

GLOBAL JOURNAL OF ADVANCED ENGINEERING TECHNOLOGIES AND SCIENCES

CASE IN VIETNAM: WHAT FACTORS HAVE A STRONG EFFECT ON GOLD PRICE IN 5 YEARS PERIOD?

Kim-Phung Truong^{1,2,*}, Ming-Hung Shu¹, Bi-Min Hsu³, Thanh-Lam Nguyen⁴

*¹Department of Industrial Engineering and Management, National Kaohsiung University of Applied Sciences, Taiwan

²Department of Financial and accounting, Lac Hong University, Dong Nai, Vietnam

³Department of Industrial Engineering and Management, Cheng Shiu University, Taiwan

⁴Office of Scientific Research, Lac Hong University, Bien Hoa, Dong Nai, Vietnam

ABSTRACT

This study aims to evaluate the key influence factors of gold price in Vietnam from 2011 till June 2015. Based on analyses of the determinants, this paper renders quantitative results for the influence to assist investors reduce the risk and gain return when investing in the Vietnamese gold market. Variables which are “consumer price index in Vietnam”, “inflation rate in Vietnam”, “USD/VND exchange rate” and “nominal interest rate in Vietnam” are employed to construct a model of the gold price in Vietnam. The model learns from monthly observations pertained to the last day of the month spanning the period from January 2011 to June 2015. The results show that there is a positive relationship between the Vietnam gold price and the USD/VND exchange rate. We conclude that the inflation and the nominal interest rate in Vietnam have no statistical significance upon the gold price. Moreover, when realizing the movements of USD/VND exchange rate and the CPI, the investors could forecast the gold price in Vietnamese market. Finally, the research results advise the Vietnamese government key factors for managing the domestic gold price more effectively.

KEYWORDS: Affecting factor, Gold price in Vietnam, Gold market, CPI, Interest rate, Exchange rate, Inflation rate.

INTRODUCTION

Gold has been used widely throughout the world. It has a variety of applications such as mean of exchange, jewelry, medicine, food and drink, electronics and, especially, investment. Government, institutional and private investors invest in gold for a number of reasons, one of which is to hedge against inflation [28]. Gold appears to act as safe-haven in times of political or financial turmoil (Baur & McDermott, 2010) [3]. Gold is often seen as an alternative to the stock market. Buying shares can give investors higher return because they receive dividends and possible growth in share capital. In times of economic turmoil or recession, the value of shares tends to go down. Then, investors may sell shares and buy gold. Thus, fear over a recession tends to increase the value of gold as people move from more risky stock market to the safer one.

Sharma & Mahendru (2010) pointed that the movement of gold price is highly sensitive to the changes in fundamentals of any economy and future prospect “expectations” which are influenced by both micro and macro bases, formed either rationally or adaptively on economic fundamentals, as well as by subjective factors which are sometimes unpredictable and also non-quantifiable [40]. The price of gold is determined by several factors, among which are oil prices, USA exchange rate, interest rate, and inflation rate considered as the most common macroeconomic factors (Toraman, 2011) [45].

In Vietnam, gold is used as not only a mean of reserve but also a mean of payment in many transactions. However, the economy in Vietnam has recently been in downturn where the real estate is frozen and stock market is still sensitive and has high risk; consequently, the gold market is one of the alternative channels for investors to concern. Dang (2008) and Phan (2012) claimed that the gold market in Vietnam is still young and quite complicated though the Government has attempted to stabilize and develop it by improving its policy system [14]. It is complicated because several affecting factors have failed to be fully identified. Thus, thorough understanding of the gold market in Vietnam as well as its key factors affecting the gold prices is necessary for not only investors but also the Government for an effective policy and implementation.

According to Central institute for economic management (CIEM, 2011), from 2001, gold price has continuously increased, especially, from April 2006, the price gold in Vietnam has increased dramatically (from 0.98 million to 1.5 million VND per unit) [10]. Although it was then stabilized at 1.3 million, the gold price all over the world and in Vietnam increased sharply that broke the record in 1980. Until now, the price of gold still fluctuated. It sometimes went up to 47.4 million per tael. Comparing December 2015 and December 2001, the gold price rose about 8.6 times. This period of time can be called “the century of gold”. After rising dramatically and continuously in a long

time, the price had the trend of reducing (from October 2011 to July 2012). However, this trend could not remain any longer as from the end of August 2012, gold price started to rise sharply. The enormous rise in gold price causes an unhealthy psychological effect on people: when the price goes up, they try to buy as much as they can, but when it falls, people tend to sell gold as quickly as possible. This is one of the reasons for the expectation of increasing price level of gold, beside the main factors brought by the fluctuations in the international gold prices.

