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A Study on Inflation Adjusted Gold Investment in Malaysia

[1]Eng Wat Kim* and [1]Syazwani Musa
[1]Faculty of Computer and Mathematical Sciences, Universiti Teknologi MARA,
40450 Shah Alam, Selangor, Malaysia.
*Corresponding e-mail: ewkim@tmsk.uitm.edu.my

Abstract

As gold price surges in the recent years, gold investment becomes popular in Malaysia and is driven by speculation. The purpose of this project is to determine whether gold is a suitable long term investment after accounted for inflation and to compare the performance of gold investment at different timing. The scope of this study is on yearly inflation adjusted gold price in Malaysia from the year 1967 to the year 2011. Using Pearson's correlation it is found that there is a very weak negative correlation between rates of return and inflation. The study also indicates that the cumulative change in gold prices is significantly higher and is almost 17 times higher than cumulative inflation in year 2011. This means gold price rises faster and beats the corresponding rise in inflation. Least squares method is used to find the best straight line fitting for inflation adjusted gold price at different investment starting years. Overall, gold investment is a suitable long term investment even after accounted for inflation. Therefore, in general, inflation adjusted gold price goes up and this suggests that gold investment is good, at least in the long term. The results indicate that inflation adjusted gold price is positively correlated with time.

Keywords: *Gold investment, Inflation, Gold price, Least squares method*

1. INTRODUCTION

For a century, gold price remained at around $20 per ounce and was raised to $35 per ounce in 1934. From 1967, gold was traded in the market and there was a gradual increase in gold price until 1980 when there was a sudden jump. Unfortunately, the high price could not be sustained and the price plunged within a short period. Since then, there have been some fluctuations until it started to climb again in 2008 and continues to increase at the point of writing. One of the reasons that people invest in gold is to hedge against inflation. Investments with intrinsic values such as gold and other commodities perform well during times of high inflation. This study focuses on how the rate of inflation affects gold price and the return of gold investment. Inflation is the rate at which the general level of prices is increasing. In more traditional usage, it can be described as the creation of money that visibly raises goods prices and reduces the purchasing power of money in an economy. The most popular way to measure inflation is the Consumer Price Index (CPI) which measures changes in the price level of consumer goods and services purchased by households.

In recent years, gold investment has attracted a lot of attention. Gold price has risen to new heights. Gold investment seems to yield high return. At the same time, inflation goes up year by year. This means that the purchasing power is reduced. Therefore, even though gold price increases in general, does it mean it is a good investment taking into account of inflation? Since gold price fluctuates in general, it is best to invest when gold price is low. However, it is very difficult to know when the price is at its low. Hence an investor may miss the right timing and ended up investing at the wrong point such as the peak of a cycle. Therefore, this study intends to find out how the timing of investment affects the return.

The overall goal of this research is to offer valuable information to investors on gold investment. This information will help investors in future decision making. This study aims to

determine whether gold is a suitable long term investment after accounting for inflation and also compare the performance of gold investment at different timings. The scope of this study is on yearly inflation-adjusted gold price in Malaysia based on data collection from 1967 to the year 2011.

2. LITERATURE REVIEW

Baur and McDermott (2009) analysed the role of gold in the global financial system. They examined whether gold acts as a diversification against stocks of major emerging and developing markets. A descriptive and econometric analysis was conducted on samples collected covering a 30 year period starting from year 1979. It was found that gold served as a safe haven for investors in the US and Canada in 1987 when the stock market suffered from a major crash. They argued that gold may act as a stabilizing force for the financial system by reducing losses in the face of extreme market shocks. Later in 2011, a study by Baur analysed the relationships of gold with the economic and financial variables to assess the validity of the main properties of gold. More specifically, it examined whether gold is a store of value, influenced by commodity prices, consumer prices and the value of the US dollar, stock market returns, stock market uncertainty and short-term and long-term interest rates. Using the empirical results from 1979 until 2011, he found that gold is influenced by the value of the US dollar. In addition, it shows that the real price of gold declined for most of the 30 year period. Moreover the correlation of gold with stocks decreased from a positive average value to a negative value in recent years. The findings demonstrate that gold as a hedge against inflation is weak.

