

FACTORS AFFECTING THE DISPARITY OF VIETNAMESE GOLD PRICES AND WORLDWIDE GOLD PRICES

▪ *Ho Thanh Tri, Vo Thi Nga*

Abstract

Gold is a precious metal which is highly appreciated because of its prominent role in the world of investments, savings, and consumption. Although gold is no longer used as a primary form of currency in some countries, it continues to have a strong influence on the value of the currencies of those countries. Compared to all the other precious metals used for investment and trade, throughout history gold has always been preferred. The value of gold is a factor mentioned in the commodities and futures market. Vietnam does not produce/mine enough gold to meet its domestic requirements. As the country has to import over sixty percent of its gold, Vietnam's gold price is mostly influenced by the world price movements, in turn increasing or decreasing domestically. Therefore, understanding and addressing the factors resulting in gold price disparities is essential in policy adjustments to stabilize the price of gold and prevent speculation, which may cause economic destabilization as well as a loss of competitiveness in Vietnamese market for gold and other precious metals. The study includes monthly data collected between January 2006 and December 2015. Exchange rates, import tax, and seasonal factor data are included in the model as independent variables. According to the empirical findings, the foreign exchange rate had a negative impact on the disparity between Vietnamese gold price and the world price. The import tax has a positive effect on the discrepancies among gold prices, while the seasonal factor variable was not statistically significant at 5 percent and negative concerning the disparity of the gold price.

Keywords: gold price, disparity, exchange rates, import tax, seasonal, competitiveness

JEL Classification: C1, E4, E7, G1

Received: January, 2019

1st Revision: June, 2019

Accepted: July, 2019

1. INTRODUCTION

Gold is a precious metal that many people are interested in because it plays a significant role for the investors, savers, and consumers. People continue to link a country's monetary value with gold rates, although the metal is no longer a primary form of currency. Among all the precious metals usually chosen as investment instruments, gold is the most popular and is the metal which

outperforms others. The topic of gold price disparities has received a lot of attention in the commodities markets and the futures markets.

In Vietnam gold plays an essential role in the purchase of precious assets such as real estate, houses and cars. The buyer generally arranges financing with a bank in terms of gold, which maintains a more stable value with regard to purchasing power compared to the Vietnamese Dong. Generally speaking, most of the valued properties of Vietnamese are attached to the price of gold. As a result, every fluctuation in gold prices is closely followed in Vietnam. Gold is used not only as a means of payment for transactions, but also as a reserve currency. During Vietnam's recent economic downturn, with its frozen real estate market and immature stock market, the gold market has been one of the most widely used alternative channels for investor concerns. For this reason, dealing in gold and in U.S. dollars is considered by many Vietnamese to be a haven from inflation and other uncertainties in the current economy (Tran et al., 2017).

In recent times, gold prices have seen great fluctuations in the domestic and world market, accompanied by concomitant turbulence in the gold trade in Vietnam. Since 2001, the gold price has been increasing steadily as reported by the country's Central Institute for Economic Management. The price of gold in Vietnam increased dramatically in April 2006 (from 0.98 million to 1.5 million VND per unit), and continued to fluctuate from 2012 to 2015 (Pham, 2017). It sometimes went up to 47.4 million per tael (1 tael = 1.2 troy ounces). The gold price rose about 8.6 times the value of the price in December 2011. This period is therefore referred to as "the century of gold." Even today the Vietnamese government has still not found solutions to this problem of price disparity.

The gold market price of Vietnam is determined by the world's price, mostly imported gold, with domestic production remaining relatively low. Therefore, a rise or fall in the world gold price influences the local gold price. The disparity between Vietnamese and world gold prices sometimes exceeds the cost of importing gold. Nevertheless, gold price fluctuations in the country do not entirely follow the global prices. Understanding the factors that affect these differences will help the Vietnamese government come up with solutions to stabilize the domestic gold price. What are the factors that have an impact on the price disparity between Vietnam gold and the world gold prices? How do these factors influence that gap?