Moreover, most of existing researches just focus on gold market in developed countries such as America [6 (for example, Sjaastad & Scacciallani, 1996; Dolley et al., 1995; Chappell & Dowd, 1997; Laurent, 1994; Ghosh et al. 2004; Gorton & Rouwenhorst, 2006; Kolluri, 1981; Levin & Wright, 2006; Ranson, 2005; Worthington & Pahlavani, 2007; Tully & Lucey, 2007; Blose, 2010); England (Mahdavi & Zhou, 1997) and some emerging countries such as China (Ye & Zhou, 2010) and Indonesia (Clarine & Dewi, 2012) [11-14-22-24-28-32-33-34-38-43-46-48]. Whereas an ample number of studies have attempted to explain gold price movements in the context of Vietnam, to the best of knowledge, surprisingly there have been a few studies carried out so far to understand the determinants of gold prices in Vietnamese market with quantitative method. This study aims to fulfill these gaps.

LITERATURE REVIEW

Lampinen (2007) claimed that numerous studies have attempted to empirically model the gold price and these can be categorized into three approaches [30], including: (1) models variation in the gold price in terms of variation in main macroeconomic variables, for example, exchange rates, interest rates, world income and political shocks by Ariovich (1983), Kaufmann & Winters (1989), Sherman (1986), Dooley et al. (1995), Sjaastad & Scacciallani (1996), and Godsell & Tran (2011) [18-1-26-41-43-23]; (2) speculation or the rationality of gold price movements by Diba & Grossman (1984), Baker & Van-Tassel (1985), and Pindyck (1993) [16-2-37]; and (3) gold is an inflation hedge with particular focus on short-run and long-run relationships between gold price and the general price level by Chappell & Dowd (1997), Laurent (1994), Mahdavi & Zhou (1997), Ghosh et al. (2004), Gorton & Rouwenhorst (2006), Kolluri (1981), Levin & Wright (2006), Ranson & Wainwright (2005), Worthington & Pahlavani (2007), Tully & Lucey (2007), and Blose (2010) [22-11-32-34-28-33-38-41-46-6].

Macroeconomic approach

Dooley et al. (1995) conducted a study to test the short and long term influences of gold prices on exchange rates conditional on the other monetary and real macroeconomic variables [18]. The empirical tests, focusing on exchange rates between the U.S dollar and four other major currencies (the Pound sterling, the Japanese yen, the Deutsche mark, and the French franc) and on the mark/yen also with data from 1976-1990, showed that gold price movements have explanatory power with respect to exchange rate movements, over and above the effects of monetary fundamentals and other variables that enter standard exchange rate models. In this research, they viewed gold as “an asset without a country”. Hence, any type of shock that reduce the attractiveness of holding claims on one specific asset, other things equal, will raise the demands for other assets including gold, which leads to changes in market-clearing prices.

The findings of Sjaastad & Scacciallani (1996) further support those of Dolley et al. (1995) [43]. Specifically, Sjaastad & Scacciallani (1996) investigated the relationship between the gold price and the foreign exchange market for from 1982 to 1990. The key finding of their study was the significant influence of an appreciation or depreciation of a European currency on the price of gold. They jumped in a conclusion that the US dollar only had a minor impact on the gold price. According to them, fluctuations in the real exchange rates among the major currencies explained almost half of the variation in the gold price.

Tan (2011) attempted to reconcile an apparent contradiction between short-run and long-run movements in the world price of gold. A theoretical model using monthly gold price data from January, 1990 to April, 2009 and cointegration regression techniques was developed and demonstrated that four factors including US dollar exchange rate, US inflation rates, oil prices and the Dow Jones industrial average all affect the gold price volatility in the short or long term, while the US Federal Funds rate only impacts gold price in the long term and negligible in short term. In addition, the international political environment, significant political and war events will affect the price of gold.

Using regression techniques and seeking a simple predictive model using annual data, Kaufmann & Winters (1989) derived a formula for the annual price of gold based on changes in the rate of inflation in the USA, an index of the US dollar exchange rate and the annual world production of gold [26]. Statistically, the model shows a high correlation between the formula price and the market price over the past 16 years (1974 – 1988) although many variables often considered important to the price of gold are ignored.

Under the background of open Chinese gold market where gold coexists with gold futures, Ye & Zhou (2010) selected the main influence factors on gold price, using monthly data as study sample from 2006 to 2010, the multiple regression model through Ordinary Least Squares (OLS) method and makes the empirical study on influence factors of gold price in Chinese market [48]. The findings indicate that the linkage between the Chinese gold and the foreign exchange rate is strong. Moreover, Godsell & Tran (2011) provided an insight into the factors driving price of gold in U.S from the past 41 years (1970-2010) [23]. Their study indicated that gold price was influenced significantly by variety of factors including national debt, gold production, interest rates and unemployment rate. They were able to use these variables to clarify a regression equation that met the classical normal linear regression model and justified this model from an economic perspective. They found that there was a positive relationship between the nominal interest rate and the price of gold. In term of national debt, low national debt may temper gold prices, because domestic currency would be stronger and people would be less favor for using it as safe haven. On the other hand, low quantities of gold production supplied coincide with high price levels at which only those that value the product most are able to afford it. In addition, their results proved that lower unemployment rates would also increase gold demand, which leads to higher gold prices. Although their regression model had notable explanatory power, it was limited by only looking at short-term interest rates, and could be strengthened by including the effect that low interest rates could have over time. Nevertheless, the analysis provided great insight to the short term behavior of commodity prices and the effects of economic conditions and fiscal policy on gold prices.

