A Study of Factors Affecting the Gold Price in Thailand during 2005 – 2015

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Abstract

The objective of this study was to determine the factors that affected the Gold Price in Thailand during 2005 – 2015. Monthly data from January 2005 to March 2015 were used to analyze the impact of World Gold Price, Oil Price, Dow Jones Industrial Average, USD Index, Consumer Price Index, SET Index, Interest Rate, Exchange Rate, and Time Lag on the Gold Price in Thailand. Multiple regression analysis was employed in this study. The findings of this study had identified World Gold Price, Dow Jones Industrial Average, USD Index, Consumer Price Index, SET Index, and Time Lag as significant predictors of the Gold Price in Thailand. The result of this study would be useful to investors, individual buyers, and sellers for their analysis and decision making on trading gold profitably.

Keywords: gold price in Thailand, gold trading, gold investment, commodity, speculation

Introduction

Gold, a precious metal people all over the world value was not only used for the jewelry purpose but for investment as well. Particularly, the new investors who do not had knowledge about investment or the investors who do not had much time to monitor the assets they invested in, gold provides the opportunity for these investors as it was an asset that had high liquidity so the investors can sell it whenever they want and they do not had to monitor the price frequently like stocks. However, in the case of the experienced investors, adding gold into their portfolios would be another way to diversify the risk and increasing return. Moreover, gold was an asset with high liquidity as it can be sold to anyone anytime and anywhere. People around the world value gold the same way and are willing to hold it for any circumstances. Aside from cash, gold had the highest liquidity as it can be exchanged for cash immediately. Further, its value of money does not reduce much like other assets when they are sold. In addition, gold itself was a special commodity that had a currency value as it was mainly reserved by most central banks (Raktin, 2009).

Currently in Thailand, the economy is moving slow as its GDP growth was relatively low and the stock market in Thailand was not very attractive. Many investors are hesitating in investing in the stock due to the nature of the stocks that can be affected by the rumor and news especially during the coup period. Moreover, the price of gold had dropped a lot from its peak at $1,895 in 2011 to $1,061 in December 2015 which was approximately a 44% drop.

Before Gold Traders Association was formed, gold traders made gold according to their preferences without considering the percentage of gold they used, some used 99% while some used 97%. The business hours and the fees they charged also varied among different traders. Such activities caused problems, thus, gold traders gathered together and made a decision to form a club called "11 Gold Traders Club" which included 11 gold traders in order to set a standard for gold and they resolved that gold in Thailand would use 96.5% from 1983 and onwards on regarding the nature of the gold itself and the use of gold so that it would be best for the customers.

After some time, the club performed well and was widely recognized, the members increased, therefore, on August 8, 1983, 11 Gold Traders Club was granted the authorization to be an association and renamed as "Gold Traders Association", and the name had been used until now. The roles of Gold Traders Association are not only setting the standard for percentage of gold used in producing and representing the gold traders but it was also authorized to set the Gold Price in Thailand which was used as a standard price for the whole country.

Literature Review

Wei *et al.* (2014) conducted a research on macro factors that had an impact on World Gold Price during the financial crisis of 2007 - 2009. The research objectives were to determine that macro factors and how they are correlated with the World Gold Price. The macro factors they used to determine the World Gold Price were USD index, CRB index (Commodity Research Bureau Futures Price Index), and US treasury CDS spread. The data used were monthly data from August 2007 to June 2009 which were during the subprime crisis. The method used in this research was Vector Autoregression (VAR). The findings show that USD index was negatively correlated with gold price; while CRB index and CDS spreads are positively correlated with gold price. Moreover, the study showed that the CRB index and USD index had one lagged relationship; while CDS spread had two lagged relationship with World Gold Price.