2. LITERATURE REVIEW

2.1 Vietnam's gold supply and demand

The factors that determine gold prices are gold supply and demand. Any increase or decrease in the supply and demand of gold will have an impact on the gold price (Fong-Sam, 2015; Ismail et al., 2009). For this reason, in order to understand the gold pricing, the supply and demand of gold needs to be clarified.

Supply: Vietnam also produces and mines gold, but the amount is not significant. The production of gold from 2009 to 2013 remained below 3.5 tons (Hong, 2003).

Tab. 1 – Gold production of Vietnam from 2009 to 2013. Source: Fong-Sam (2015), World Gold Council, and Vietnam banking & financial services report Q3-2017

Gold (Tonnes)	2009	2010	2011	2012	2013
	3.0	3.5	3.5	3.5	3.5

Table 1 shows the gold supply in Vietnam for investment and jewelry. It can be seen that the Vietnamese gold mining and production available are not enough to meet the domestic demand for gold (Table 1 & 2). The primary source of Vietnam’s gold supply is import.

Depending on the targets of monetary policies and the gold supply-demand within each period, the State Bank of Vietnam (SBV) organizes the import and export of gold material for gold bar production, issues the licenses to import gold material to enterprises, and grants permits to export gold material for companies that possess a license for gold exploitation (Tran et al., 2017). The gold supply in Vietnam heavily depends on the decisions of SBV. The SBV can decide to allow more gold importation to ease the market demand for gold by increasing supply if the domestic price is too high (Hong, 2003; Le et al., 2013; Pham, 2017; Thu & Perera, 2011).

Demand: The global and domestic gold demands are mainly for reserves, investment, technology, and jewelry. In Table 2, we can see that the gold demand for jewelry in Vietnam tended to decrease from 2010 to 2014, which was in contrast with the investment demand. According to Tran et al. (2017), Vietnamese investors increased the demand for gold bars and coins from 2011; the investment demand in Vietnam was fueled by persistently high inflation, the poor performance of domestic property and stock markets, and the continuous VND devaluation against the US dollar.

Tab. 2 – Consumer demand in Vietnam from 2010-2014. Source: Fong-Sam (2015), World Gold Council, and Vietnam banking & financial services report Q3-2017

(Tonnes)	2010	2011	2012	2013	2014
	82.3	103.4	84.3	99.6	66.7
Jewelry	14.2	12.8	10.5	11.8	12.5
Bars and coins	68.1	90.6	73.8	87.8	54.2

2.2 Previous research

The issue of gold price has been reviewed in the literature in many studies. It has been observed that gold prices are affected by many factors such as oil prices, stock exchange price indexes, the value of US dollar, world income levels, US inflation level, interest rates, season, etc.

Toraman et al. (2011) found a negative impact between the gold price and the USA dollar, with other variables not correlating significantly with the performance of gold. This research used monthly data between June 1992 and March 2010 examined with the generalized autoregressive conditional heteroskedasticity (GARCH) model. Following the conclusion of this study, the gold



market can be evaluated as inefficient, and the same consequences could be applied both to the developed and developing countries.

Ismail et al. (2009) pointed out that several factors affect gold price, such as stock research office future indexes, foreign exchange rates, inflation rates, money supply, the New York stock exchange, the Standard & Poor's 500 index, treasury bills, and the US dollar index. The study analyzed two models, with the first model examining all possible independent variables. The second model considered to be significant the following four separate variables: Commodity Research Bureau Index lagged one, foreign exchange rate lagged one, inflation rate lagged two, and money supply lagged two.

Examining the topic "Is gold an inflation-hedge?", Aye et al. (2016) applied data from 1833 to 2013 to trace whether gold can act as a hedge against inflation. In this investigation, the authors examined the hedging role of gold against price-level, while checking for other financial assets under a flexible structure. They found that gold may behave as a hedge for inflation in the long-run, but this role has been superseded due to changes that affect the gold market.