Speculation approach

To confirm the empirical data analysis that short run movements are influenced by the gold lease rate, the convenience yield and the LIBOR suggested by Ghosh *et al.* (2004), Bialkowski *et al.* [22. (2011) investigated if the rapidly growing investment activities had triggered a new asset price bubble by using time sample from 1978 to 2010 [5]. They drew on the convenience yield model and used commodity dividends to derive gold's fundamental value. It proved that once the commodity dividend increases by 1%, the gold price goes up by 0.61% (0.76%). They approximated the commodity dividends with the help of future contracts, and used them to explain the gold price, establishing a stable long-run relationship. The empirical evidence was favorable for a fundamentally justified price level even during the current period of a drastically rising gold price.

Pindyck (1993) tried to develop a present value model for the gold price based on futures [37]. And, the model nicely performed for several commodities like copper, lumber and heating oil, etc. However, the present value model fails to provide an effective model for the price of gold due to the fact that gold had not the same level of convenience yield like the other commodities (Pindyck, 1993) [37]. Monthly net convenience yield had always been less than 1% of price, and usually less than 0.2%. Moreover, except for the brief spike in convenience yield in 1981, there was little co-movement with price. This suggested that sharp rise in price (such as those of 1980 and late 1982 - early 1983) were not expected to be temporary. The strongest rejections of the present value model were for gold because it was not even clear that futures and spot prices were co-integrated, and there was no evidence that the spot price and convenience yield were co-integrated. Throughout the 15-year samples, the convenience yield for gold was always very small relative to price, so the present value model can only explain price movements in terms of changes in market perceptions of either the mean arrival rate of an event, or the probability distribution for the size of the event. Since such changes in market perceptions are unobservable and do not affect current convenience yield.

Diba & Grossman (1984) investigated whether there were rational bubbles in the relative price of gold [16]. The critical implication of the theoretical analysis is that: "if rational bubbles exist, the time series of the relative price of gold, as well as any time series obtained by differencing a finite number of times, is non-stationary". They found a close correspondence between the time series properties of real interest rates and the time series of the relative price of gold, which is supported by the theory related to the time series properties of the fundamental component of the relative price of gold. Their evidence was consistent with the conclusion that the relative price of gold corresponded to market fundamentals and the process generating first differences of market fundamentals was stationary, so actual price movements did not involve rational bubbles.

The main conclusions from the empirical study of Koutsoyiannis (1983), based on a time sample of 316 daily observations covering the period from January 1980 to March 1981 were [29]:

- 1) Contrary to the findings of other studies, it seemed that speculative markets were inefficient in the very short run, and rational speculators dealing in assets (like gold) the prices of which were highly volatile, and which involved a large amount of funds, were unwilling to react immediately to all available market information, preferring to wait and see whether the changes in conditions are transient or more permanent in nature;

- 2) The price of gold, universally quoted in US dollars, had become firmly related to the state of the American economy: the strength of the American dollar, the US rate of inflation and the prevailing US interest rate were important determinants of the price of gold;
- 3) Stocks and silver provided speculative investment alternatives to gold holders;
- 4) Factors which were not easily quantified, such as political instability, can be meaningfully incorporated into a quantitative study, and political tension index constructed on the basis of major political developments showed that geopolitical factors exerted a strong influence on the price of gold;
- 5) In variance to the findings of other studies, their results suggested that the gold market was not efficient in the very short run, in the sense that participants did not incorporate into current price behavior all new information available in any one period;
- 6) The structure of the model was different in periods of high and low prices of gold. According to Koutsoyiannis (1983), the theoretical hypotheses and the empirical results of the study should be considered only as the first step towards a more thorough exploration of the complex factors that affect speculative behavior [29].

Inflation hedge approach

Kolluri (1981) studied the role of gold for inflation hedging by proposing two approaches, including [28]. Specifically, the first one modeled the relationship between the return on gold investments and the anticipated inflation or its variants which were estimated through the iterative procedure of Cochrane-Orcutt by using monthly gold prices from 1968 to 1980. The second one modeled the return of shares and bonds between 1926-1978 to use it as minimum required return for gold investments. The study concluded that gold well hedged against inflation in the period 1968-1980.

Gorton & Rouwenhorst (2006) studied commodity derivatives and their hedging capabilities in the USA [24]. They used historical data from 1959 to 2004 and found that indices made from spot prices and futures prices had beaten inflation. They also noticed that the positive correlation with commodities (including gold) and inflation was higher in the long-run than in the short-run. They also studied whether commodities could also act as a hedge against unexpected inflation and found a proof for that.