Boonsri (2012) studied the factors affecting the Gold Price in Thailand and gold future price forecast to advance by ARIMA method. The objectives of the study were to study the economic factors affecting the Gold Price in Thailand and to forecast the Gold Price in Thailand by using ARIMA method. The independent variables used in this study

were World Gold Price, Consumer Price Index, Oil Price, Exchange Rate of USD/THB, and three-month fixed deposits Interest Rate while the dependent variable was Gold Price in Thailand. The secondary data used in this study was collected monthly from January 2007 to December 2011. The study had found that World Gold Price, Exchange Rate, Consumer Price Index, and Gold Price in Thailand were positively correlated while the Interest Rate and Oil Price were negatively correlated.

Praphaphak (2012) studied factors affecting the gold bullion price in Thailand before and after the economic crisis of the USA. The research objective was to determine the factors affecting the bullion price in Thailand before and after the economic crisis of the USA. There were many independent variables taken in this study which included the Consumer Price Index, Oil Price, World Gold Price, Interest Rate, Exchange Rate USD/THB, SET Index, and Thailand industrial index which determined the dependent variable which was the bullion price in Thailand. The method used in this study was ARIMAX. The data were collected monthly from January 2002 to December 2010. The findings showed that the Exchange Rate USD/THB, Thailand industrial index and World Gold Price were positively correlated with the bullion price in Thailand. However, Consumer Price Index and Oil Price had no significant correlation with the bullion price in Thailand. Further, Interest Rate and SET Index did not directly affect the bullion price in Thailand.

Kusolpalalert (2012) investigated the relationships of various assets in the different markets in Thailand during the recovery period and the subprime crisis. He studied the relationship among SET Index, World Gold Price, government bond yields, and Treasury bill rates in Thailand. The variables he used to investigate the relationships of the various assets in this study were SET Index, World Gold Price, 1-year government bond yield, 2-year government bond yield, 10-year government bond yield, 1-month Treasury bill rate, and 3-month Treasury bill rate. In order to perform the investigation, he adopted 2 statistical models which are Johansen's integration and Vector Error Correction. He found that the SET Index had a positive relationship with World Gold Price, 2-year government bond yield, and 3-month Treasury bill rate but had an inverse movement with 1-year, 10-year government bond yield, and 1-month Treasury bill rate in the recovery period. Meanwhile SET Index had a positive relationship with World Gold Price, 1-year, 10-year government bond yield and 1-month Treasury bill rate during the economic crisis.

Toraman *et al.* (2011) study on the "Determination of factors affecting the World Gold Pric" aimed to determine the factors affecting World Gold Price with the MGARCH model. The variables researchers used in order to determine the World Gold Price were USD Index, US inflation rate, US real interest rate, Oil Price and Dow Jones Industrial Average. The data were collected monthly from January 1992 to March 2010.

The result showed that the highest correlation was between World Gold Price and USD Index but it was a negative correlation. Moreover, Dow Jones Industrial Average also had a negative relationship with World Gold Price. However, there was positive correlation between World Gold Price and Oil Price, US inflation rate, and US real interest rate.

Teerasan (2010) conducted a research on an analysis of economic factors affecting Gold Price in Thailand. The researcher aimed to study the economic factors affecting the Gold Price in Thailand and forecast the Gold Price in Thailand. The variables involved in this study included the Gold Price in Thailand as a dependent variable and World Gold Price, Exchange Rate USD/THB, Consumer Price Index, three-month fixed deposits Interest Rate, per capita income, Oil Price, and gold tax as independent variables. The data were collected monthly from January 1997 to December 2007. The researcher employed 2 statistical models in analyzing the data which were regression and ARIMA. The research findings showed that all of the independent variables had a significant effect on the Gold Price in Thailand and the forecasting showed a high tendency of increasing Gold Price in Thailand.

Kampiew (2010) presented an analysis of the relationship between World Gold Price and the US exchange rate using co integration method. This research analyzed the relationship between World Gold Price and EUR/USD and USD/JPY. The statistical models used to analyze the relationship were co integration and Error correction model. EUR/USD and USD/JPY were used as independent variables while World Gold Price was used as a dependent variable. The researcher collected the data daily from January 4, 1999 to May 11, 2010. The result showed that EUR/USD had a bi-directional causality relationship while USD/JPY had one causality relationship with the World Gold Price.

