THE EFFECT OF THE S&P 500 ON GOLD PRICES

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Abstract:

The purpose of this project is to provide a better understanding of how S&P affected Gold prices from 2009-2022 and to analyze and see the correlation between S&P 500 and Gold prices with each other. This study will use regression analysis in excel as the ultimate indicator to measure and interpret the correlation between the two variables. From the analysis, we conclude that there is a weak positive correlation between gold prices and S&P prices. Despite, during this timeline, it was shown that the variables moved also in opposite directions, the model presented in this study is relevant as the Significance P suggests that the model is significant.

Keywords: *Gold prices, S&P 500, correlation, and regression*

JEL classification: *C5, G1, and G2.*

Introduction

One of the most commonly used ways to see the relationship and correlation between 2 variables is regression analysis. This study will make use of this method and will analyze the correlation between S&P 500 and Gold Prices. Firstly, will be given a background introduction explaining briefly the two variables of this study, and other indexes, explaining why the S&P index was chosen. Then using the historical data provided by finance yahoo, a regression analysis will be conducted using excel. The findings will then be better displayed in charts and tables. After that, the final step is making a conclusion and remarks regarding the correlation between the two from 2009-2022.

The Standard & Poor's 500 Index (S&P 500, or simply S&P) is a market capitalization-weighted index of the 500 largest U.S. firms listed on the New York Stock Exchange or Nasdaq Composite. The index was first published in 1923, while the S&P 500 was first published on March 4, 1957. The S&P 500, unlike the Dow Jones Industrial Average, is a market value-weighted index that includes 500 businesses from a variety of industries, as well as growth and value stocks. The S&P 500 is one of the most widely followed equity indices for these reasons, and it is widely regarded as one of the greatest representations of the US stock market.

Until 1971, when the gold standard was replaced by a fiat currency system, gold had served as money for thousands of years. Gold has been utilized as an investment since then. Gold is frequently categorized as a commodity, yet it functions more like a currency. Yellow metal has a low correlation with other commodities and is underutilized in the industry. The yellow metal, unlike national currencies, is not connected to any particular country. Gold is a global monetary

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asset, and its price reflects global sentiment, but it is mostly impacted by macroeconomic conditions in the United States.

The link between stock prices and gold prices is a hot topic of discussion. The conventional view holds that these two markets are inversely linked: when stocks rise, gold falls, and vice versa. This is usually the case since gold is a safe haven, and when traders go into defensive mode, they may prefer gold to riskier stocks. As shown in the graph below, there have been numerous instances where stocks and gold have moved in opposite directions. As a result, gold is a strong portfolio diversifier because it hedges against the S&P 500 Index. As a result, adding gold to your equity investment portfolio is a good idea.

Chart 1: Gold prices (yellow line, left axis) and S&P 500 Index (green line, right axis) from 1971 to 2017.

The chart, which shows the gold price and the S&P 500 Index, does, however, reveal periods of co-movement (think about the 2000s). It means that the gold-stock relationship shifts over time as a result of external influences, particularly macroeconomic issues. As a result, while there is typically a shift of funds from stocks to gold during stock market crashes, the relationship between the S&P 500 and gold is complex and depends on external macroeconomic factors.

During the 2020 coronavirus crisis, the finest example would be the correlation between the S&P 500 and gold prices. As shown in the chart below, the stock market and gold market both fell in March 2020, only to rally together in April. It appears as though when the stock market went down, investors sold gold holdings to raise cash and cover margin calls.

Chart 2: Gold prices (yellow line, right axis) and S&P 500 Index (green line, left axis) in 2020.