Levin & Wright (2006) proved that there was a long run relationship between the price of gold and the average price level in the US for the period 1975-2006 [33]. Their empirical results showed that an increase of 1% in the average US level made the gold price averagely increased by 1%. They used co-integration technique to model the long run relationship and error correction models for the short run dynamics. The main determinants of the gold price in the short run include: (1) changes in US inflation, (2) inflation volatility, (3) credit risk, and (4) the interest rate to lease gold and the US trade weighted exchange rate. They also proved that 66% of a deviation of the long run relationship will disappear within five years after the shock that caused the deviation.

Similarly, Worthington & Pahlavani (2007) tested for the presence of a stable long-run relationship between the price of gold and inflation in the United States in two periods of time: 1945 - 2006 and 1973 - 2006 [46]. After taking these breaks into account, strong evidence of a co-integrating relationship between gold and inflation in the post-war period and since the early 1970s was provided by using a modified co-integration approach. The results supported to the widely held view that both direct and indirect gold investment can serve as a useful inflation hedge.

By applying the same and co-integration regression techniques, Gosh *et al.* (2002) developed a theoretical model, using monthly gold price data from 1976 to 1999, suggested a set of the conditions that would have to be satisfied for the price of gold to rise over time at the general rate of inflation. If these conditions were met then gold would be an effective long-run hedge against inflation. The model also demonstrated that this equilibrium relationship was consistent with sizeable short-run movements in the gold price. The key finding was that movements in the nominal price of gold appeared to be dominated by these short run influences and consequently the long-run relationship (although significant) was of much less importance. This research added value to the research of Ghosh *et al.* (2000) by including a variable "political risk in oil producing countries" [22].

Moreover, Lampinen (2007) tried to confirm the results from the study of Levin & Wright (2006) by extending the research period one more year and similar results were found [30-33]. The biggest difference was the number of included time dummy variables. Levin & Wright (2006) only needed 10 time dummy variables while Lampinen (2007) needed 19 time dummy variables [30-33]. These time dummy variables were added in order to prevent autocorrelation in the residuals. The results of a study conducted by Moore (1990) indicated that an investor who followed the signals, buying gold when the up signal flashed and selling on the down signal of inflation index of Columbia University during 1970 - 1988 and investing in U.S. Treasury bonds or in common stocks at other times,

would have earned an average annual rate of return of 18% to 20%. Following this strategy, investor can gain profit from gold prices during the signaled upswings and bond prices or stock prices during the signaled downswings. The demand for gold had been thought to grow when the prospects for inflation rose. Many individuals invested in gold as an inflation hedge, expecting that as the general price level rose, leading to higher gold prices. The leading index contains seven components, all selected on the basis of their relevance as measures of inflationary pressures and their historical record as leading indicators of inflation.

With the data of gold price and domestic inflation from 1996 to 2007 in China, Fu et al. (2009) analyzed the correlation between them with the Phillips expanding curve equation and the method of least squares estimation [20]. The results indicated that the price of gold acted a role in forecasting the inflation. Therefore, the price of gold can be used as a reference to indicate the economic trends and the changes of the inflation fluctuations. At the same time, gold had the function of inflation hedge with the characteristics of commodity and currency.

However, Mahdavi & Zhou (1997) examined if gold and other commodity prices were leading indicators of the inflation rate by specifying an error- correction model [34]. They found no evidence for a co-integrating relationship between the CPI and the London price of gold over the testing period (1979-1994). In an inflation forecasting exercise, the price of gold performed poorly as an indicator of inflation. The phenomenon is possibly explained by the fact that the short term movements in the price of gold are too volatile to properly explain small changes in the price level; and the role of gold as an inflation hedge may have diminished with the growth of the financial futures markets. According to the authors, the weak results were caused by the strong volatility of the gold price in the short run.

Similarly, Tully & Lucey (2007) pointed that no significant relationship between the price of gold and inflation can be determined [46]. Their result was confirmed by Blose (2010) who used unexpected changes in CPI announcement in the period 1900 -2008 as a proxy for future expectations [6]. By applying the percentage change in the gold price as a dependent variable, the research rejected the hypothesis that an increase in expected inflation effects gold prices.

A simple but commonly applied Granger-Causality testing by Siregar & Nguyen (2013) further insinuated that the movement of gold price granger-caused inflation in Vietnam during the observation period (2001-2011) [42]. Concurrently, the test results also demonstrated that inflation did not granger-cause movement in the gold price.

From the literature review, the following factors are investigated in this paper: Price of gold in Vietnam (PGV), Interest rate in Vietnam (INR), USD/VND exchange rate (REX), CPI of Vietnam (CPI), Inflation rate of Vietnam (IRV).

METHODS

Data Collection

After specifying all the dimensions above, the next step is to select a type of data and its sources. There are three categories of literature sources available: primary, secondary and tertiary (Saunders et al., 2009). The current research requires utilizing of secondary data, such as books, journals, newspapers and databases. The data used in the modeling are monthly observations from the last day of the month covering the period from January 2011 to June 2015. Monthly samples are chosen because many studies did the same with the short period of time, for example, studies of Pindyck (1993), Gosh et al. (2002), Kolluri (1981), etc. In addition, the data related to interest rate, consumer price index, exchange rate are not observed daily or weekly [28-37].

