

# GOLD'S PRICE IS DETERMINED FACTOR FOR HANGSENG INDEX

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## ABSTRACT

*The purpose of this paper is to explore the effects gold on Hang Seng index. Gold is the most popular as an investment. Investors generally buy gold as a hedge or harbor against economic, political, or social fiat currency crises (including investment market declines, burgeoning national debt, currency failure, inflation, war and social unrest). The gold market is subject to speculation as are other markets, especially through the use of futures contracts and derivatives. The history of the gold standard, the role of gold reserves in central banking, gold's low correlation with other commodity prices, and its pricing in relation to fiat currencies during the last financial crisis, suggest that gold behaves more like a currency than a commodity.*

**Keywords:** Stock market, Gold , Hang Seng , HKEX , Exchange rates , VIX

**JEL Classification:** G10, G14, G15.

## INTRODUCTION

The Hong Kong Stock Exchange (HKSE), established at the end of the 19th century, today, with its total securities market capitalization of a record sum of HK\$ 8,839.3bn (US\$ 1,138.9 trillion), ranks 6th place by market capitalization in the world.

The purpose of this study is to evaluate time variant relationship between the Gold vs. the Hong Kong index (HANG SENG). We show that annual results are quite different across years and therefore that conclusions based on all years combined could be quite misleading. We also show that causal and correlation relationship between the variables changes during the crisis and post-crisis. These changes are strong enough to change the results based on the entire sample period combined.

## LITERATURE REVIEW

Relationship between fluctuations in gold prices and the U.S. dollar posited in the popular press during 2007-2010Marzo and Zagaglia (2010) used a bivariate structural Garch model

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to test for a causal relationship between volatility changes of the dollar and gold for the period October 13, 2004 through March 5, 2010. In their study August 9, 2007 was designated the beginning of the Financial crisis period which they call "financial turmoil" in global financial markets. For the late 2007 and early 2010 interval covered by their study they found a significant positive relationship and positive correlation both before and during the post 2007 turmoil period. Interestingly the movements of gold during the crisis period were much more stable than those of the U.S. dollar

Parallel to research on the relationship between the VIX and gold returns, Baur (2011) finds that the volatility of gold returns exhibits a symmetric reaction to positive and negative gold returns. The asymmetric nature of this reaction allows for its characterization as abnormal or inverted when compared to its parallel in equity markets. Furthermore, because this asymmetric reaction is ten times larger for gold than for any other commodity, Baur argues that investors interpret positive gold returns as an indication of future adverse conditions and uncertainty in other asset markets. Baur further argues that this interpretation electively introduces uncertainty into the gold market and brings about increased volatility of gold returns.

Gold price fluctuations which affect most sectors of economies and hence stock market mainly, as a safe heaven investment tool. Gold investment market has highly grown worldwide in the last seven years. Many investors tend to have a proportion of gold in their portfolios due to the fact that the price of gold is expected to rise in line with inflation and act as an inflation hedge (Levin and Wright, 2006). In general, during periods of political and economic uncertainty, investors tend to purchase gold and gold related instruments as a store of value, as diversification tool and as protection from stock and currency shocks and from the new complex of balancesheet investments which sometimes are not in transparency. According to Tully and Lucey(2007) gold functions traditionally as a hedge for stocks and responds with higher prices during equity market crashes. Johnson and Soenen (1997) came to similar conclusions claiming that gold is an attractive investment in terms of diversification only in specific periods of equity turmoil. Hiller et al.(2006) studied the role of gold and commodities on equity markets. They discovered that in the period 1976-2004 gold had a small negative correlation with S&P 500 index. They found that portfolios which had 5% to 10% in gold performed better than portfolios without gold. Jaffe (1989) proved that the low correlation of gold with equities grants it a place in a well diversified portfolio. Smith (2002) also concluded that after the September 11th 2001 terrorist attack, the prices of U.K. equities have fallen whereas the price of gold has risen. However, gold has recently been used in combination with equities as a useful tool not only for diversification purposes but also for the development of speculative investment strategies. Batten et. al. (2010) found that, for the period 1996 - 2006, the S&P500 index price is more important for gold price movements than monetary variables such as the U.S. Consumer Price Index and the monetary aggregate.

## **DATA**

Foreign exchange data is obtained from the Federal Reserve. Equity market index levels are from the Yahoo! Finance and HKEX (Hong Kong stock exchange). Gold data from London Gold Market Fixing Ltd. is obtained from the London Bullion Market Association and hang seng data from World Federation Of Exchanges members and hkex .