Fan et al. (2014) used the EGARCH model to examine the results related to any possible macroeconomic variables related to gold prices. In data collected from August 1, 2007 to June 30, 2009, a correlation was found between the CRB index, the USDX index and the US Treasury CDS, defining all of these as macro-factors that influenced the gold price during the financial crisis.

Baur & Lucey (2010) showed that gold stocks are a relatively safe haven, but gold is not safe in terms of certificates in any markets. Gold only operates as a haven for a reduced time of around 15 trading days in times of crisis. In a more extended run, investors will eventually lose money with their gold investment if they hold gold for more than 15 trading days after an adverse shock.

Baur (2013) analyzed gold accounts for each month from 1980 to 2010 and found out that September and November were the only months with positive and statistically vital gold price changes. The factors affecting those changes were the stock market, the demand for gold jewelry in the Indian wedding season, and a negative sentiment from investors.

Tran et al. (2017) examined the low prices of gold in the world as compared to Vietnam gold prices. The results showed that interventions from the State Bank of Vietnam required a barrier in the gold market and increased the price gap. Vietnam's government should have long-term development policies considering the factors affecting the disparity of Vietnamese and world gold prices. The data collected from January 2008 to April 2013 were received from Bloomberg, IMF, World Gold Council, and Vietnam's General Statistics Office. The representation includes 64 observations. This study used three methods (OLS, IV, and GMM) for analyzing the gap between global and domestic gold price. The Hansen test and 2SLS estimation were used to measure the endogenic problem in this model.

Chaisuriyathavikun & Punnakitikashem (2016) collected data from 370 respondents in Bangkok and neighboring areas and they analyzed them by the factor analysis and multiple regression. That investigation showed two significant factors which correlated with customers' purpose as buyer preference and expected future value.

Sjaastad (2008) found out from an investigation of gold and foreign exchange markets for the 1991–2004 period that the US dollar had effects on the gold price in each currency in the 1990s and in the first years of the current century.

Bostan (2014) found out the regulatory structure of gold operations as it was established by state governments, especially highlighting the taxation regulations – their freedom from Value Added Tax. The outcome of the study revealed that the structure provides the information that any action in purchasing gold (exceeding the purity of 99,5% for gold bars and 90% for coins) is free from the payment of VAT.

Until this moment, there were many areas of deficits in the literature review after revising information about the approaches connected to the gold price. The data used in the previous studies are not the most up-to-date ones at the moment, and they are just focused on gold in developed countries such as America (Aye et al., 2016; Baur & Lucey, 2010; Fan et al., 2014; Ismail et al., 2009; Sjaastad, 2008; Toraman et al., 2011) and in some emerging countries such as Romania (Bostan, 2014) and Thailand (Chaisuriyathavikun & Punnakitikashem, 2016).

On the other hand, an ample number of studies have attempted to explain the gold price in the context of Vietnam. Only a few studies about the determinants of gold prices in the Vietnamese market with the quantitative method of the study of Tran et al. (2017) have been carried out so far. This study aims to fulfill those gaps of the authors Tran et al. (2017). In the research of Tran et al. (2017), the data research was collected from January 2008 to April 2013. That is a short period to evaluate the disparity of Vietnamese and the gold prices. The gold market in Vietnam from 2004 to 2008 was not taken into consideration. A dummy variable such as the season factor was not discussed. The result of the research was just focused on the government policies without mentioning the market factors.

3. METHODOLOGY

3.1 Dataset and Variables

In this study, the OLS model is tested to find out the variables affecting the disparity between Vietnam and the world gold prices. Following the previous studies, the import tax on material gold, foreign exchange rate, season factor can be considered as the variables determining the disparity of gold prices between Vietnam and the world. The study includes monthly data collected between January 2006 and December 2015, the data collected from Bloomberg, IMF, World Gold Council and Vietnam's General Statistics Office. The variables are explained below in this article.