The Dow Jones Industrial Average (commonly known as the DJIA, Dow Jones, or just the Dow) is a stock index comprised of 30 big and well-known publicly-held firms that trade on the New York Stock Exchange or the Nasdaq (such as Apple, Coca-Cola, JPMorgan Chase, Microsoft, Wal-Mart, or Walt Disney). Charles Dow established the index in 1896, making it one of the world's oldest stock indices. It's also one of the most actively watched and frequently cited stock indexes as an indicator of stock market performance, mainly amongst the general public. However, because it does not take into consideration each stock's market capitalization and only covers 30 businesses, some experts believe the S&P 500 is a better indicator of overall market performance.

Literature Review

In his study J. Risk Financial Manag. 2019, Takashi applies a quantile regression model to investigate how gold returns respond to changes in various financial indicators. The model quantifies the asymmetric response of gold return in the tails of the distribution based on weekly data over the past 30 years. He conducted a statistical test that allows finding the relationship between gold return and some key financial indicators. According to his empirical analysis of the whole sample period, he found that: (1) the gold return rises significantly if stock returns fall sharply; (2) it rises as the stock market volatility increases; (3) it also rises when general financial market conditions tighten; (4) gold and crude oil prices generally move toward the same direction; and (5) gold and the US dollar have an almost constant negative correlation. Looking at each sample period, (1) and (2) are remarkable in the period covering the global financial crisis (GFC), suggesting that investors divested from stocks as a risky asset.

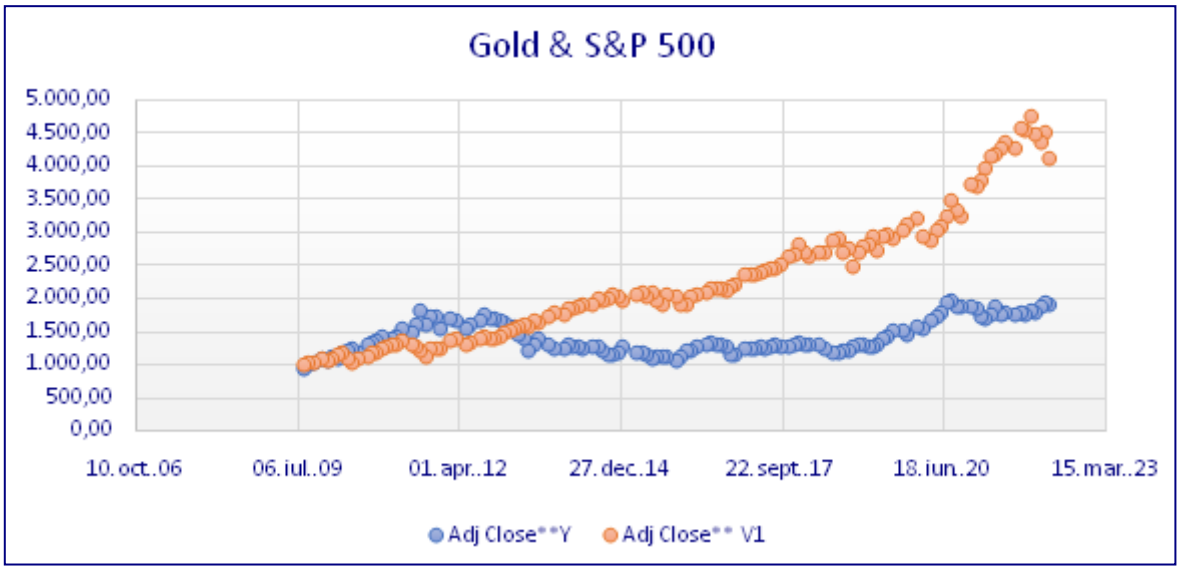
Methodology and Data

The methodology used will use primary sources taken from yahoo finance historical data including both Gold and S&P monthly prices from August 2009 to April 2022. Then using the statistical function in excel will be analyzed the data mainly by running a regression, and displaying it in different charts. This methodology will be objective as the data analysis which will be displayed by the graphs and tables will show the trend and performance of each of them in comparison with the other one. It will deal with numbers, logic, and an objective stance. Also,

an interpretation of regression statistics with be conducted to complement the received results and to give real meaning to the analysis.