Aunyankovit (2010) conducted a research on factor determination of Gold Price in Thailand. The research aimed to study the relationship between Gold Price in Thailand and domestic interest rate, Oil Price, and SET Index. The study used real interest rate, Oil Price, and SET Index as independent variables and Gold Price in Thailand as a dependent variable which the data were collected from January 1998 to December 2008. The statistical models used in the study were simple regression and multiple regression. The study found that Oil Price was the best explainable factor to Gold Price in Thailand with the positive relationship. SET Index also had a positive relationship with the Gold Price in Thailand while real interest rate had a negative relationship with the Gold Price in Thailand.

Raktin (2009) determined factors affecting Gold Price in Thailand and compared whether the factors affecting Gold Price in Thailand were different in the period that the price was fluctuated and in the period that the price was quite stable. The statistical model

used in the study was multiple regression. The dependent variable was Gold Price in Thailand while the independent variables were the Exchange Rate USD/THB, World Gold Price, Dow Jones Industrial Average, SET Index, USD Index, Interest rate, Consumer Price Index, and Oil Price. The research collected the data monthly from January 1999 to June 2008. The research findings showed that the Exchange Rate USD/THB and World Gold Price affected the Gold Price in Thailand positively. The effect of both factors were different during the fluctuated period and stable period.

Innoi (2009) conducted a research on an essential element of Gold Price in Thailand gold market. The study presented the Gold Price in Thailand determinants in Thailand gold market. The statistical model used in this research was multiple regression. The independent variables included the Exchange Rate USD/THB, World Gold Price, diesel price in Thailand, SET Index, Silver Price, and three-month fixed deposits Interest Rate. The data were collected monthly from January 2004 to October 2008. The researcher found that the factors determined Gold Price in Thailand were the World Gold Price, diesel price in Thailand, three-month Interest Rate and Silver Price. However, the fluctuation of Gold Price in Thailand, SET Index, and the Exchange Rate USD/THB cannot explain the behavior of Gold Price in Thailand.

Sanphechudayan (2008) showed the factors determining gold bullion price in Thailand. The study aimed to analyze the factors affecting changes in the price of gold bullion sold in Thailand. The statistical model employed in this study was regression by ordinary lease square (OLS). The independent variables used in this study consisted of the Exchange Rate USD/THB, World Gold Price, real interest rate, Consumer Price Index, and Oil Price. The data were collected quarterly from the second quarter of 2002 to the third quarter of 2008. The result showed that the Exchange Rate USD/THB, World Gold Price, and Consumer Price Index were positively correlated with Gold Price in Thailand while the real interest rate and Oil Price were negatively correlated with the Gold Price in Thailand.