Wang *et al.* (2010) examined the short-run and long-run inflation hedging effectiveness of gold in the United States and Japan during the period of January 1971 to January 2010. The findings showed that the inflation hedge of gold is not absolute. Investors should choose to invest at a time when gold price responds to inflation more quickly to avoid inflation. The inflation hedge ability of gold could help investors have a better asset portfolio and reduce the loss caused by inflation. Blose (2009) examined and tested a theory hypothesis that underlies the relationship between gold and inflation expectations. The study indicates that gold price does not change as a result of changes in inflation expectations. Although investors are to look ahead and know that future inflation will be significantly different from market expectations, they are not able to establish a strategy and speculate in the gold market. Besides, the study also found that investors cannot determine market inflation expectations by examining the spot price of gold.

The main objective of the research of Sjaastad and Scacciavillani (1996) was to examine the theoretical and empirical relationships among the exchange rate and price of gold by using forecast error data. They identified the effect of major currency exchange rates on the prices of gold. From the results, it showed that the exchange rates among the major currencies have been a major source of price instability in the market price of gold. The market price of gold seemed to be dominated by the U.S. dollar. Depreciation of dollar gave a strong effect on the price of gold especially in other currencies. Tully and Lucey (2007) carried out research using an asymmetric power GARCH model (APGARCH) against six gold models to investigate the price of gold. They investigated the relationship between two crisis periods for the equity market. Through a long period of time by using gold cash and futures data, they found that the U.S. dollar was the macroeconomic variable that affected price of gold.

There were many attempts to forecast gold prices. Ismail *et al* (2009) tried to model gold price based on factors such as Reuters Commodity Research Bureau index, EUROUSD foreign exchange rate, inflation rate, money supply, New York Stock Exchange composite index, Standard and Poor's 500, treasury bills and US Dollar index. They used multiple linear

regression for the modelling. Step regression method was used to take care of the problem of multicollinearity as well as correlated error terms. Shafiee and Topal (2010) pointed out that there is a very strong correlation between gold and oil prices which was at 85%. Furthermore, there was a negative relationship (-9%) between gold price and cumulative inflation. They obtained a model for gold price forecasting using a modified long term trend reverting jump and dip diffusion model. Abdullah (2012) tried to forecast the selling price of gold bullion coin using Auto-Regressive Integrated Moving Average (ARIMA) model. In his result, he found ARIMA (2, 1, 2) to be suitable for the prediction of gold bullion coin price.

3. METHODOLOGY

3.1 Data collection

For the purpose of this study, three types of data were collected. The data for gold price comprises forty five yearly observations starting from year 1967 as gold ceased to be a control commodity in that year. The data used in this study were obtained from various sources from the addresses as shown in Table 1.

Table 1: List of data source

Variable	Source
Gold price	www.kitco.com
Exchange rate of USD to RM	www.measuringWorth.com
Rate of inflation or Malaysia Consumer Price Index (CPI)	Bank Negara Malaysia www.IndexMundi.com

3.1.1 Rate of return (r)

Rate of return of gold could be computed using formula:

$$\text{Rate of return year-}n\text{, rn} = \frac{P_{n+1} - P_n}{P_n} \times 100\% \quad (1)$$

Where:

P_n = Gold price at year-*n.*

P_{n+1} = Gold price at year-(n+1).

3.2 Pearson's correlation analysis.

Pearson's correlation is used to measure the degree of strength of the relationship between at least two continuous variables. In this study, it is used to find a correlation between rates of return of gold and inflation. Correlation is a statistical technique that can show whether and how strong pairs of variables are related. As such, the degree of the strength of the relationship, whether strong or weak, is reflected in the value of the coefficient which lies between -1 and +1. The value of a negative one (-1) indicates perfectly negatively correlated and the value positive one (+1) indicates perfectly positively correlated series, and zero indicates lack of relationship between the variables. Correlation coefficient was calculated by using Microsoft Excel.

3.3 Cumulative inflation and cumulative change in gold price

The cumulative inflation and cumulative change in gold price were calculated in percentage by using the formula below:

$$\text{Cumulative inflation, } C_{i+1} = [(1+ r_{1967}) (1+r_{1968}) \ldots (1+ r_n) - 1] \times 100\% \quad (2)$$

Where:
r_i = Rate of inflation during the *i*-the year, $i \geq 1968$
C_{1967} = 0% (1967 is taken as the base year)

$$\text{Cumulative change in gold price} = \frac{G_n - G_0}{G_0} \times 100\% \quad (3)$$

Where:
G_n = Gold price during current year
G_0 = Gold price during base year 1967

3.4 Least squares method

Inflation adjusted gold prices were computed using the formula

$$G_n = G_0 (1+r_1) (1+r_2) (1+r_3) \ldots (1+r_n) \quad (4)$$

Where:
G_0 = Gold price during initial year
r_i = Rate of inflation during the *i*-the year

The least squares method was used to determine the equation of the straight line for inflation adjusted gold prices against time. A scatter plot and the best fit equation of straight line were plotted for different investment starting year. Least squares quadratic fitting of data to average annual rate of change for return versus year was also carried out.