The disparity of gold prices between Vietnam and the world

Fluctuations in the international gold price create volatilities in the domestic gold price denominated in a national currency. The international gold price is converted into the local rate following the formula below: $\text{Converted price (in local currency)} = (\text{International price} + \text{freight} + \text{insurance}) \times (1 + \text{gold import tariff}) \times \text{USD/VND exchange rate} + \text{fabrication fees} + \text{custom fees}$.



The import tax on material gold

Every year, Vietnam consumes about 50-60 tons of material gold, but the total output exploited in the country only reaches 2-3 tons/year. Therefore, the difference between what is exploited and what is demanded must be imported. The material gold needed for production operation and business in the country must be imported from other nations. In other words, Vietnam is a country which mainly depends on imported gold (Le et al. 2013; Tran et al. 2017). Thus, the import tax on gold is a significant factor affecting the domestic gold price. While, on the other hand, the world does not distinguish between the gold bar and material gold, but Vietnam still has this distinction in the import tariff.

Hypothesis 1: There is a positive correlation between the disparity of gold price and the import tax on material gold.

Foreign exchange rate

Currently, US dollar is considered to be a global payment currency, so the goods of other countries can be priced in US dollar, and also in gold. Consequently, any impact on the value of the dollar will also directly affect the price of gold. The effect of USD/VND very much complicates the Vietnamese gold prices, contributing to the disparity between domestic and world gold price. The foreign exchange rate is an essential factor determining gold price due to the apparent relationship between the gold price and dollar (Ismail et al., 2009; Sjaastad, 2008; Toraman et al., 2011). The exchange rate taken as a tool and result of the government monetary policies, has an impact directly on the expected value of USD. It is similar to a reference index when the investor wants to invest in the financial market, and the gold is an investment channel in that market.

Hypothesis 2: There is a negative correlation between the exchange rate and the disparity of Vietnam gold prices and gold prices in the world.

Seasonal factor

A seasonal factor represents the periodic price changes during the year. Due to the culture of the different countries, the gold prices will be affected significantly during the months when gold price is fixed within the year. That is the reason why the seasonal factor affects the gold price in Vietnam. In Vietnam, the gold price faces sharp fluctuations especially in January, February, November, and December. This period is full of significant events such as weddings and the date of the god of wealth. Aye et al. (2016) proved that gold is a hedge against inflation, that is why the Vietnamese people buy gold at the end of the year.

Hypothesis 3: There is a positive correlation between the disparity of gold price and seasonal factor (January, February, November, and December.)

The data used in the modeling are monthly observations from the last day of the months covering the period from January 2006 to December 2015. Monthly samples are selected because this is the period when the volatility of gold prices in Vietnam and in the world are more visible. Moreover, the data related to the import tax on material gold, foreign exchange rate, seasonal factor. The data set can be seen in Table 3.

Tab. 3 – Variables descriptions. Source: own research

Variable	Abbreviation	Measurement
The disparity of Vietnam gold prices and gold prices in the world.	DGOLD	The average difference in percentage between the domestic and international gold price in a month t.
The import tax on material gold	Tax	Percentage of the import tax on material gold in a month t.
Foreign exchange rate	Exchange	The average change in the percentage of USD/VND exchange rate in a month t.
Seasonal factor	Seasonal	Set at 0 from March to October and 1 for January, February, November, December.

3.2 The Model

After considering the factors affecting the disparity of Vietnam gold prices and gold prices in the world, the study will be carried out in three steps, and the appropriate model will be chosen.

Step 1: The analysis with the ordinary least squares (OLS) method. The OLS method is the linear regression model which measures the impact of factors such as the foreign exchange rate, the import tax on material gold, the seasonal factor on the disparity of Vietnam gold prices and gold prices in the world.

Step 2: Transformation of the variables such as the foreign exchange rate, the import tax on raw material gold, the seasonal factor into appropriate function with the disparity of gold price. The functions use linear, logarithmic, inverse, quadratic, cubic, power, compound, S-curve, logistic, grow variables, following which the OLS method was used with the new variables.