- Price of gold in Vietnam (PGV)

PGV is the monthly average selling price of SJC gold per bar denominated in Vietnam Dong (1,000VND/tael). The reason we choose SJC gold price as proxy for gold price in Vietnam is that The Saigon Jewelry Company (SJC) is the most well-known manufacturer who dominates the monopoly on gold bars manufactured within Vietnam. The SJC gold is the purest gold available on the market, and is used for bank to bank transfers, real estate transactions and by private collectors. The data of PGV variable are obtained from its website (www.sjc.com.vn).

- Interest rate of Vietnam (IRV)

When interest rate rises, people tend to keep money on deposit better than gold which does not earn interest (non-interest-bearing). This will cause pressure on the price of gold. Conversely, when interest rate falls down, the price of gold will likely rise. In theory, if the short-term interest rate rises, the gold price falls. In Vietnam, interest rates decisions are taken by The State Bank of Vietnam. The official interest rate is the Refinancing Rate. The data of IRV (%) are collected from the official site of the State Bank of Vietnam (www.sbv.gov.vn).

- USD/VND exchange rate (REX)

Increase in USD/VND exchange rate means that domestic currency would be weaker and people would be

more favor for using gold as safe haven. In addition, the majority of gold in Vietnam is imported while the gold prices in world trade are quoted mainly by USD. Thus, when USD/VND exchange rate rises, the gold price in Vietnam rises. USD/VND exchange rate historical data for REX can be found on Ministry of Finance website (www.mof.gov.vn).

- CPI of Vietnam (CPI)

The general price level in Vietnam (Vietnamese consumer price index) is included as an explanatory variable to test whether the gold price moves together with the general price level so that gold can be considered as a long run hedge against inflation. The monthly CPIs used in this paper are compared to the base year 2011 and the data are collected from the official website of the Ministry of Finance (www.mof.gov.vn).

- Inflation rate of Vietnam (IRV)

Gold is a hedge against inflation. In dollar terms, gold has consistently proven to hold up to inflation. So as price inflation heats up expect more people to jump on the gold band wagon. This demand will create higher and higher highs in the price of gold. Inflation rate is calculated by the following equation:

$$\pi_t = \frac{CPI_t}{CPI_{t-12}} - 1$$

Analytical Method

This paper employs an econometric model and cointegration regression technique for the data analysis because econometric models are generally algebraic models that are stochastic in including random variables. The random variables that are included, typically as additive stochastic disturbance terms, account in part for the omission of relevant variables, incorrect specification of the model, errors in measuring variables, etc. (Michael, 1983) [35]. Moreover, the concept of cointegration gains importance from the fact that the statistical properties of the composite variable are so dramatically different from the properties of the component series. Cointegration captures the notion of long-run relationships in economics and allows for possibly extensive divergences in the short-run. If a stationary linear combination does exist, the regression is the co-integrating regression [27].

So far, there were many researchers use different modeling methods for analyzing gold price. Widely used models used for modeling heteroskedasticity are Engle (1982)'s ARCH (Autoregressive conditional heteroskedasticity) model and Bollerslev (1986)'s GARCH (Generalized Autoregressive Conditional heteroskedasticity) model [7-19]. ARCH and GARCH models have been used in several studies (Yuchen, 2012; Bradley & Farooq, 2012). Tully & Lucey (2007) examined various macro-economic factors that influence gold by using the asymmetric power GARCH model for spot and future price over a 20 year period [8-46-49].

On the other hand, the co-integration regression method is also commonly used for modeling. It was claimed that as the statistical methods were developed for stationary series, its applications on non-stationary series may result in spurious conclusion. And cointegration analysis allows non-stationary data to be used so that spurious results are avoided. This method also provides applied econometricians an effective formal framework for testing and estimating long-run models from actual time-series data. Therefore, in order to take advantage of the cointegration regression technique, many analyses use this method for more accurate results (Claire et al., 2009; Dipak et al., 2000) [13-17]. Similarly, Bernard (2012) applied the cointegration regression technique to analyze the determinants of the gold price [4]. Therefore, due to the robustness of this approach, this paper uses the cointegration regression method to analyze the factors that affect the gold price in Vietnam.

The multiple regression models are used as follow:

$$PGV = \beta_1 + \beta_2 CPI + \beta_3 INR + \beta_4 REX + \beta_5 IRV + \varepsilon$$

where PGV is called dependent variable; INR, REX, CPI, and IRV are called independent variables; $\beta_2, \beta_3, \beta_4, \beta_5$ are called "Regression coefficients"; and ε is model error.

Moreover the multiple regression models have to satisfy best linear unbiased estimators (BLUE). The full ideal conditions consist of a collection of assumptions about the true regression model and the data generating process and can be thought of as a description of an ideal data set. Ideal conditions have to be met in order for ordinary least squared (OLS) to be a good estimate BLUE. If all assumptions are met than the OLS estimators beta are BLUE.