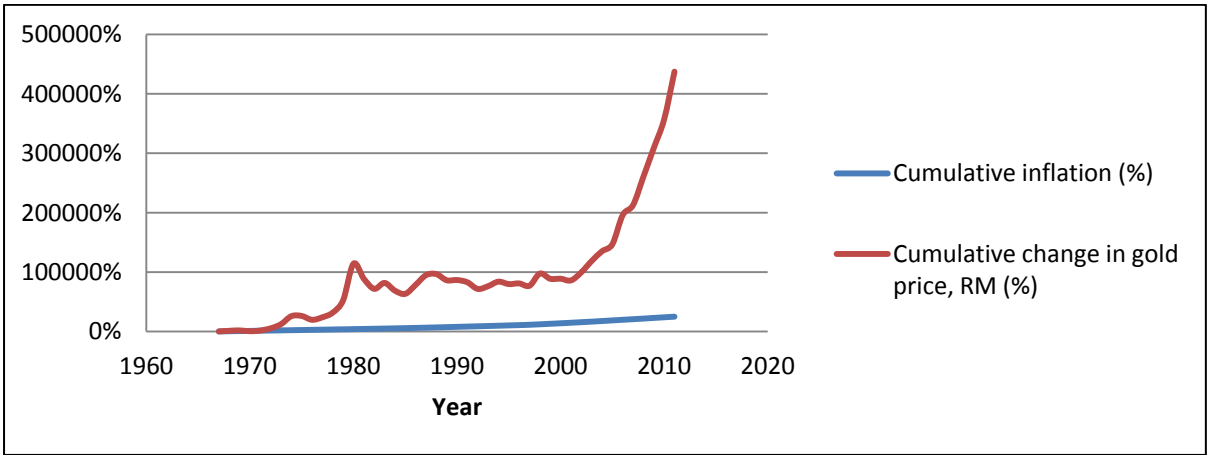
4. RESULTS AND DISCUSSIONS

4.1 Finding correlation coefficient

Pearson's correlation analysis is used to find correlation between rates of return of gold and rates of inflation. Using excel, it was found that r= -0.06, indicating a very low negative relationship.

4.1.1 Comparison of cumulative inflation and cumulative change in gold price

Figure 1: The graph of yearly trend of the percentage cumulative change in gold price and cumulative inflation from 1967 to 2011



The graph of cumulative change in gold price in comparison to cumulative inflation shows the increase in gold return is significantly higher than rate of inflation, where gold investment return is at least 17 times higher than cumulative inflation in year 2011.

4.1.2 Selection of investment starting year

Figure 2: The graph of gold price in USD indicating the 6 cases of investment starting years

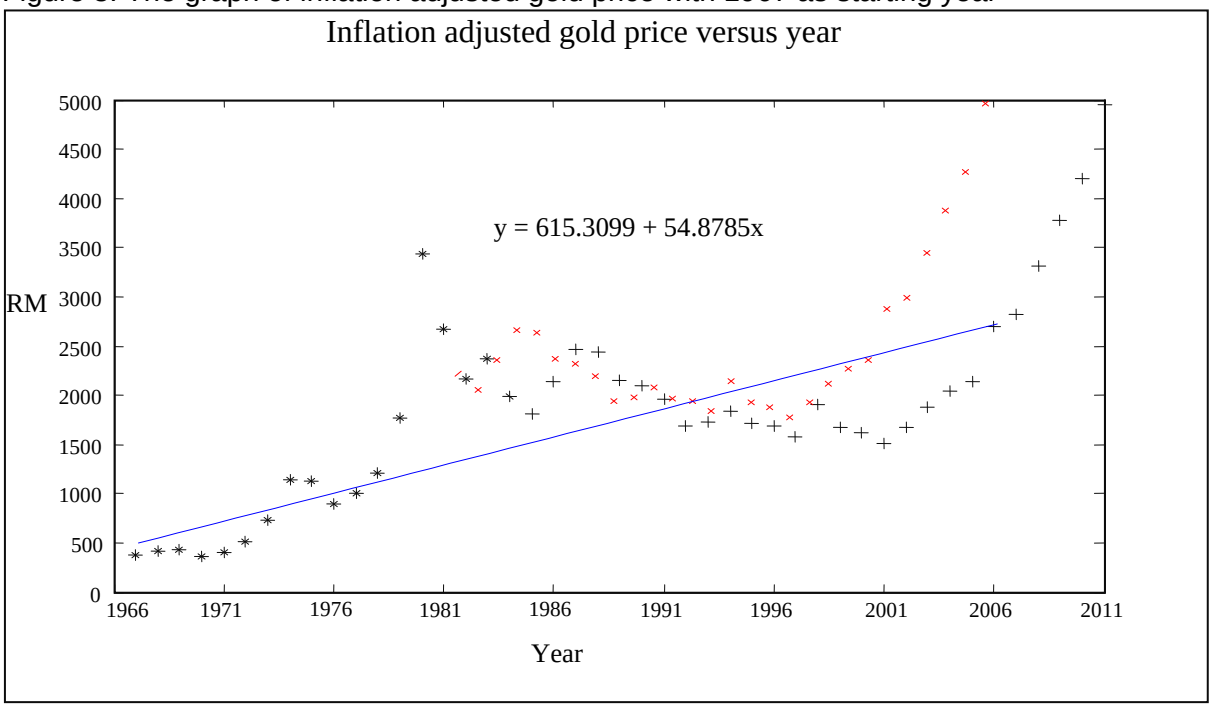
Table 2: The cases of different investment starting years