Step 3: Before undertaking the OLS method, this study will test the stationarity of the time series of variables in the model following the method of Contreras et al. (2003), Dritsaki (2015), Esling & Agon (2012), Gangopadhyay et al. (2016), Tam et al. (1997) and Wang et al. (2017).

4. EMPIRICAL EVIDENCE

Tab. 4 – Descriptive Statistics. Source: own research

Variable	Obs	Mean	Median	Std Dev	Skewness
DGOLD	120	243587.8	114950.4	317522.5	5.180619
Tax	120	0.003500	0.002500	0.003921	1.864284
Seasonal	120	0.416667	0.00000	0.495074	1.114286
Exchange	120	18896.05	18932.00	2260.505	1.273149

Notes: DGOLD is the average difference in percentage between the domestic and international gold price in a month t. Tax is the import tax on material gold in a month t. Seasonal indicates a dummy variable which is set at 0 from March to October and at 1 for January, February, November and December. Exchange indicates the

average change in the percentage of USD/VND exchange rate in a month t.

Firstly, the study will involve descriptive statistics through values such as mean, median, Std Dev, Skewness. Regarding Table 4, most of the values fall within the allowable range, and the data are rendered in the form of a standard distribution.

Subsequently, the study will consider the correlation between the disparity of gold price and other factors such as the foreign exchange rate, the import tax on material gold, and the seasonal factor (Table 5 & 6). The VIF index (Table 6) of the elements is less than 10, and it is thus suitable for the research (Gujarati, 2009).

Tab. 5 – Correlation Matrix. Source: own research

Variable	DGOLD	Tax	Seasonal	Exchange
DGOLD	1.000			
Tax	0.174	1.000		
Seasonal	0.010	0.000	1.000	
Exchange	-0.460	-0.682	-.0180	1.000

Notes: DGOLD is the average difference in percentage between the domestic and international gold price in a month t. Tax is the import tax on material gold in a month t. Seasonal indicates a dummy variable which is set at 0 from March to October and at 1 for January, February, November and December. Exchange indicates the average change in the percentage of USD/VND exchange rate in a month t.

Tab. 6 – Test of the Variance Inflation Factor (VIF). Source: own research

Variable	VIF
Tax	1.872
Seasonal	1.001
Exchange	1.873
Mean VIF	1.186

Notes: DGOLD is the average difference in percentage between the domestic and international gold price in a month t. Tax is the import tax on material gold in a month t. Seasonal indicates a dummy variable which is set at 0 from March to October and at 1 for January, February, November and December. Exchange indicates the average change in the percentage of USD/VND exchange rate in a month t.

Tab. 7– Results of the three models. Source: own research

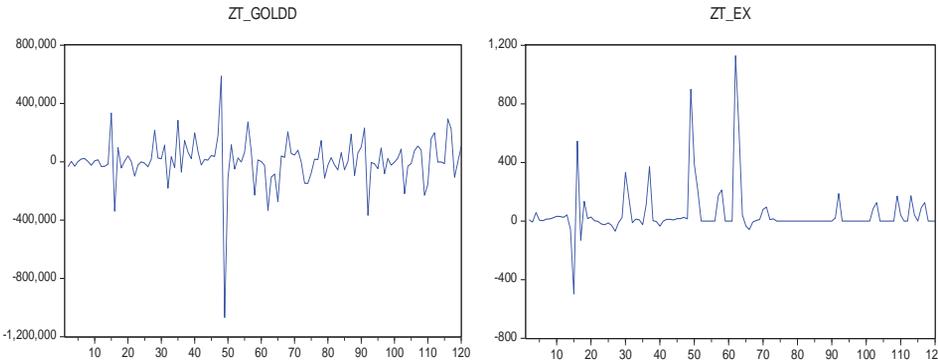
	Model 1		Model 2		Model 3	
	Coefficient	p-value	Coefficient	p-value	Coefficient	p-value
Tax	21658069.646	0.034	0.515	0.122	39291811	0.0010
Exchange	19.270	0.273	0.630	0.045	-437.7531	0.0000