Conceptual Framework

The conceptual framework of this study was based on the theoretical framework of the previous studies. In this model, World Gold Price, Oil Price, Consumer Price Index, and Exchange Rate were the common variables with the studies of Praphaphak (2012), Teerasan (2010), and Raktin (2009), Interest Rate and SET Index were taken from Praphaphak (2012) and Raktin (2009), and USD Index and Dow Jones Industrial Average were taken from Raktin (2009).
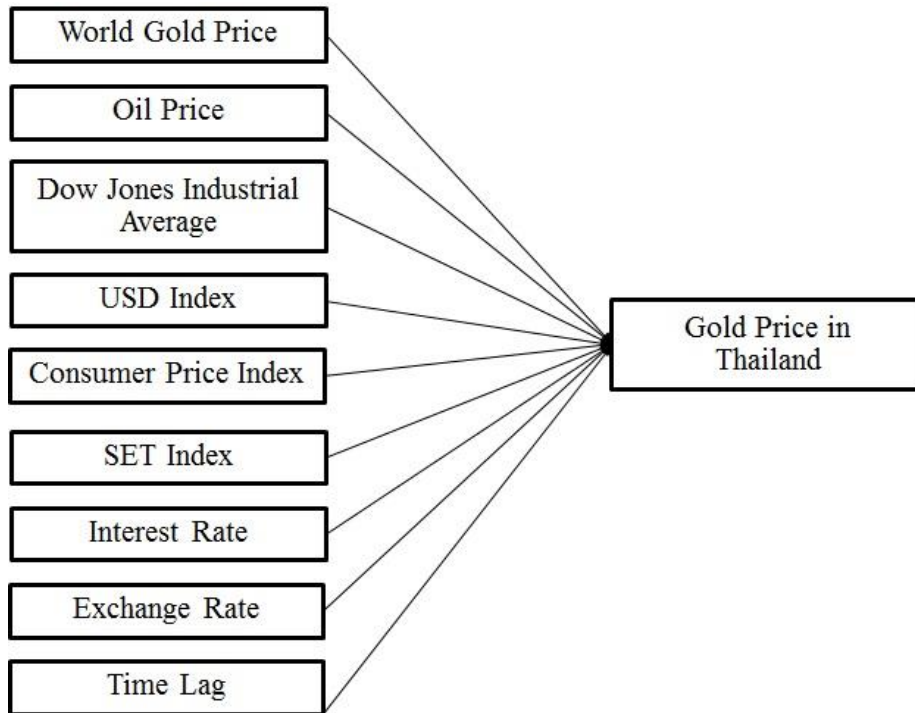
Figure 1 Conceptual Framework

Source: Adapted from Praphaphak (2012); Teerasan (2010); Raktin (2009).

This framework can be written in economic model as follows:

$$GPT = \beta_0 + \beta_1 WGP + \beta_2 OP + \beta_3 DJI + \beta_4 USDX + \beta_5 CPI + \beta_6 SET + \beta_7 IR + \beta_8 FX + \beta_9 LAG + \varepsilon$$

Where,

β_0	=	constant,
β_1 to β_9	=	coefficients of variables,
WGP	=	World Gold Price,
OP	=	Oil Price,
DJI	=	Dow Jones Industrial Average,
USDX	=	USD Index,
CPI	=	Consumer Price Index,
SET	=	SET Index,
IR	=	Interest Rate,
FX	=	Exchange Rate
LAG	=	Time Lag

ε =   error term

Research Hypotheses

$H1_a$: There was a significant impact of World Gold Price on Gold Price in Thailand during 2005 – 2015.

$H2_a$: There was a significant impact of Oil Price on Gold Price in Thailand during 2005 – 2015.

$H3_a$: There was a significant impact of Dow Jones Industrial Average on Gold Price in Thailand during 2005 – 2015.

$H4_a$: There was a significant impact of USD Index on Gold Price in Thailand during 2005 – 2015.

$H5_a$: There was a significant impact of Consumer Price Index on Gold Price in Thailand during 2005 – 2015.

$H6_a$: There was a significant impact of SET Index on Gold Price in Thailand during 2005 – 2015.

$H7_a$: There was a significant impact of Interest Rate on Gold Price in Thailand during 2005 – 2015.

$H8_a$: There was a significant impact of Exchange Rate on Gold Price in Thailand during 2005 – 2015.

$H9a$: There was a significant impact of Time Lag on Gold Price in Thailand during 2005 – 2015.

Research Methodology

This study determined the correlations among the World Gold Price, Oil Price, Dow Jones Industrial Average, USD Index, Consumer Price Index, SET Index, Interest Rate, Exchange Rate, Time Lag and Gold Price in Thailand. First of all, Augmented Dickey Fuller (ADF) test was used to check for stationarity of time series data. Secondly, multiple regression analysis was used to determine the relationship between independent variables and the Gold Price in Thailand. Thirdly, Variance Inflation Factor was used to find the multicollinearity problem. Lastly, Durbin-Watson test was used to find autocorrelation problem.