Time series graph of the two variables are provided in the Figures.1



**Figure 1 . The HANG SENG and Gold historical chart**

### METHODOLOGY

1. There is a true or population line (or equation):  $y_i = \beta_0 + \beta_1 x + \varepsilon_i$ , where  $\beta_0$  is the  $y$ -intercept and  $\beta_1$  is the slope, which defines the linear relationship between the independent variable,  $x$ , and the dependent,  $y$ . The random deviations,  $\varepsilon_i$ 's, allow the points to vary about the true line. (The estimated line is:  $\hat{y}_i = b_0 + b_1 x$ .)
2. The  $\varepsilon_i$ 's have mean zero,  $\mu_e = 0$ .
3. The standard deviation of the  $\varepsilon_i$ 's is constant,  $\sigma_e$  is not dependent on the  $x$ 's.
4. The  $\varepsilon_i$ 's are independent of each other.
5. The  $\varepsilon_i$ 's are normally distributed.

We use the residuals,  $e_i$ 's, to estimate the  $\varepsilon_i$ 's. Combined, this says each of the  $\varepsilon_i$ 's are independently, identically distributed  $N(0, \sigma^2)$  or  $\varepsilon_{iid} \sim N(0, \sigma^2)$ . This means that the  $y$ 's are also normal, and each  $y \sim N(\beta_0 + \beta_1 x, \sigma^2)$ .

The sole purpose of residual plots is to check these assumptions!!!!

NOTE: we now have 2 parameters,  $\beta_0$  and  $\beta_1$  we have to estimate for  $\mu_y$ , which is why the df for the  $t$ -test =  $n-2$ .

ANOVA Table for Simple Linear Regression

Source	df	Sum of Squares	Mean Squares	F value	p-value
Model	1	$\Sigma(\hat{y}_i - \bar{y})^2 = \text{SSModel}$	$\text{SSM} = \text{MSM}$	$\text{MSG}/\text{MSE}$ $= F_{1, n-2}$	$\text{Pr}(F > F_{1, n-2}^*)$
Residual	$n-2$	$\Sigma e_i^2 = \text{SSResidual}$	$\text{SSR}/(n-2) = \text{MSE}$		
Total	$n-1$	$\Sigma(y_i - \bar{y})^2 = \text{SSTotal}$	$\text{SST}/(n-1) = \text{MST}$		

Residuals are often called errors since they are the part of the variation that the line could NOT explain, so

$MSR = MSE = \text{sum of squared residuals}/df = \sigma^2 = \text{estimate for variance of the population regression line}$

$SSTot/(n-1) = MSTOT = s_y^2 = \text{the total variance of the } y\text{'s}$

$F = t^2$  for Simple Linear Regression. The larger the F (the smaller the  $p$ -value) the more of  $y$ 's variation the line explained so the less likely  $H_0$  is true. We reject when the  $p$ -value  $< \alpha$ .

$R^2 = \text{proportion of the total variation of } y \text{ explained by the regression line} = SSM/SST = 1 - SSResidual/SST$

**RESULTS**

The relationship between HANG SENG and gold is the most apparent and continuous in this study. Based on the results provided below, except for the 2003-2010, the Regression between gold and HANG SENG is always positive. 2003to2010 are the period of the highest correlated years.

Based on the entire sample, the results provided with the Table below hang seng and gold relationship present similar evidence. There is positive regression and instantaneous feedback since 2003. There is also bi-directional sequential causality between the two variables based on the entire sample.

Variables Entered/Removed

Model	Variables Entered	Variables Removed	Method
1	percentage	.	Enter

**Note:** a. All requested variables entered  
 b. Dependent Variable: percentage

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.737 <sup>a</sup>	.542	.466	.2295481

**Note:** a. Predictors: (Constant), percentage

ANOVA<sup>b</sup>

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	.375	1	.375	7.114	.037 <sup>a</sup>
Residual	.316	6	.053		
Total	.691	7			

**Note:** a. Predictors: (Constant), percentage  
 b. Dependent Variable: percentage

**Coefficients**

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	-.264	.182		-1.456	.196
percentage	2.192	.822	.737	2.667	.037

**Note:** a. Dependent Variable: percentage

**CONCLUSION**

The Hang seng and Gold graphs from our results for both time periods seem to indicate that the primary driver of gold price in recent times has been the US interest rates; primarily 2003 – 2010 and the hang seng index. This causality seems to have been present long before the onset of the credit crisis and also before the sub-prime backed mortgage bubble reached its peak. Though the recent talk in financial media has centered round safe haven theory as far as gold price movements are concerned during and after the crisis and still playing out in the market place and economies around the world, the rise in gold prices started in the early 2000s when the era of low US interest rates began right after the dot com bubble and the terrorist attacks on WTC and has only increased in pace in recent times. The question one needs to ask in the light of these results is given the reasonable assumption that hang seng index rates will start going up as economic growth in as a result of the extra money pumped into the economy by the FRB, what effect will that have on the gold price movements? Given the empirical evidence of gold employed as a hedge against inflation historically, will that mean that any changes to the hang seng index as a reaction to economic growth will only result in the flattening of gold price. The results from the constrained VAR in levels models for both the historical data proposed framework to investigate the relation between index and gold price. Framework proposed in this paper to study variance links between any time series set of variables with known structural or empirically proven non-structural links.

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