Seasonal	8081.181	0.890	-0.657	0.427	-2086.099	0.9333
_cons	-199700.135	0.578	-0.556	0.810	28083.60	0.0839
Obs	120		120		119	
R2	0.040		0.171		0.368	
F	1.627		7.991		22.394	
Durbin- Watson	0.254		0.905		1.99	

Notes: DGOLD is the average difference in percentage between the domestic and international gold price in a month t . Tax is the import tax on material gold in a month t . Seasonal indicates a dummy variable which is set at 0 from March to October and at 1 for January, February, November and December. Exchange indicates the average change in the percentage of USD/VND exchange rate in a month t .

The OLS regression result of model 1 (Table 7) shows that the import tax on material gold is significant at the level of 5 percent, and positive with the disparity of gold price, but other variables are not significant for the original hypothesis. This is the opposite of the result obtained by Ismail et al. 2009 as well as Sjaastad, 2008. Therefore, our study will transform the variables such as the foreign exchange rate, import tax on material gold and the seasonal factor into appropriate functions for the disparity of gold price, which is shown in model 2. The quadratic function of the foreign exchange rate variable and the import tax on the material gold variable work better than the other functions. The seasonal variable is a linear function. After analyzing the OLS regression method, the result of model 2 is similar to model 1, with a single statistically significant variable represented by the exchange rate.

The authors used model 3 to overcome the problems of models 1 and 2. In this model, the study finds the lag of the time series of variables and then continues with the OLS regression method.



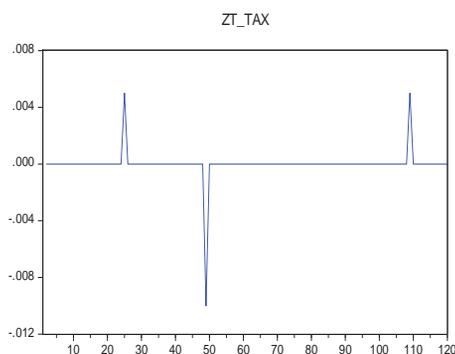


Fig. 1 – The volatility of three variables after obtaining the first difference. Source: own research

Notes: ZT_GOLDD is the first difference in the disparity of the gold price factor. ZT_EX is the first difference in the foreign exchange rate factor. ZT_TAX is the first difference in the import tax factor on raw material gold.

From Figure 1, three variables, the disparity of gold price, foreign exchange rate and the import tax on material gold, are stationary at the first difference. The OLS regression result of model 3 shows the first difference between the foreign exchange rate variable and the import tax variable on material gold, both of which are statistically significant at 5 percent. Many authors such as Aye et al. (2016), Baur & Lucey (2010), Chaisuriyathavikun & Punnakitikashem (2016), Ismail et al. (2009), Sjaastad (2008), Toraman et al. (2011) and Tran et al. (2017) have confirmed this finding. The seasonal factor variable was not statistically significant at 5 percent and it was negative with the disparity of gold price. This issue can be explained as follows: being a high-value material, gold is the first choice when people seek to invest or to hoard. Nowadays, in Vietnam, with the development of the stock market and the real estate market, investors have turned their investment concerns to these two channels. People who purchase gold no longer have the feeling that they are receiving all the information from the market. They need to increase their investment in the gold market when the potential for high profitability arises. The seasonal factor does not impact strongly the disparity of Vietnamese gold prices and world gold prices at this time. Concerning the seasonal factor, most the gold is consumed in the jewelry sector in the first and last months of the year. Meanwhile, the world deals mainly in gold bullion (used for investment). The demand for jewelry gold is not high and not consistent enough to cause gold price volatility. Therefore, the results for the seasonal factor is the opposite compared to initial expectations. From the results of the above three models, we can see that model 3 is the appropriate model as expected before the study was begun.

