic interests of Europe and the US is no longer just a matter of turnover linked to performance and economic rationality but also to the conquest of world gold resources in different continent.

Africa is not spared from this logic of domination either directly by the possession of the gold reserves of the independent states e.g. “France” or indirectly by the exploitation of mineral deposits by the American and European multinational corporations. The question that arises is why gold is so important?

The value of gold is not only related to its use, but also to its relation to money, it is considered as a guarantee to the possibility of collapse of the value of money, with inflation on the rise and gold run looming. President Richard Nixon’s team enacted a plan that ended dollar convertibility to gold and implemented wage and price controls, which soon brought an end to the Bretton Woods System. The British exit before the actual and definitive entry into the European Union can be suspected, which hides behind a possibility of collapse of the European economy. American multinationals installed in England do not seek a replacement within the “Europe”, on the contrary they are willing to pay now the price, but win in the long run.

2. Background of the Study

Gold production in many countries, especially in developing or emerging markets, has declined in the last few
years, as the depressed price level of gold has led many mining operations to shut down or downsize significantly.

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<td>34127.1</td>
<td>34765.8</td>
<td>36805.8</td>
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Source: Statistical review of World Gold Council, 2017

Proven reserves are reserves claimed to have a reasonable certainty of being recoverable under existing economic and political conditions, with existing technology. Over the past two decades, proven gold reserves have increased by more than 2%. At the end of 2016, proven gold reserves reached 36805.8 Tonnes, sufficient to meet 54.2 years of global production (World Gold Council, 2017).

Europe & Eurasia has the highest proven gold reserves in all of the two decades. Over the previous decade, proven gold reserves of all regions show a decrease, however, the highest increment has been in the case of Asia Pacific. This is primarily due to increase in Russia's proven gold reserves, which are claimed to be the largest in the world. Russia holds 1,208.2 tonnes of gold, which represents 12.2% of its reserves. Russia has more than doubled its gold reserves in recent years and is likely to keep buying. In 2011, Russian Prime Minister Vladimir Putin claimed the United States was “like a parasite” on the global economy and said the dominance of the dollar as a world reserve currency is a threat to the financial system (see, [4]). In 2013, Russia's central bank added 77 tonnes of gold to its official reserves (see, [3]). Last year, Russia bought another 173 tones to its reserves, accounting for 36% of total central bank demand (see, [11]).

Figure 1: Proven gold reserves: A comparison over the decades.
The center of gravity of gold exploration and production is shifting to the eastern hemisphere as new reserves are being discovered in China, Russia, the United States, Peru and Australia (World Gold Council, 2017). Major part of the gold reserves still lies in Europe. The Euro Area holds 85.4% of all the continental Europe’s gold reserves (excluding European ex-Soviet Union countries but including the Baltic Countries). It also represents 93.3% of all the European Union’s gold reserves and 90.2% of the Central Bank Gold Agreement (CBGA) countries gold reserves. It is evident, then that the Euro Area controls most of the European official gold reserves, however, new reserves and advanced technologies of extracting gold means that one can predict a future. For the Pacific: The world’s largest producer of gold is a candidate to seize the place of the United States as the world’s first gold-holding country, China has become an inescapable gold market. Yet Beijing is no longer publishing on the exact amount of its gold reserves. Hundreds of tons of gold produced annually are not exported, while China continues to import in bulk.

In six points, the round of reasons that give China an increasing weight in the gold market. But also in the world economy market: China wants to back its currency to gold, to make it an international currency, equal to the dollar, the yen or the euro. And the International Monetary Fund (IMF) has made it a reference currency since October 2016.

The continuous rise in Chinese gold stocks and the veil thrown on their exact volume has reasons; China plans to back its YEN to gold. This would allow the YEN to become an internationally recognized currency, a gold standard backed by tangible value.

If China takes second place in the world’s largest gold holders, it will still be behind the United States, whose dollar is still the most recognized currency in the world. And China also has much larger foreign currency reserves than those in European countries or even the United States. To back the gold YEN, the Chinese giant will have to continue to accumulate gold in reserve before it can use its currency in a position of strength in world trade.

Beijing is already ahead of schedule: China has signed agreements with Russia, Japan, Indonesia and Brazil to bill their trade in their own currency, not in dollars.

Finally, unlike Germany, Switzerland, France or even more recently US states, China does not need to repatriate its gold stock to reassure its national economy. It does not need it because it does not export it: the YEN therefore takes more and more its ease at the top of a mountain of gold, whose height is unknown.

The black continent holds half of the world's gold reserves identified. After oil, gold is one of the top five global markets in the mineral sector; it weighs about 65 billion a year. Africa is increasingly coveted by multinational mining companies, in addition to the large gold reserves; the share of the state's operating revenues has been reduced to the extreme (20%, or even 0% as is the case with a gold mine in Botswana). The African workforce is very cheap, trade union movements are quickly suppressed and environmental standards are not enforced or restricted. As a result, the profit margin achieved by the major western mining companies is higher than in any other place on the planet. Over the past decade, with the spectacular rise in gold prices, foreign investment has skyrocketed in the gold sector, especially in West and Central Africa.

### 3. Geopolitical of Gold, Data and Summary Measures

Considering the historical annual average closing gold prices per ounce (USD and EUR) data for Microsoft stock over the period 06/1979 to 06/2016 (see World Gold Council, 2017) and let \( r_t \) is the continuously compounded growth rate in gold prices between annual \( t-1 \) and \( t \).

\[
    r_t = 100 \times \log \left( \frac{P_t}{P_{t-1}} \right),
\]

where \( P_t \) and \( P_{t-1} \) denote the gold price in annual \( t \) and in annual \( t-1 \), respectively.

