

Gold: What Are The Factors Influence The Price Movement?

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Abstract

Gold is one of the most useful mineral mines from the earth. Gold is not only used in jewelry and technology sectors but as an investment assets in the financial market. As the gold price has fluctuating price, it would be of interest to investigate the causes of the movements. In this study, the factors that influenced the gold price are investigated. The influential factors are oil price, US dollar, central bank gold reserve and time. This study involves secondary data for 20 years based on monthly basis. Since Linear regression analysis is a commonly used statistical technique in all fields of engineering, science, financial and management, this study employed a multiple linear regression model with gold price as dependent variable and oil price, US dollar, central bank gold reserve and time as independent variables. This analysis enables to predict the value of a dependent variable from a set of independent variables. Results of the analysis show that US dollar, central bank gold reserve and time are associated with the movement of the gold price while oil price is not related with the movement of gold price. The results of this study also provide the best prediction on the gold price for the gold's user.

Keywords: Gold price, oil price, US dollar, central bank gold reserve, time, linear regression

1.0 Introduction

Gold is known as a very valuable metal and has always been powerful stuff in this world. It becomes a symbol of wealth, beauty and power to the owner. Moreover, history has proven that gold was used as money since thousands years ago. Until now, gold still becomes a valuable metal to the people especially to investor.

The aims of this study to find out the factors that influence the gold price. The results also provide the best prediction model on the gold price for the investors to predict the price of gold in the future. Information about gold price is important since it is one of the most popular investment assets for people. Furthermore, the gold price continue rising steadily instead of drop like other commodities. Thus, gold is one of the most lucrative investments in the market.

2.0 Literature Review

2.1 Oil Price

Lee and Chang(2011) found co-integrating (long-run) relationships existing between vestothe incil price and inflation, inflation and the gold price, and the prices of oil and gold. This finding

suggests that the pairwise relationships among the variables are not only limited in the short-run. The results from Granger causality analysis support their proposed hypothesis on oil price-gold price relationship through inflation channel. It means that, in the long-run, rising oil price generates higher inflation which strengthens the demand for gold and hence pushes up the gold price.

Kim and Dilts (2011) investigates the relationship between the value of the dollar and the prices of two commodities, gold and oil. Granger causality is used on monthly data from January of 1970 through July of 2008. The empirical results show that the hypothesis that there is no causal relation between the value of the dollar and the prices of gold and oil is not supported by the evidence. There are causal relations between each of the prices, and there is a negative relation between the value of the dollar and the price of each of the commodities, as predicted by standard economic theory.

Studied done by Liao and Chen (2008) finds that as the oil prices and gold prices make the Volatility Spillover Effects, the fluctuations in the gold prices will be effected by the severe fluctuations in the oil prices.

2.2 Value of USD

Pukthuanthong and Roll (2010) finds that gold price expressed in a currency can be associated with weakness in that currency and, over the same interval, a similar relationship with the same sign can hold for gold prices and weakness in other currencies. Indeed, we find empirically that not just the Dollar, but also the Euro, Yen and Pound, displayed the same negative association over the entire period from 1971 through 2009, a higher gold price was correlated with a weaker currency for all of them.

Larry_ (1996) examines the theoretical relationship between the major exchange rates and the prices of internationally-traded commodities. In the empirical section, the case of gold is analyzed using forecast error data. Among other things, it is found that, since the dissolution of the Bretton Woods International monetary system, floating exchange rates among the major currencies have been a major source of price instability in the world gold market and, as the world gold market is dominated by the European currency bloc, appreciations or depreciations of European currencies have strong effects on the price of gold in other currencies.

Subramanian (2010) points out that evidently there was a growing inverse relationship between the values of gold and the US Dollar. In the context of the recent global financial crisis, he further noted that there was an uneasy balance for some months and the balance came under severe stress around mid-2008 when the financial crisis erupted. An additional reason for some central banks to consider buying gold is the recent decline in the value of US dollar against the world's main trading currencies and feared that it may decline further.