Case	Year	Reason
1	1967	It is initial year of study
2	1973	It is moderate between the low before and high at 1980
3	1980	It is peak for gold price
4	1990	It is between high before and a low after
5	2001	It is showed a temporary low
6	2006	It is halfway uptrend

4.1.3 Least squares fitting of data to inflation adjusted gold price

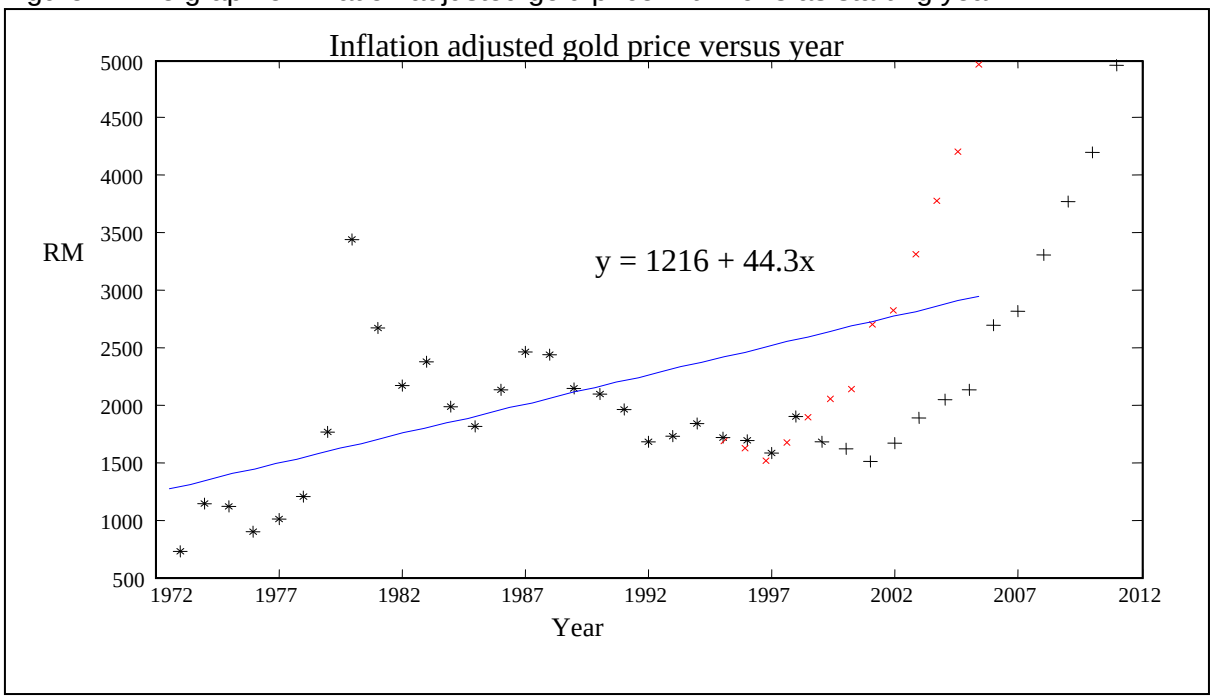
CASE 1: Least squares straight line fitting of data to inflation adjusted gold price with investment starting year 1967