Data Collection

The Monthly time series data of World Gold Price, Oil Price, Dow Jones Industrial Average, USD Index, Consumer Price Index, SET Index, Interest Rate, and Exchange Rate were collected from January 2005 to March 2015. The major sources of secondary data for the research were the Gold Traders Association, Kitco website, Yahoo

website, Investing.com, Bureau of Trade and Economic Indices, SCBAM, and Bank of Thailand.

Description of Variables

This study considered nine independent variables used in fundamental analysis and evaluated their correlations with the dependent variable, the Gold Price in Thailand. Independent variables included were World Gold Price, Oil Price, Dow Jones Industrial Average, USD Index, Consumer Price Index, SET Index, Interest Rate, Exchange Rate, and Time Lag.

Results and Discussion

Descriptive Statistics

The following descriptive statistics provided the mean, standard deviation, minimum and maximum values, skewness, and kurtosis for each variable. There were 23 monthly observations (N) for each variable. In terms of skewness, values between +1 and -1 indicate that the data were symmetrical (Rafay et al., 2014); where this was not the case, the variables were log transformed. The Augmented Dickey Fuller (ADF) test was applied to check stationarity; where time series data were found to be non-stationary at level, they were transformed into stationary data via differencing. Table 1

Descriptive Statistics of Variables

	GPT	WGP	OP	DJI	USDX	CPI	SET	IR	FX	LAG
Mean	16670.82	1079.967	81.33691	12426.6	81.80659	96.15992	962.8301	2.26935	33.40622	16657.70
Std. Dev.	5187.142	401.4978	20.01539	2463.508	5.027779	7.749804	336.2077	1.074722	3.19536	5206.481
Minimum	7835.42	416.3	41.68	7062.93	72.17	80.4	401.84	0.75	29.275	7835.42
Maximum	25738.46	1828.5	140	18132.7	98.66	107.9	1597.86	4.75	41.655	25738.46
Skewness	0.006079	0.017429	0.082239	0.464623	0.525401	-0.119769	0.481027	0.508908	1.108007	0.013413
Kurtoswas	1.872155	1.859206	2.495734	2.735484	3.481725	1.850752	2.014407	2.864353	3.263817	1.859885

Augmented Dickey Fuller Test

While analyzing time series data, it was important to ensure that all included data were stationary; if was not the case, the empirical results can show a significant relationship between variables where none exists in actuality. ADF test was applied to check stationarity of data for use in Multiple Regression analyses so as to avoid spurious results. Table 2 illustrates the results of ADF testing. Table 2 indicates that all variables were stationary at first difference.

Table 2

Investigation of Unit Root at Level, 1st difference, & 2nd difference

Variables	At Level			At First Difference		
	ADF test	Critical Value	Prob.	ADF test	Critical Value	Prob.
GPT	0.904402	-1.943471	0.9015	-9.710187	-3.447383	0.0000
WGP	0.416394	-1.943471	0.8017	-13.44139	-3.447383	0.0000
OP	-0.686085	-1.943494	0.4179	-8.073474	-3.447383	0.0000
DJI	1.438592	-1.943471	0.9622	-10.46888	-3.447383	0.0000
USDX	0.612738	-1.943471	0.8474	-10.94453	-3.447383	0.0000
CPI	2.441847	-1.943494	0.9965	-7.431318	-3.447383	0.0000
SET	1.205700	-1.943471	0.9412	-9.489015	-3.447383	0.0000
IR	-0.845641	-1.943494	0.3477	-7.727135	-3.447383	0.0000
LFX	-0.798962	-1.943471	0.368	-11.15627	-3.447383	0.0000
LAG	1.024830	-1.943494	0.9192	-9.334607	-3.449020	0.0000

Multiple Regression Analysis

Multiple linear regression is when we need to explain changes in the dependent variable (Gujarati and Porter, 2009). Multiple regression analysis had been used in numerous previous studies to test the correlations between the Gold Price in Thailand and the determining variables (Sanphechudayan, 2008; Raktin, 2009; Innoi, 2009; and Aunyakovit, 2010). Using the results from the ADF unit root test, this study used the following modified model for regression analysis.

$$GPT = \beta_0 + \beta_1 DWGP + \beta_2 DOP + \beta_3 DDJI + \beta_4 DUSDX + \beta_5 DCPI + \beta_6 DSET + \beta_7 DIR + \beta_8 DLFX + \beta_9 DLag + \varepsilon$$

Where, D represents first differences

The above model was consistent with that used by Rafay *et al.* (2014) who used transformed symmetrical data for regression analysis. The Eviews output for the regression model was illustrated in Table 3 below.