2.3 Central Bank gold reserve

Meltzer and Allan (1991) finds that if the U.S. chose to raise the price of gold once, it would have almost certainly excited expectations that it was prepared to do so again. An early run on U.S. gold reserves would have become correspondingly more likely. A way around this would have been to allow the dollar price of gold to float but this would have represented breaking the gold-dollar link once.

A study by Wozniak (2008) pointed out that 'portfolio optimizer models' are used to show that the 'efficient frontier' of a typical developing or emerging market economy's central bank can be enhanced by adding gold. The empirical study pointed out that an allocation between 2.4 per cent

and 8.5 per cent to gold is found to be optimal for a central bank with around a 5 per cent risk tolerance. At a risk tolerance of 8.3 per cent, the allocation to gold increases substantially to 29 per cent. Nonetheless, there is no universally accepted norm of gold allocation as optimum level, among the central banks as it depends upon a combination of factors, including the legacy of the past, its investment policy objectives and guidelines, its existing asset mix, its risk appetite, its tactical view on market trends and its liquidity requirements.

2.4 Time

Back-propagation neural networks with genetic algorithms is used by Mirmirani and Li (2004), to predict gold price movement. The results indicate that prices in the past, up to 36 days, strongly affect the gold prices of the future. This confirms the fact that there is short-term time dependence in gold price movements.

3.0 Research Methodology

This study is to examine the factors that contribute to the gold price. Secondary data set consisting of world gold price, world oil price, US dollar, central bank gold reserve from January 1992 to April 2012 are gathered in Data Stream programmed. In order to answer the objectives of this study, regression is used as a method of analysis. Using linear regression modeling, dependent variable is the world gold price (USD per ounce) and independent variables are world oil price (barrel), US dollar, central bank gold reserve and time. Figure 3.1 shows the conceptual framework of this study.

INDEPENDENT VARIABLES

DEPENDENT VARIABLE

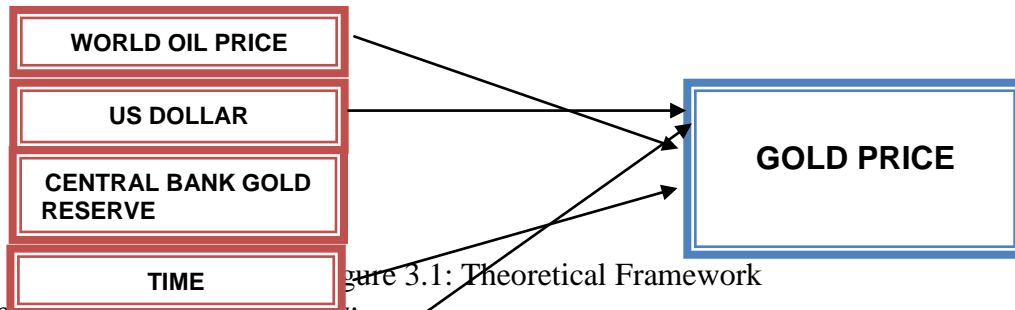


Figure 3.1: Theoretical Framework

The theoretical model is as follow:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \varepsilon_t$$

where:-

Y= Gold price

β_0 and β_i = parameters

X_1 = world oil price

X_2 = US dollar

X_3 = central bank gold reserve

X_4 = time

ε_i is a random error term with the mean $E(\varepsilon_i) = 0$ variance $\sigma^2\{\varepsilon_i\} = \sigma^2$ and ε_j are uncorrelated so that their covariance is zero.