Figure 3: The graph of inflation adjusted gold price with 1967 as starting year



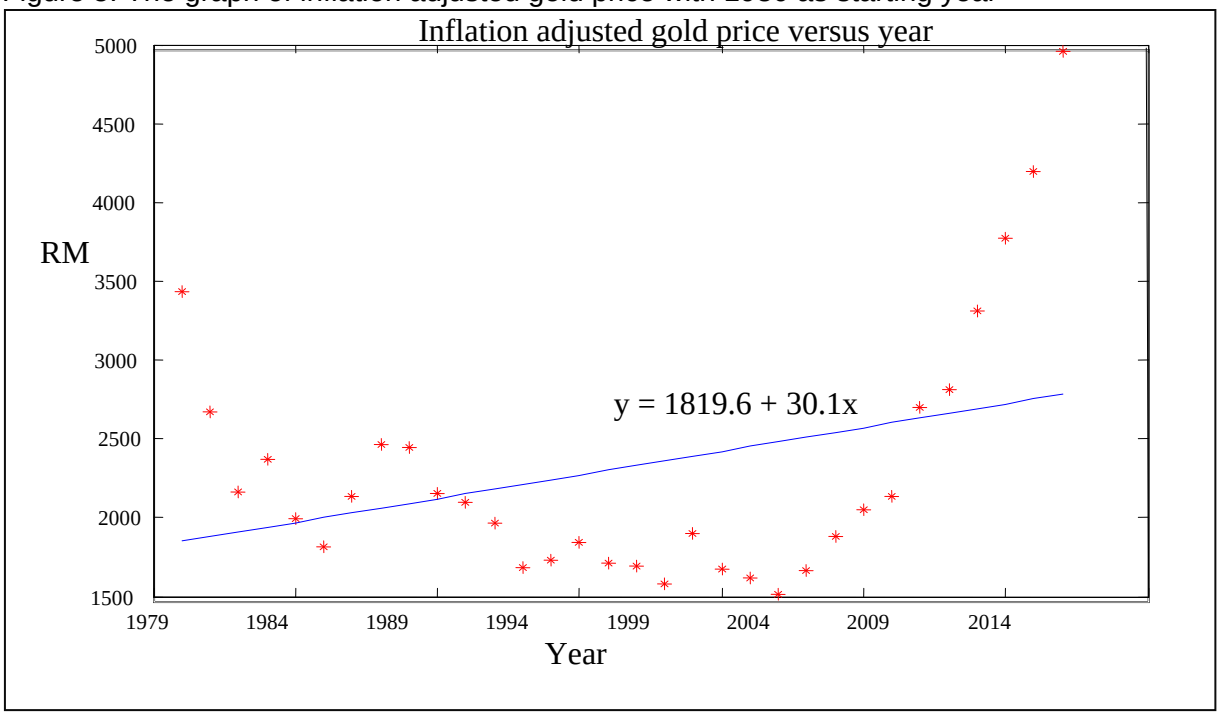
CASE 2: Least squares straight line fitting of data to inflation adjusted gold price with investment starting year 1973