5. CONCLUSION

The disparity of Vietnamese gold prices and world gold prices can be explained through essential elements such as foreign exchange rate, the import tax on raw material gold, and the seasonal factor. The foreign exchange rate had a negative impact on the disparity of gold price in Vietnam and the world gold price. This indicates that when the foreign exchange rate increases,

the differences among gold prices will reduce and vice versa. Therefore, the Vietnam government should form more suitable monetary policies. Concerning the monetary policy itself, the following primary reform steps would need to be studied: the transition of responsibilities for conducting monetary policy to the State Bank of Vietnam, the establishment of a hierarchy of monetary policy goals and price stability, the monetary policy strategy in terms of increased flexibility regarding the exchange rate. On the other hand, stabilizing monetary policy will also create a suitable environment for attracting foreign direct investment in Vietnam. One of the essential factors that impacts on the disparity of Vietnamese gold prices and world gold prices is the import tax on material gold. The import tax has a positive effect on the discrepancy of gold prices. Therefore, the Vietnam government should use the import tax policy on material gold in the current market situation instead of a quota as it does today.

Recommendations: First, the SBV could sell a part of its gold reserves to stabilize the gold market as well as issue long-term bonds in gold for sale to gold trading enterprises. These gold trading enterprises are required to pay the SBV in U.S. dollars, which will later be used to intervene in the foreign exchange market to stabilize the USD/VND exchange rate. Subsequently, the SBV may issue paper gold (promissory notes in gold) to sell to commercial banks. Moreover, the SBV should also allow commercial banks to receive bank deposits in VND guaranteed by gold to avoid situations in which people draw upon deposits in VND to purchase gold. Also, the SBV should allow gold trading enterprises to import and export gold plates to interlink the domestic market to the world market. This could help reduce the gap between the domestic gold price and the global gold price. The SBV should also allow commercial banks to mobilize deposits in gold and to monetize gold by selling it to the SBV. Then the SBV can in turn convert the gold into VND to fund the economy. In critical cases, commercial banks should be able to purchase gold from the SBV or from the market. The SBV needs to establish a national gold trading center to mobilize public gold sales. A national gold trading center run by the SBV itself would help prevent gold smuggling in the black market.

Acknowledgement:

The authors would like to thank the Internal Grant Agency of FaME for providing financial support to carry out this research. Funding was extended through TBU No. IGA/FaME/2018/019 - FDI absorptive capacity and the factor determining FDI flows in developing countries of Asia and Africa.

References

1. Aye, G. C., Chang, T., & Gupta, R. (2016). Is gold an inflation-hedge? Evidence from an interrupted markov-switching cointegration model. *Resources Policy*, 48(1), 77–84. <https://doi.org/10.1016/j.resourpol.2016.02.011>
2. Baur, D. G. (2013). The autumn effect of gold. *Research in International Business and Finance*, 27(1), 1–11. <https://doi.org/10.1016/j.ribaf.2012.05.001>
3. Baur, D. G., & Lucey, B. M. (2010). Is gold a hedge or a safe haven? An analysis of stocks, bonds and gold. *The Financial Review*, 45(2), 217–229. <https://doi.org/10.1111/j.1540-6288.2010.00244.x>
4. Bostan, I. (2014). Investment gold: Exemption from tax (vat) in the romanian fiscal system. *Metalurgija*, 53(4), 731–733.