4.0 Result

4.1 Regression Analysis

Table 4.1 represents the result of multiple linear regression analysis. The independent variables US dollar, central bank gold reserve and time are significantly contributed to the world gold price while the oil price is not significant since its p-value is greater than 0.05. The estimated model for world gold price is:

$$\text{World gold price} = 684.016 - 222.786 \text{ US dollar} + .107 \text{ central bank gold reserve} + 3.067 \text{ time}$$

Table 4.1 : Multiple Linear Regression

Model	Unstandardized Coefficients		Standardized Coefficients		Sig.
	B	Std. Error	Beta	t	
(Constant)	684.016	49.241		13.891	.000
oil price	.084	.096	.015	.881	.379
US dollar	-222.786	16.609	-.315	-13.413	.000
central bank gold reserve	.107	.006	.504	18.595	.000
Time	3.067	.172	.573	17.817	.000

Table 4.2 shows the coefficient of multiple determination is 0.945. Therefore, about 94.50% of the variation in the world gold price is explained by US dollar, central bank gold reserve and time. The regression equation appears to be very useful for making predictions since the value of R^2 is close to 1.

Table 4.2 :Coefficient of multiple determination R^2

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.972	.945	.944	89.59960

ANOVA table exhibits if the model is useful for predicting the response. From table 4.3, the p-value is less than 0.05. As conclusion, at the $\alpha = 0.05$ level of significance, there exists enough evidence to conclude that at least one of the predictors is useful for predicting world gold price. Therefore the model is useful.

Table 4.3 :ANOVA

Model		Sum Squares	of df	Mean Square	F	Sig.
1	Regression	3.279E7	4	8197175.411	1.021E3	.000
	Residual	1918712.944	239	8028.088		

Total	3.471E7	243
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The normal plot of the residuals in Figure 4.1 shows the points close to a diagonal line. Thus, the distribution of the residuals is approximately normal.

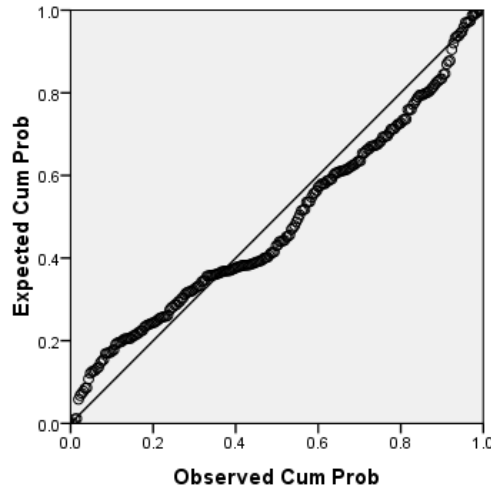


Figure 4.1 : Normal plot of the residuals

Based on the Figure 4.2, it shows that the scatter plot of residuals against predicted values shows systematic pattern, thus indicating the residuals have a constant variance.

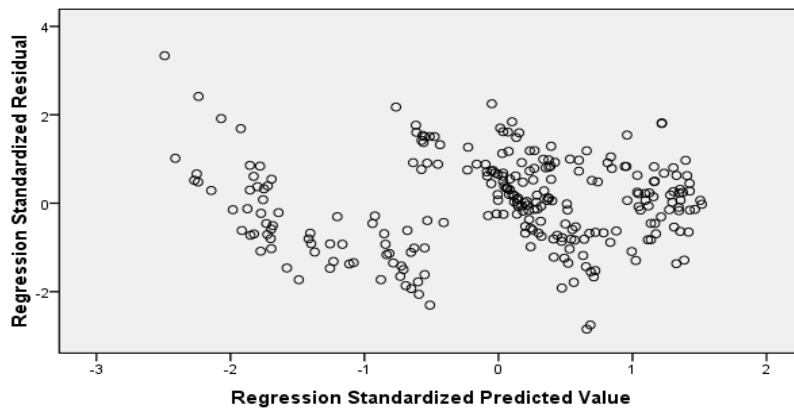


Figure 4.2
residuals
predicted

scatter plot of
against
values

5.0 Conclusion and Recommendation

As mention in the previous chapter, the stated objectives of this study are to determine the factors that contribute to the gold price and to know the prediction model of the gold price. From the findings, it can be concluded that the movements of the gold price either increase or decrease is identified by the changes of US dollar, central bank gold reserve and time. Using linear regression analysis, variables US dollar, central bank gold reserve and time have significant

relationship with the gold price while oil price is not significant. Regarding to Thai-Ha Lee and Youngho Chang(2011),co-integrating (long-run) relationships existing between oil price and inflation, inflation and the gold price, and the prices of oil and gold whileKaspar Allese (2008) stated that there is a strong linear relationship between the price of gold and price of crude oil. For US dollar, Steve Saville (2007) found that there is inverse relationship between gold price and US dollar.