EMPIRICAL RESULTS

Dependent Variable: PGV

Method: Least Squares

Sample: 2011M01 2015M06

Included observations: 54

White heteroskedasticity-consistent std. errors & covariance

 $PGV=C(1)+C(2)*CPI+C(3)*INR+C(4)*REX+C(5)*IRV$

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	-47290.62	8701.898	-5.434518	0.000
C(2)	270.58	66.205	4.087037	0.000
C(3)	91285.14	52997.710	1.722435	0.091
C(4)	2.28	0.919	2.596392	0.014
C(5)	373.16	196.494	1.899107	0.071
R-squared	0.937912	Mean dependent var	35087.41	
Adjusted R2	0.932844	S.D. dependent var	9404.797	
S.E. of regress	2437.208	Akaike info criterion	18.52312	
Sum sq. resid	2.91E+08	Schwarz criterion	18.70728	
Log likeliho.	-495.1241	Hannan-Quinn criter.	18.59414	
F-statistic	185.0511	Durbin-Watson stat	0.638190	
Prob(F-statistic)		0.000000		

In this paper, we take the significant level of 5%. The p-values for C(3) and C(5) greater than 5% indicate that INR and IRV are insignificant in the model; thus, they are omitted from the model. Therefore, its updated model is obtained as the following:

Dependent Variable: PGV

Method: Least Squares

Sample: 2011M01 2015M06

Included observations: 54

 $PGV=C(1)+C(2)*CPI+C(3)*REX$

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	-64515.86	7772.769	-8.300241	0.000
C(2)	147.3778	63.54143	2.319398	0.024
C(3)	4.189320	0.768912	5.448371	0.000
R-squared	0.927914	Mean dependent var	35087.41	
Adjusted R2	0.925087	S.D. dependent var	9404.797	
S.E. of regress	2574.113	Akaike info criter.	18.59835	
Sum sq. resid	3.38E+08	Schwarz criterion	18.70885	
Log likeliho.	-499.1555	Hannan-Quinn criter.	18.84097	
F-statistic	328.2445	Durbin-Watson stat	0.615878	
Prob(F-statistic)		0.000000		

The p-values for CPI and REX are all less than 5%; thus, they are all significant. Besides, P-value of F-statistic of the model is very small compared to the given significance level of 5%, hence, the model is considered well fit the actual data for Vietnamese gold price. Moreover, the adjusted R2 of 0.925 indicates that CPI and REX explain 92.5% of the changes in Vietnamese gold price. The goodness-of-fit of the model is rather good. Importantly, the correlation between CPI and REX is found at 0.674 with the significant level of 0.002; thus, multicollinearity doesn't exist in this model. Besides, the test the assumption of normality shown in Figure 1 and Table 1, the value of JB test of 2.06 with p-value of 0.3569 shows that the model is normal distributed.

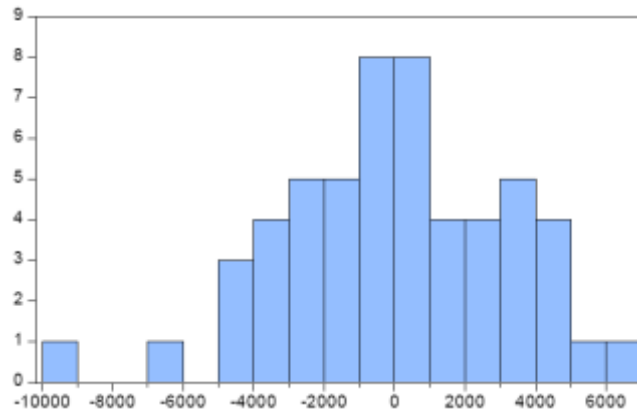


Fig. 1: Test for normality of residuals

Table 1: Test for normality of residuals

Series: Residuals	
Sample: 2011M01 2015M06	
Observations: 54	
Mean	-5.02e-12
Median	103.7340
Maximum	6877.368
Minimum	-9870.128
Std. Dev.	3176.035
Skewness	-0.401901
Kurtosis	3.519319
Jacque-Bera	2.060527
Probability	0.356913

In short, the econometric model for the price of gold in Vietnam and its affecting factors found in this study is presented as:

$$PGV = -64515.86 + 147.3778CPI + 4.189320REX + \varepsilon$$

According to the model, both CPI and REX have positive relationships with Vietnamese gold price, indicating that the changes in CPI and/or REX would obviously result in the change of the USD/VND exchange rate; specifically, every increase in 1 point of CPI would lead to an average increase of 147,378 VND/tael of gold, and every increase in 1 VND per USD would lead to an average increase of 4,189 VND/tael of gold.