Table 3

Regression Output (OLS)

Dependent Variable: DGPT
Method: Least Squares
Date: 11/14/15   Time: 02:15
Sample (adjusted): 2005M03 2015M03
Included observations: 121 after adjustments

HAC standard errors & covariance (Bartlett kernel, Newey-West fixed bandwidth = 5.0000)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DCPI	161.2093	89.38820	1.803474	0.0740
DDJI	-0.438130	0.132762	-3.300115	0.0013
DIR	39.60591	146.3810	0.270567	0.7872
DLAG	0.211797	0.081578	2.596250	0.0107
DLFX	1325.711	1918.944	0.690854	0.4911
DOP	-7.401779	9.702244	-0.762893	0.4471
DSET	-1.841631	0.947696	-1.943273	0.0545
DUSDX	-45.59525	23.67192	-1.926133	0.0566
DWGP	5.073020	0.841821	6.026248	0.0000
C	46.10311	45.17049	1.020647	0.3096

R-squared	0.435128	Mean dependent var		86.25273
Adjusted R-squared	0.389328	S.D. dependent var		635.3126
S.E. of regression	496.4684	Akaike info criterion		15.33195
Sum squared resid	27359376	Schwarz criterion		15.56300
Log likelihood	-917.5827	Hannan-Quinn criter.		15.42579
F-statistic	9.500525	Durbin-Watson stat		2.638264
Prob(F-statistic)	0.000000	Wald F-statistic		18.58463
Prob(Wald F-statistic)	0.000000			

Table 3 shows the adjusted R^2 to be 0.3893 which indicates that the fundamental variables included in this model explain 38.93 percent of the variation in the Gold Price in Thailand. Statistical significance of the model was 0.000; this means that the regression model was significant at the 1% significance level. From the results of the multiple regression, the derived equation can be written as:

$$GPT = 46.10311 + 5.073020DWGP - 7.401779DOP - 0.43813DDJI - 45.59525USDX + 161.2093DCPI - 1.841631DSET + 39.60591DIR + 1325.711DLFX + 0.211797LAG + \varepsilon$$

The results imply that World Gold Price, Dow Jones Industrial Average, USD Index, Consumer Price Index, SET Index, and Time Lag had a significant impact on the Gold Price in Thailand while Oil Price, Interest Rate, and Exchange Rate were statistically insignificant determinants at the 5% significance level.

Moreover, the results showed that World Gold Price had a significant impact on Gold Price in Thailand during 2005 – 2015 since the *p* value was 0.0000 which was less than 0.01. The coefficient was 5.07302 which means that an increase in World Gold Price by one dollar caused Gold Price increase in Thailand during 2005 – 2015 by 5.07302 baht.

However, Oil Price was not found to have a significant impact on Gold Price in Thailand during 2005 – 2015 as the *p* value was 0.4471 which was greater than 0.10. The coefficient was -7.401779 which means that an increase in Oil Price by one dollar would cause Gold Price in Thailand during 2005 – 2015 to decrease by 7.401779 baht.

Nevertheless, the Dow Jones Industrial Average was found to have significant on impact Gold Price in Thailand during 2005 – 2015 as the *p* value was 0.0013 which was less than 0.01. The coefficient was -0.43813 which means that an increase in Dow Jones Industrial Average by one point would cause Gold Price in Thailand during 2005 – 2015 to decrease 0.43813 baht.