Figure 4: The graph of inflation adjusted gold price with 1973 as starting year



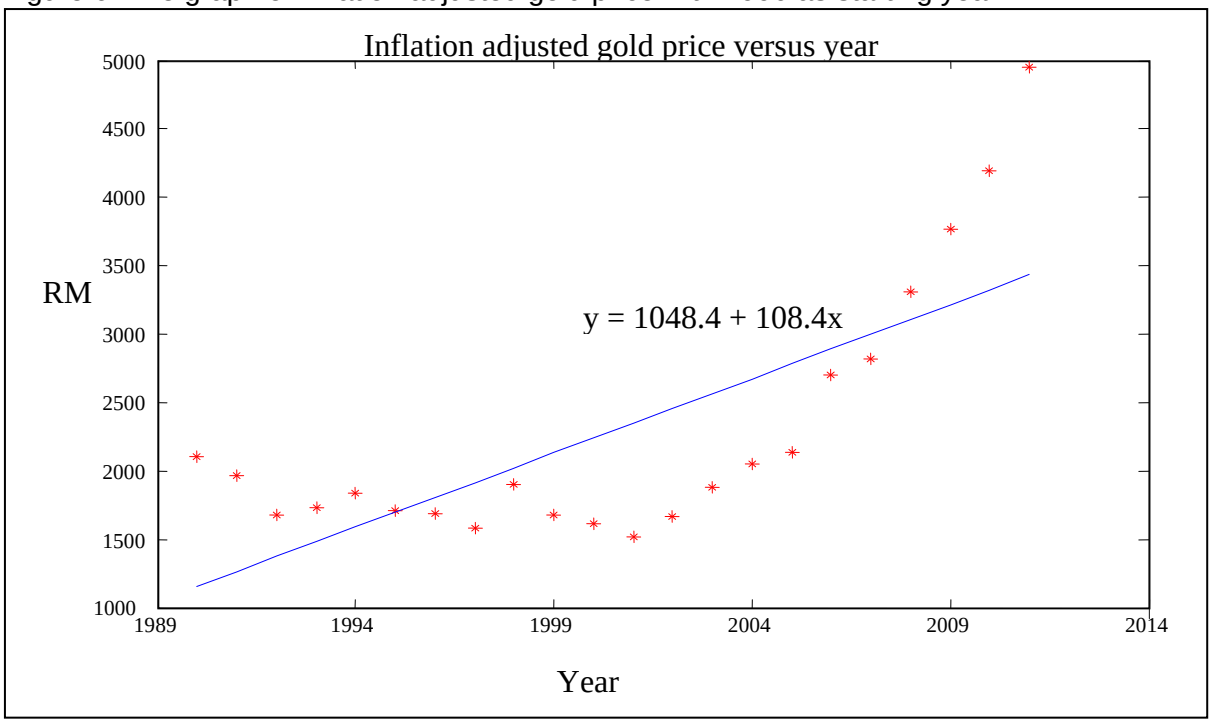
CASE 3: Least squares straight line fitting of data to inflation adjusted gold price with investment starting year 1980

Figure 5: The graph of inflation adjusted gold price with 1980 as starting year



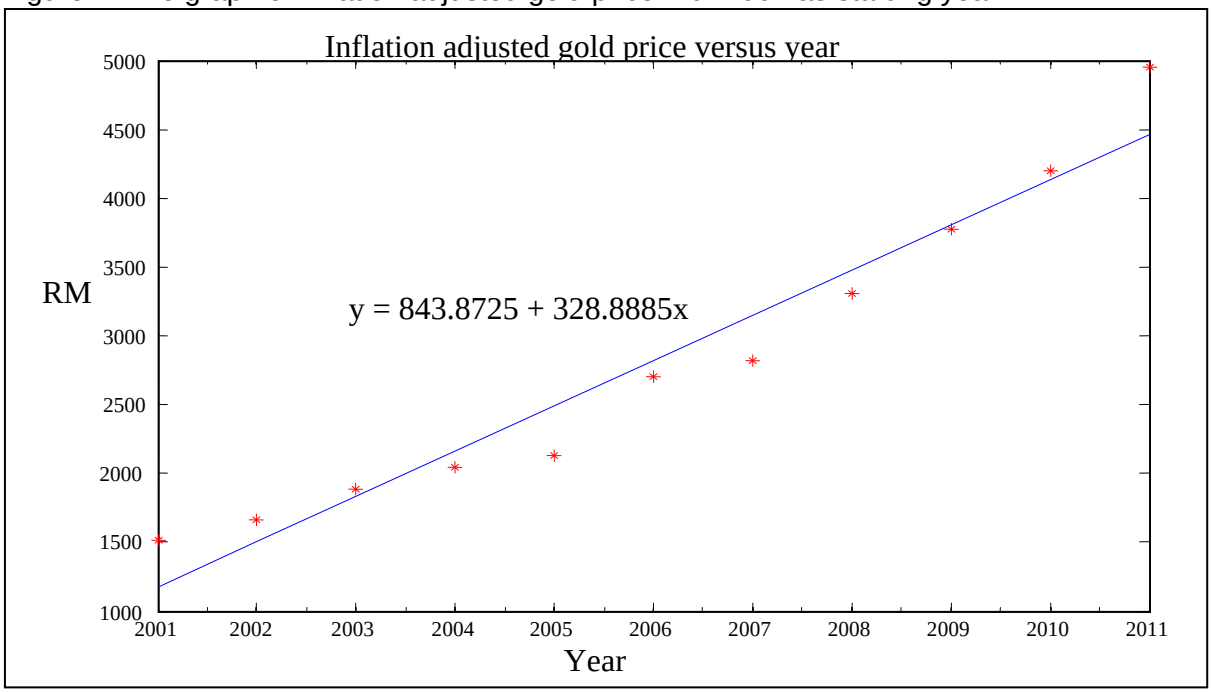
CASE 4: Least squares straight line fitting of data to inflation adjusted gold price with investment starting year 1990