The results in this paper further support those of Mahdavi & Zhou (1997), Tulley & Lucey (2007), Jaffe (1989), Garner (1995), Larson & McQueen (1995), Cecchetti et al [21-25-34]. (2000) who concluded that the gold price does not affected by inflation [9]. Some others also show that inflation in countries other than the US does not accurately predict the gold price (Chua & Woodward, 1982) and proved that gold cannot hedge against inflation in many countries. Studies using data including the post-1999 period of gold price hikes also failed to prove the relationship between inflation and the gold price [6-12]. Similar with the findings of Siregar & Nguyen (2013), this paper demonstrates that inflation does not significantly cause the movement of gold price in ietnam [42].

However, our findings are in contradiction to those of Godsell & Tran (2011) and Koutsoyiannis (1983) who concluded that the gold price was influenced significantly by interest rate [23-29]. It is because from May, 2012 the Vietnamese gold price and the nominal interest rate have the dramatically different movements, leading to the release of the Decree No.24 which was first valid on 25th May, 2012, so the gold price market has been strongly affected and did not move with the nominal interest rate.

In contrast to the study of Mahdavi & Zhou (1997) who found no evidence for a co-integrating relationship between the CPI and the London price of gold over the testing period (1979-1994), the empirical test of this research shows that the Vietnamese price index is one of factors significantly driving the domestic gold price [34]. Higher CPI means higher expected inflation, which reduces the confidence of the people and enterprises in the domestic currency and increases hoard of gold and foreign currencies. In consequences, the demand for gold increases and the price of gold in the domestic market goes up.

Especially, this paper further confirms the empirical results of Sharma & Mahendru (2010), Toraman (2011) who claimed that the gold price is driven by USD exchange rate [40-45]. As mentioned, the Vietnamese gold market is the price taker as gold is mainly imported from other countries and quoted in US dollars. Thus, the domestic gold price converting to VND has been subjected to a duplicate effect. On the one hand, it follows after the increase of the world gold price in terms of USD. On the other side, it is affected by the increase of USD/VND exchange rate. This duplicate effect is significant because the shortage of foreign currency reserve has been a hot issue in Vietnam since the beginning of 2010 that the USD/VND exchange rate keeps rising strongly.

CONCLUSION

As a result of model by testing different macroeconomic variables that affects to gold price in Vietnam, a positive relationship is found between Vietnam gold price and the USD/VND exchange rate. The findings of this study suggest that the USD/VND exchange rate and CPI are the two key variables that have significantly positive effect on Vietnamese gold price.

REFERENCE

- [1] Ariovich G. (1983), "The impact of political tension on the price of gold," *Journal for Studies in Economics and Econometrics*, 16: 17-37.
- [2] Baker S.A., Van-Tassel R.C. (1985), "Forecasting the Price of Gold: A Fundamental Approach," *Atlantic Economic Journal*, 13: 43-51.
- [3] Baur D.G., McDermott T.K. (2010), "Is gold a safe haven? International evidence," *Journal of Banking & Finance*, 34(8): 1886-1898.
- [4] Bernard D. (2012), "Determinants of the gold price, Universiteit Gent."
- [5] Bialkowski J.P., Bohly M.T., Stephan P.M., Wisniewsk T.P. (2011), "Is there a speculative bubble in the price of gold? Germany: Wilhelminian University of Munster."
- [6] Blose L.E. (2010), "Gold prices, cost of carry, and expected inflation," *J. Economics and Business*, 6(1): 35-47.
- [7] Bollerslev T. (1986), "Generalised Autoregressive conditional heteroskedasticity," *J. Econometrics*, 31: 307-327.
- [8] Bradley T., Farooq M. (2012), "Volatility transmission between gold and oil futures under structural breaks, *Int. Review of Economics & Finance*," 25(11): 113-121.
- [9] Cecchetti S.G., Chu R.S., Steindel C. (2000), "The unreliability of inflation indicators," *Current Issues in Economics and Finance*, 6: 1-6.
- [10] CIEM (Central institute for economic management) (2011), "Issue of monetary market, Hanoi: Central institute for economic management."
- [11] Chappell D., Dowd K. (1997), "A simple model of the gold standard," *J. Money, Credit and Banking*, 29: 94-105.
- [12] Chua J., Woodward R.S. (1982), "Gold as an inflation hedge: A comparative study of six major industrial countries," *J. Business and Accounting*, 9: 191-197.
- [13] Claire G., Ginette M., Rajneesh S., Ahmet T. (2009), "The dynamics of gold price, gold mining stock prices and stock market prices comovements," *Research in Applied in Economics*, 1(1): 1-19.
- [14] Clarine J., Dewi T. (2012), "The determinants of the price of gold in Indonesia," Indonesia: BINUS University.
- [15] Dang T.T.V. (2008), "Các giải pháp phát triển kinh doanh vàng tại Việt Nam (Solutions to develop the gold trading business in Vietnam) [Vietnamese]," Ho Chi Minh: University of Economics Ho Chi Minh City.
- [16] Diba B.T., Grossman H.I. (1984), "Rational bubbles in the price of gold," Cambridge: NBER, WP No. 1300.
- [17] Dipak G., Eric J., Peter M., Roberte W. (2000), "Gold as Inflation Hedge? *Studies in Economics and Finance*," 22(1): 1 -25.
- [18] Dooley M.P., Isard P., Taylor M.P. (1995), "Exchange rates," country-specific shocks and gold, *Applied Financial Economics*, 5: 121-129.
- [19] Engle R. (1982), "autoregressive conditional hetero-skedasticity with estimates of variance of United Kingdom inflation," *Econometrica*, 50: 987-1007.
- [20] Fu D., Mei X., Zhang H. (2009), "Empirical analysis on the correlation between gold price and inflation," Shanghai: Sanghai Finance University.
- [21] Garner C.A. (1995), "How useful are leading indicators of inflation?" *Economic Review*, 80: 5-18.
- [22] Ghosh D., Levin E.J., Macmillan P., Wright R.E. (2002), "Gold as an inflation hedge?" University of St. Andrews Discussion Paper Series, Department of Economics, No. 21, January 2002.
- [23] Godsell G., Tran V. (2011), "Gold prices and short-term nominal interest rates: An examination of potential influences on gold prices," Canada: University of Ottawa.