The result also showed that USD Index was found to have a significant impact on Gold Price in Thailand during 2005 – 2015 as the *p* value was 0.0566 which was less than 0.10. The coefficient was -45.59525 which means that an increase in USD Index by one point would cause Gold Price in Thailand during 2005 – 2015 to decrease 45.59525 baht.

Further, Consumer Price Index was found to have a significant impact on Gold Price in Thailand during 2005 – 2015 as the *p* value was 0.074 which was less than 0.10. The coefficient was 161.2093 which means that an increase in Consumer Price Index by one percent would cause Gold Price in Thailand during 2005 – 2015 to increase 161.2093 baht.

SET Index was also found to have a significant impact on Gold Price in Thailand during 2005 – 2015 as the *p* value was 0.0545 which was less than 0.10 with the coefficient of -1.841631 which means that an increase in SET Index by one point would cause Gold Price in Thailand during 2005 – 2015 to decrease 1.841631 baht.

Though, Interest Rate was not found to have a significant impact on Gold Price in Thailand during 2005 – 2015 as the *p* value was 0.7872 which was greater than 0.10. The coefficient was 39.60591 which means that an increase in Interest Rate by 1 percent would cause the Gold Price in Thailand during 2005 – 2015 to increase by 39.60591 baht.

In addition, Exchange Rate was not found to have a significant impact on Gold Price in Thailand during 2005 – 2015 as the *p* value was 0.4911 which was greater than 0.10. The coefficient was 1325.711 which means that an increase in Exchange Rate by 1 baht would cause Gold Price in Thailand to increase by 1325.711 baht.

Lastly, Time Lag was found to have a significant impact on Gold Price in Thailand during 2005 – 2015 as the *p* value was 0.0107 which was less than 0.05. The coefficient was 0.211797 which means that an increase in last month Gold Price in Thailand by 1 baht would cause Gold Price in Thailand to increase by 0.211797 baht.

Conclusion and Recommendations

This study aimed to explore whether fundamental and statistical variables – World Gold Price, Oil Price, Dow Jones Industrial Average, USD Index, Consumer Price Index, SET Index, Interest Rate, Exchange Rate, and Time Lag – had an impact on the Gold

Price in Thailand. Secondary data from January 2005 to March 2015 were used in this study at monthly frequency for a total of 123 observations. Raw data were converted into logs where skewness was indicated, and differenced variables were used where non-stationarity, i.e. the presence of unit roots, was found. Using multiple regression analysis, it was affirmed that the fundamental and statistical variables included in this study's model had a significant impact on the Gold Price in Thailand. Moreover, this study found that World Gold Price, Dow Jones Industrial Average, USD Index, Consumer Price Index, SET Index, and Time Lag had a significant impact on the Gold Price in Thailand. The impacts of Oil Price, Interest Rate, and Exchange Rate were found to be statistically insignificant. Further, World Gold Price was found to be significantly impact on the Gold Price in Thailand at 1% significance level, thus, it was affirmed as a reference price for quoting the Gold Price in Thailand according to the Gold Traders Association. Therefore, it was important for the investors or the individual buyers and sellers to pay more attention on the six factors that impact Gold Price in Thailand especially World Gold Price and they can apply the model to predict the trend of Gold Price in Thailand.

The results of this study can be used by the investors and individual buyers and sellers to predict the Gold Price in Thailand. Investment includes risk, thus, the fundamental and statistical variables can be used as a tool for risk management by studying patterns in the fundamental and statistical indicators which could explain fluctuations in the Gold Price in Thailand. Accurate forecasting of Gold Price in Thailand can allow investors and individual buyers and sellers to maximize the returns while minimizing the risk. Hence, this study recommends the investors and individual buyers and sellers to trade gold with caution regarding the impact of all the possible factors included in the model studied which were World Gold Price, Dow Jones Industrial Average, USD Index, Consumer Price Index, SET Index, and Time Lag since they had significant impact on the Gold Price in Thailand.

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