We have 39 price observations and 38 return observations in total. Based on this information, the gold price returns rate in USD and EUR was determined, and also the performance of the gold prices for the 38 year period analyzed. The graphical representation of gold returns is illustrated as Figure 2 and 3. We used the regression econometric model meant to evaluate the relation between the current gold prices per ounce in USD and in EUR.

In the first stage, the data processed with the help of Microsoft Excel were imported in a new application created in Eviews. Statistical tests were applied for the two data series considered and the evolution of the two indicators was graphically represented. The results are displayed below:

Figure 2: Statistical Tests for Gold Price Returns Rate in USD.

Figure 3: Statistical Tests for Gold Price Returns Rate in EUR.
Tables provide the descriptive statistics of gold return series. The mean value is close to zero while the standard deviation is much larger. The Jarque-Bera statistic rejects the null hypothesis of Gaussian distribution at 1% significance level implying the fat-tail distribution, also evidenced by the positive Skewness and high values of Kurtosis. The statistics of Augmented Dickey-Fuller (ADF) and Phillips-Perron unit root tests based on the lowest AIC value reject the null hypothesis of a unit root at 1% significance level indicating that the return series are stationary. Out of the graphs above it can be noticed that the repartition of the two data series is a very similar one which means that there is a pronounced dependence between the two sizes. This idea can be sustained also by the argument of the graphic representation of the evolution of the two analyzed indicators.

![Figure 4: Evolution Gold Price Returns Rate in USD and EUR.](image)

From the above graph it is obvious that the evolution of the two data series is more than similar which leads to the conclusion that there is a pronounced dependence between the two analyzed indicators. In order to establish the type of the econometric model to be utilized, to define the existing relation between the gold price returns rate in USD previously mentioned the gold price returns rate in EUR. A graph representation of the data series has been achieved, by drawing up the relative regression line.

![Figure 5: Relative Regression Line.](image)

Based on the observations made, the linear simple regression model was defined as:

$$\text{REND\_GOLDS}\text{D} = \alpha + \beta \cdot \text{REND\_GOLDEUR} + \epsilon$$

In Eviews, by using for estimation the least squares method, the parameters of the model identified above were estimated. Subsequently, the model was tested for validity by using specific tests:
According to the results of the previous stage, the regression model that describes the linear dependence between the evolution of the rate of return gold in USD and EUR can be written as:

\[ REND_{\text{GOLDUSD}} = 0.1904386776 + 0.9228020668 \times REND_{\text{GOLDEUR}} + \epsilon \]

The value recorded by Prob (0.0000) indicates the fact that the variable is significant from statistical point of view. Thus, we can conclude that the influence which the general evolution of the Gold Prices in EUR has upon the considered Gold Prices in USD is a significant one. The connection between the two variables is a direct one which shows that for a decrease of 1% of the Gold Prices in EUR yield, the Gold Prices in USD yield records an increase of 92.28%.

The value being recorded by R-squared shows that, at a ratio of 69.76%, the Gold Prices in USD yield is explained by the Gold Prices in EUR yield the difference up to 100% representing the influence of other factors not included in the present model.

Regarding the validity of this econometric model, it is confirmed by the tests performed by default in Eviews. It is appropriate to observe the values of R2, F-statistic (83.05971) or Prob(F-statistic) (0.00) tests. All this fully confirm the strength of the model and also the possibility to be used in future analyses, to estimate the evolution of the Gold Prices in USD depending on the evolution of the Gold Prices in EUR. The model justifies, based on official data recorded on the 38 years of historical annual Gold Prices, the idea, outlined in economic literature, that such econometric model can be successfully used to define and systematize, under a mathematical form, the relationships existing between various indicators specific to the Gold Prices. Also, it can be stated that the values of Gold in USD can be estimated starting from the values of Gold in EUR. They can be justified politically by:

- Any change in economic relations and the value of the currency between the Euro and US dollars will directly or indirectly affect the capacity for economic exchange between the two continents.
- For the United States, any initiatives to rationalize the value of the dollar will directly affect domestic consumption and production capacity.
- The production activities of most American companies based in Europe, depends on the European market. It is Europe that absorbs the inflation of the dollar next to the Golf countries.
- The gold reserve of a few states within Europe is not really tied only to their production capacity but also to their dominance over the reserves of other African states as an example: France.
- Europe's geopolitical problems with Russia are indirectly pushing Europe to strengthen co-operation ties with the United States.
• The dollar not linked to gold is scattered around the world especially as any transaction related to gold product is realized in dollars.

4. Conclusion

In this paper we have presented a new frequency approach based on the econometric and political analysis by studying the monthly data for gold prices from July 1979 to December 2016. By analyzing the correlation between the gold prices in USD and EUR, we have observed that there exist a high degree of interaction between them during the study period and that the value of Gold in USD can be estimated starting from the value of Gold in EUR. Our study justifies and confirms the possibility that the presented econometric approach can be used in future analysis, to estimate the evolution of the Gold Prices in USD depending on the evolution of the Gold prices in EUR and define and systematize, under a mathematical form, the relationships existing between various indicators specific to the Gold Prices.

Acknowledgment

We are grateful to the reviewers for their constructive comments that helped to improve the paper.

References