- [24] Gorton G., Rouwenhorst K.G. (2006), "Facts and fantasies about commodity futures," *Financial Analyst Journal*, 62(2): 47-68.
- [25] Jaffe J.F. (1989), "Gold and gold stocks as investments for institutional portfolios," *Financial Analysts J.*, 45: 53-59.
- [26] Kaufmann T.D., Winters R.A. (1989), "The price of gold: A simple model," *Resource Policy*, 15(4): 309-313.
- [27] Kevin D. (1995), "Macroeconometrics: Developments, Tensions, and Prospects," London: Kluwer Academics.
- [28] Kolluri B.R. (1981), "Gold as a hedge against Inflation: An empirical investigation," *Quarterly Review of Economics and Business*, 21: 13-24.
- [29] Koutsoyiannis A. (1983), "A short-run pricing model for a speculative asset, tested with data from the gold bullion market," *Applied Economics*, 15(5): 563-581.
- [30] Lampinen A. (2007), "Gold Investments and short- and long-run price determinants of the price of gold," WP. Finland: Lappeenranta University of Technology.
- [31] Larsen A.B., McQueen G.R. (1995), "REITs, real estate, and inflation: Lessons from the gold market," *Journal of Real Estate Finance and Economics*, 10(3): 285-297.
- [32] Laurent R.D. (1994), "Is there a role for gold in monetary policy? *Economic Perspectives*," 18: 2-14.
- [33] Levin E.J., Wright R.E. (2006), "Short run and long run determinants of the gold price, London: World Gold Council."
- [34] Mahdavi S., Zhou S. (1997), "Gold and commodity prices as leading indicators of inflation: Tests of long-run relationship and predictive performance," *Journal of Economics and Business*, 49: 475-489.
- [35] Michael D. (1983), "Economic and Econometric Models," Los Angeles: University of California.
- [36] Pham T.H.T. (2012), "The factors affecting the gold market in Vietnam economy," Thesis, VNU University of Economics and Business.
- [37] Pindyck R.S. (1993), "The present value model of rational commodity pricing," *Economic J.*, 103(418): 511-530.
- [38] Ranson R.D. (2005), "Inflation protection: why gold works better than Linkers," London: The World Gold Council.
- [39] Saunders M., Lewis P., Thornhill A. (2009), "Research methods for business students (5th Ed.)," Harlow: Financial Times Prentice Hall.
- [40] Sharma G.D., Mahendru M. (2010), "Impact of macro-economic variables on stock prices in India," *Global J. Management and Business Research*, 10(7): 19-26.
- [41] Sherman E. (1986), "Gold Investment: Theory and Application," New York: Prentice Hall.
- [42] Siregar R.Y., Nguyen T.K.C. (2013), "Inflationary Implication of Gold Price in Vietnam," Singapore: AMRO.
- [43] Sjaastad L.A., Scacciavillani F. (1996), "The price of gold and the exchange rate," *Journal of International Money and Finance*, 15(6): 879-897.
- [44] Tan W. (2011), "Analysis on factors of affecting gold price," China: Human Chemical Vocational Technology College.
- [45] Toraman C., Basarur C., Bayramoglu M.F. (2011), "Determination of Factors Affecting the Price of Gold: A Study of MGARCH Model," *Business and Economics Research Journal*, 2: 37-50.
- [46] Tully E. & Lucey B. (2007), "A power GARCH examination of the gold market," *Research in International Business and Finance*, 21(2): 316-325.
- [47] Worthington A.C., Pahlavani M. (2007), "Gold investment as an inflationary hedge: cointegration evidence with allowance for endogenous structural breaks," *Applied Financial Economics Letters*, 3(4): 259-262.
- [48] Ye L., Zhou Y. (2010), "Influence factors on gold price in China market: An empirical study," China: Hebei University of Technology.
- [49] Yuchen D. (2012), "Modelling and forecasting volatility of gold price with other precious metals prices by univariate GARCH models," Uppsala Universitet.