5. Chaisuriyathavikun, N., & Punnakitikashem, P. (2016). A study of factors influencing customers' purchasing behaviours of gold ornaments. *Journal of Business and Retail Management Research*, 10(3), 147–159.
6. Contreras, J., Espinola, R., Nogales, F. J., & Conejo, A. J. (2003). ARIMA models to predict next-day electricity prices. *IEEE Transactions on Power Systems*, 18(3), 1014–1020. doi:10.1109/TPWRS.2002.804943
7. Dritsaki, C. (2015). Box–Jenkins modeling of greek stock prices data. *International Journal of Economics and Financial Issues*, 5(3), 740–747.
8. Esling, P., & Agon, C. (2012). Time-series data mining. *ACM Computing Surveys*, 45(1). 1–12. <https://doi.org/10.1145/2379776.2379788>
9. Fan, W., Fang, S., & Lu, T. (2014). Macro-factors on gold pricing during the financial crisis. *China Finance Review International*, 4(1), 58–75. <https://doi.org/10.1108/CFRI-09-2012-0097>
10. Fong-Sam, Y. (2015). *The mineral industry of Vietnam*. Minerals Yearbook: Area Reports: International Review: 2012 Asia and the Pacific.
11. Gangopadhyay, K., Jangir, A., & Sensarma, R. (2016). Forecasting the price of gold: An error correction approach. *IIMB Management Review*, 28(1), 6–12. <https://doi.org/10.1016/j.iimb.2015.11.001>
12. Gujarati, D. N. (2009). *Basic econometrics*. Tata McGraw-Hill Education, New Delhi.
13. Hong, N. (2003). Wedding Boom Raises Gold Price. *Vietnam Investment Review*, 630, 15.
14. Ismail, Z., Yahya, A., & Shabri, A. (2009). Forecasting gold prices using multiple linear regression method. *American Journal of Applied Sciences*, 6(8), 1509–1514. <https://doi.org/10.3844/ajassp.2009.1509.1514>
15. Le, T. S., Trinh, T. C., & Nguyen, T. N. A. (2013). Determinants of the Gold Price in Vietnam (Doctoral dissertation, FSB).
16. Pham, T. H. A. (2017). *Dollarization and de-dollarization in transitional economies of Southeast. Switzerland*: Springer Nature.
17. Sjaastad, L. A. (2008). The price of gold and the exchange rates: Once again. *Resources Policy*, 33(2), 118–124. <https://doi.org/10.1016/j.resourpol.2007.10.002>
18. Tam, W., Tam, W., & Reinsel, G. C. (1997). Tests for seasonal moving average unit root in ARIMA models. *Journal of the American Statistical Association*, 92(438), 725–738. <https://doi.org/10.1080/01621459.1997.10474025>
19. Thu, T. T., & Perera, R. (2011). Consequences of the two-price system for land in the land and housing market in Ho Chi Minh City, Vietnam. *Habitat International*, 35(1), 30–39.
20. Toraman, C., Basarir, A., & Bayramoglu, M. F. (2011). Determination of factors affecting the price of gold: A study of MGARCH model. *Business and Economics Research Journal*, 2(4), 37–50.
21. Tran, T. N., Le, C. D., & Hoang, T. T. P. (2017). Does the state bank widen the gap between international and domestic gold prices? evidence from Vietnam. *Global Business Review*, 18(1), 45–56. <https://doi.org/10.1177/0972150916666853>

22. *Vietnam banking & financial services report - Q3 2017*. 2017. London: Business Monitor International.
23. Wang, K. W., Deng, C., Li, J. P., Zhang, Y. Y., Li, X. Y., & Wu, M. C. (2017). Hybrid methodology for tuberculosis incidence time-series forecasting based on ARIMA and a NAR neural network. *Epidemiology and Infection*, 145(6), 1118–1129. <https://doi.org/10.1017/S0950268816003216>

Contact information

Ho Thanh Tri

Tomas Bata University in Zlín

Faculty of Management and Economics

Department of Finance and Accounting

Czech Republic

E-mail: hothanhtri@gmail.com

ORCID: 0000-0002-7614-4217

Võ Thị Nga

Tomas Bata University in Zlín

Faculty of Management and Economics

Department of Management and Marketing

Czech Republic

E-mail: vo@utb.cz

ORCID: 0000-0001-9004-820