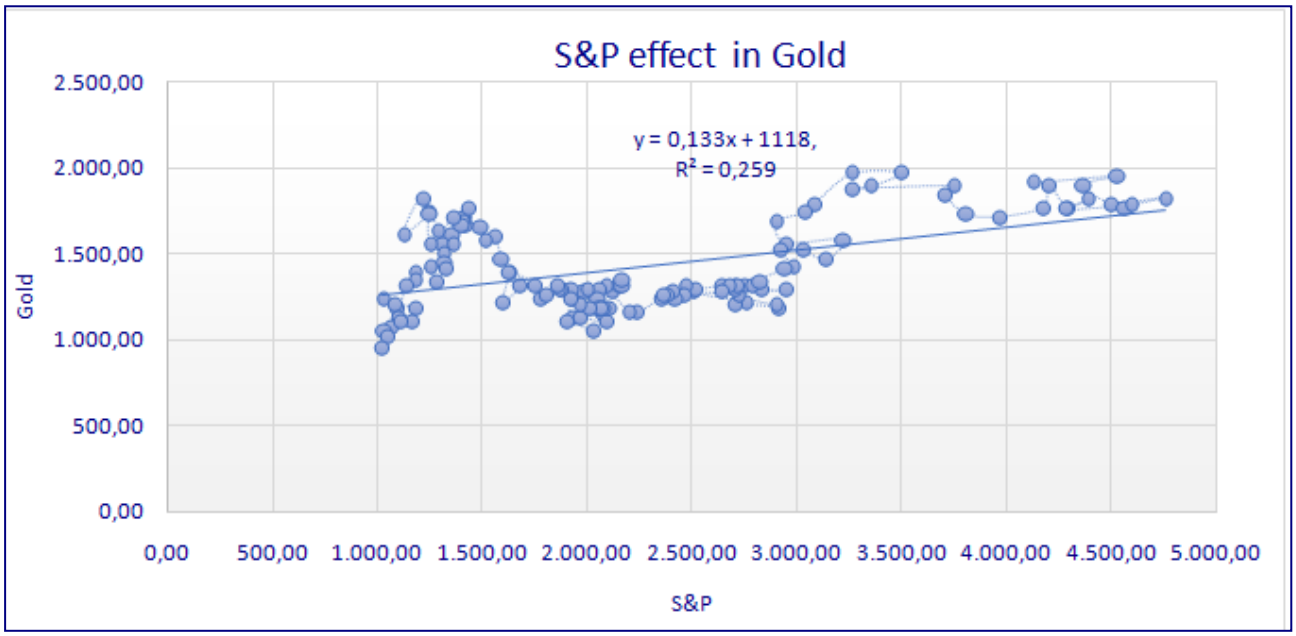
Results

As explained in the introduction part we see that S&P changes in the price sometimes move the gold price curve (red curve) in the same direction, and sometimes in the opposite direction.



By looking at the graph above, we can conclude that S&P prices' effect on gold prices in a timeline from 2009-2022 is not so clear, as sometimes is positively related (ex. 2020) and sometimes negative (2011). By having said so, I believe that the correlation between the independent variable and y (i.e., gold and S&P) is weak.

As we see the R Square which is the coefficient of determination, tells us that around 24% of the variation of gold prices around the mean is explained by the S&P prices. This tells us that the variables are positively correlated but in a weak form. This kind of correlation is also stated by the regression equation which as we see on the chart has a positive intercept which suggests that for each increase in the S&P price, there is a slight increase in the price of Gold.