Figure 6: The graph of inflation adjusted gold price with 1990 as starting year



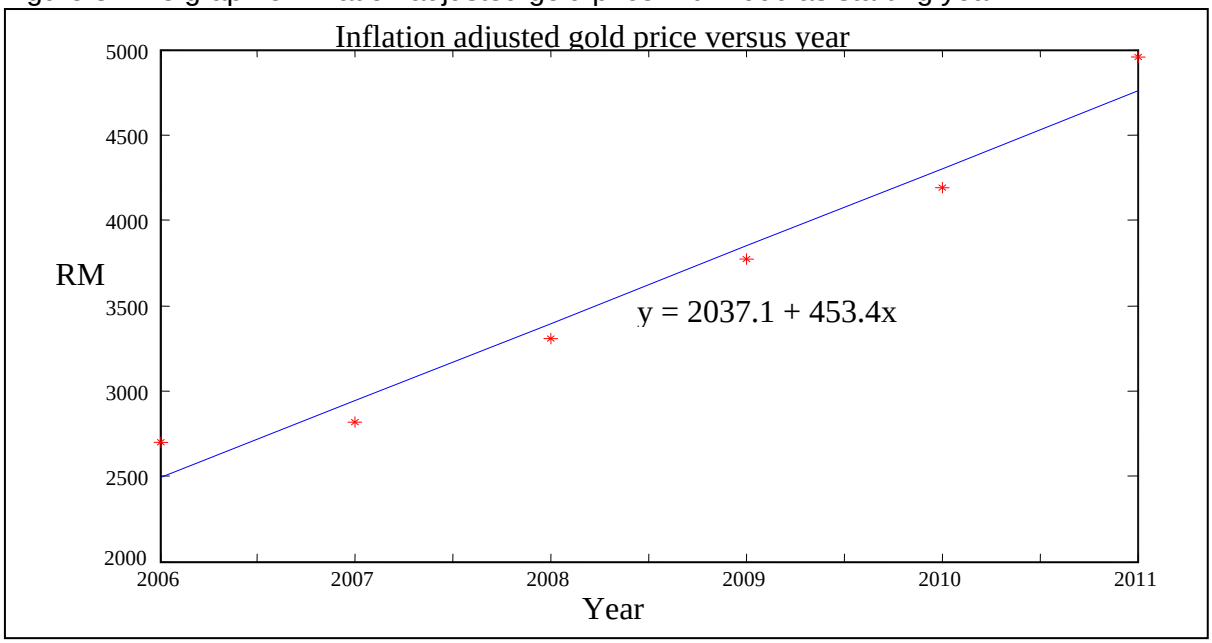
CASE 5: Least squares straight line fitting of data to inflation adjusted gold price in with investment starting year 2001

Figure 7: The graph of inflation adjusted gold price with 2001 as starting year



CASE 6: Least squares straight line fitting of data to inflation adjusted gold price with investment starting year 2006