The central bank has to control the gold reserve if the gold price is always increasing and the demand of gold also increase. Therefore, control of gold reserve will sustain the price of gold.Besides that, the investor can start to invest gold since there is negative relationship between gold and US dollar. If the US dollar decreases, the gold price will increase. It is also a safe investment if the US dollar increases because the value of gold price not change too much.

References

- Armitage, P., Berry, G. & Matthews, J.N.S (2002).Statistical Methods in Medical Research (4thed.). Malden, MA: Blackwell.
- Asıkgil, B. &Erar, A. (2009).Research into Multiple Outliers in Linear Regression Analysis.Hacettepe Journal Of Mathematics And Statistics Volume 38 (2) (2009), 185 – 198.
- Belsley, D.A., Kuh, E. & Welch, R.E. (1980).Regression Diagnostics: Identifying Influential Data and Source of Collinearity.New Jersey: Wiley.
- Chatterjee, S. &Hadi, A.S. (2006).Regression Analysis by Example (4thed.). Canada: Wiley.
- Eusoff, S. A. M. (2011). The Determinants of Gold Price. Practical Training Report, Bsc. Statistics, UiTM Shah Alam.
- Fox, J. (1997). Applied Regression Analysis, Linear Models, and Related Methods. USA: SAGE.
- Fox, J. (2002). An R and S-Plus Companion to Applied Regression. USA: SAGE.
- Johnson, R. A., Wichern, D.W. (2007). Applied Multivariate Statistical Analysis(6thEd.).
- Kim, M.H. & Dilts.D.A. (2011) "The Relationship of the value of the Dollar, and the Prices of Gold and Oil: A Tale of Asset Risk", Economics Bulletin, Vol. 31 no.2 pp. 1151-1162.
- Kutner, M. H., Nachtsheim, C.J. &Neter, J. (2008).Applied Linear Regression Models (4th Ed.). New York.
- Larry, A. S. (1996) "The price of gold and the exchange rate", Journal of International Money and Finance, Volume 15, Issue 6, Pg. 879-897.
- Lee, T. H. & Chang.Y. (2011). "Oil and Gold: Correlation or Causation?,"Munich Personal RePE Archive (MPRA). Nanyang Technological University.
- Liao, S.J. & Chen, J.T. (2008). "The relationship among oil prices, gold prices, and the individual industrial sub-indices in Taiwan", Working paper, presented at International Conference on Business and Information (BAI2008), Seoul, South Korea
- Meltzer & Allan, H. (1991), "U.S. Policy in the Bretton Woods Era," Federal Reserve Bank of St. Louis Review 73 (May/June), pp.54-83.
- Mirmirani, S & Li, H.C. (2004), "Gold Price, Neural Networks and Genetic AlgorithmGold Price, Neural Networks and Genetic Algorithm", Computational Economics, Volume 23, Number 2 (2004), pg. 193-200
- Nicolas Arnoult (2010). "The Determining Factors of Gold Price,".Universite

Paris 1 Pantheon Sorbonne Master MOSEF.

Pukthuanthong, K. & Roll, R. (2010) “Gold and the Dollar (and the Euro Pound, and Yen)”,
Journal of Banking and Finance, No. of Pages 15, Model 5G.

Subramanian, K. (2010): ‘The IMF and its Gold Sale’, **Economic and Political
Weekly**, Vol xlv no 4: pp 17-20, January 23, 2010

Wozniak, R.(2008): Gold as a Strategic Asset for UK Investors, **WGC Report**, WGC.