Regression Analysis

Regression Statistics	
Multiple R	0,494933173
R Square	0,244958846
Adjusted R Square	0,239060087
Standard Error	220,9224974
Observations	130

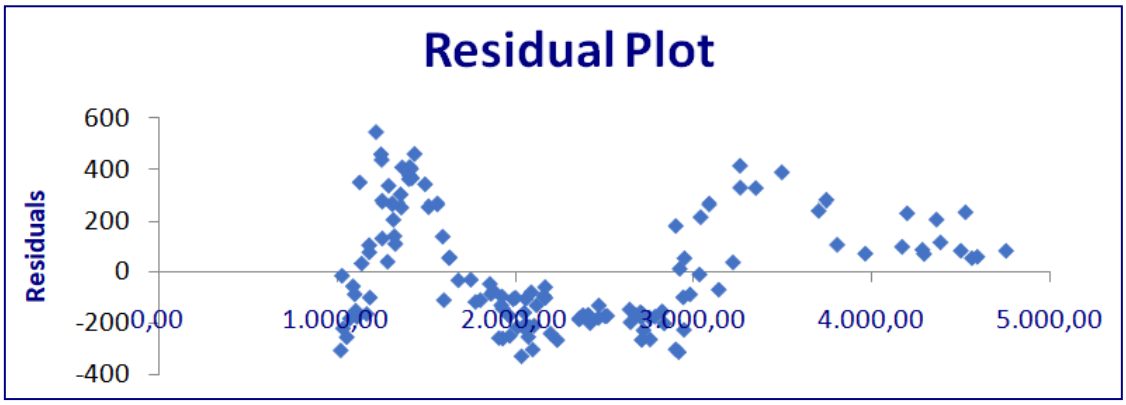
ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	2026806,843	2026806,843	41,52718319	0,0000000021543
Residual	128	6247263,983	48806,74986		
Total	129	8274070,825			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95,0%*	*Upper 95,0%*
Intercept	1124,947007	49,77122938	22,60235524	0,0000000000000000	1026,466127	1223,427888	1026,466127	1223,427888
4127,5	0,129803353	0,020142792	6,444158843	0,0000000021542874	0,089947397	0,169659309	0,089947397	0,169659309

As we see the multiple R which tells us about the correlation coefficient is 0.49, indicates a positive relationship between variables but not a very strong one. On the other hand, R2 which is the coefficient of determination tells us that around 24% of the variation of y-values (i.e., gold prices) around the mean is explained by the x-values (i.e., S&P prices). Furthermore, we see that Significance F is smaller than 0.05 meaning that this model is significant and can be considered relevant. The same goes for P-value. The lower the P-value means the greater the statistical significance of the observed difference. A P-value lower than 0.05 is, generally, considered statistically significant.

A residual plot displays the residuals on the vertical axis and the independent variable on the horizontal axis. Residual plots help us to determine whether a linear model is appropriate for modeling the given data. Since a residual is the «leftover» value after subtracting the expected value from the actual value and the expected value is obtained through a linear model such as a line of best fit, a residual plot shows how the data points deviate from the model. If the residuals are randomly scattered around the residual = 0, it means that a linear model approximates the data points well without favoring certain inputs. In such a case, we conclude that a linear model is appropriate.



If the residuals show a curved pattern, it indicates that a linear model captures the trend of some data points better than that of others. In such a case, we should consider using a model other than a linear model. In our case, the diversity of the residual plot makes it a little bit difficult to decide whether or not to choose to use linear regression as sometimes it looks like it shows a pattern, and sometimes it looks like the residuals are spread randomly. This might be one of the reasons why the relationship between stock valuations and the gold price is widely debated.

Conclusions

All in all, we conclude that based on the statistical regression analysis for the effect that S&P price changes had on Gold from 2009-2022, there is a weak positive correlation between the two variables. This was supported by R Square, which told us that around 24% of the variation in gold prices was explained by the S&P prices. However, during this timeline, it was shown that the variables moved also in opposite directions such as in the year 2011 for instance. Anyhow, the model presented in this study is relevant and can be considered, as the Significance P which was smaller than 0.05 suggests that the model is significant.

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