Figure 8: The graph of inflation adjusted gold price with 2006 as starting year



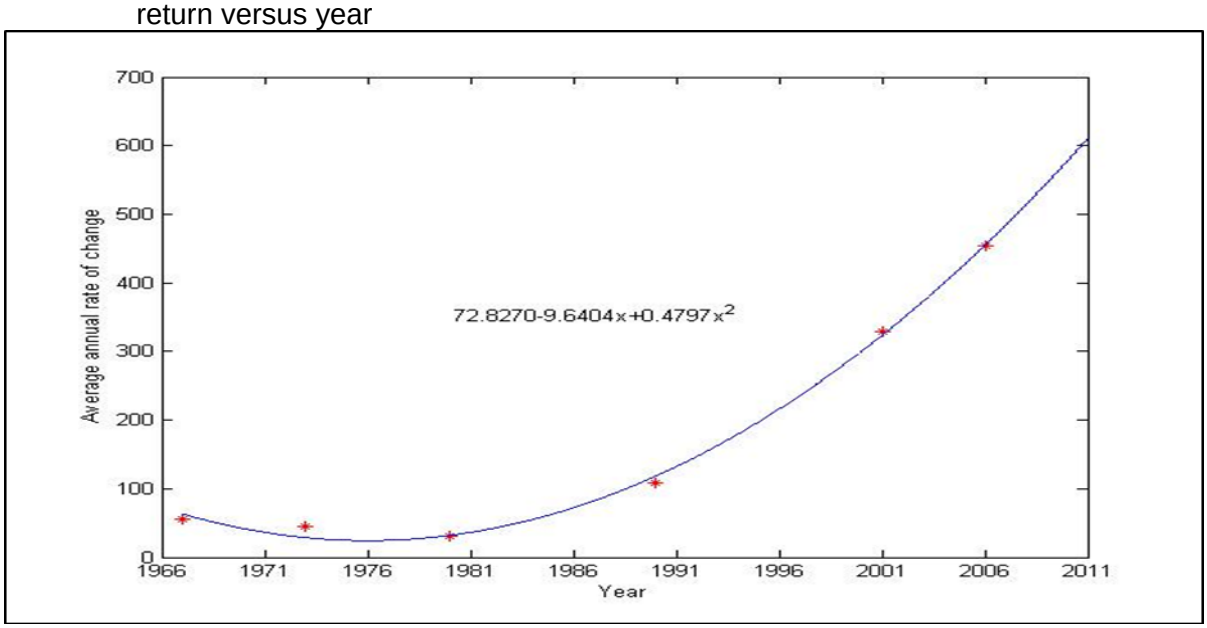
4.1.4 Average annual rate of change for return

From the above 6 cases of least square straight lines fitting of returns, we determine average annual rate of change which is obtained from gradient of straight lines for different investment starting years.

Table 3: The average annual rate of change for return versus year

Year	1967	1973	1980	1990	2001	2006
Rate of return	54.88	44.30	30.10	108.40	328.89	453.40

Figure 9: The graph of least squares quadratic fitting of average annual rate of change for return versus year



Since inflation reduces purchasing power, inflation adjusted gold price is used for calculation so as to see the actual and more realistic return of gold investment. Table 4 shows the equations of best fit straight lines for inflation adjusted gold price at different investment starting years.

Table 4: The equation of best fitting straight line

Starting year	Equation of best fitting straight line
1967	y = 615.3099 + 54.8785x
1973	y = 1216 + 44.3 x
1980	y = 1819.6 + 30.1 x
1990	y = 1048.4 + 108.4x
2001	y = 843.8725 + 328.8885x
2006	y = 2037.1 + 453.4x

From the equations of the best fit lines, it is found that gold investment done at different investment starting year will give different average annual rate of change. In general, the higher the average annual rate of change, the better the investment is. The average annual rates of change are all positive, indicating that investment done at all these starting years can be a hedge against inflation. Overall, average annual rate of change decreases from 1967 until 1980, and improved after that.

The scatter plots of the average annual rate of change showed a quadratic relationship. The equation of quadratic fitting to average annual rate of change is $y = 72.8270 - 9.6404x + 0.4797x^2$. From the equation, average annual rates of change reduce from 1967 to 1976. The minimum average annual rate of change occurs in year 1976. From 1976 to 2011, the rate of return increases faster and faster. Overall the average is all positive.

5. CONCLUSION

This study examines how unexpected changes in inflation as well as in CPI affect gold prices. In 1967 gold ceased to be a control commodity. Gold was then traded in the market from 1967 and the price increased with rapid fluctuations from then on. Pearson's correlation analysis is used to explain the relationship between rates of return of gold investment and inflation rates. There is a very weak negative relationship between rates of return and inflation. However, the study showed that the cumulative change in gold prices were significantly higher and amounts to around 17 times higher than cumulative inflation in year 2011. This means gold price rises faster and far exceeds the corresponding rise in inflation.

Least squares method was applied for linear fitting of data to inflation adjusted gold price and quadratic fitting of data to average annual rate of change. The least squares method was tested for 6 cases with different investment starting years. The gradient of the straight lines are all positive. Therefore, in general, inflation adjusted gold price goes up and this suggests that gold investment is good, at least in the long term. The results indicated that inflation adjusted gold price is positively correlated with time.

Gold investment from 1967 to around 1977 is considered not as good as the average annual rate of change decreases. This is due to the high gold prices during this period, which reduced capital gains. Overall, gold investment is a suitable long term investment even after accounted for inflation.

As a conclusion, gold investment is a suitable long term investment even after accounted for inflation, as the average annual rate of change is positive in the last forty-five years.

Moreover, gold investment has become increasingly attractive in the recent years as the average rate of change gets higher and higher.

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