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THE RELATIONSHIP BETWEEN GOLD PRICE, EURO, US DOLLAR, OIL PRICE AND STOCK MARKET

Case the European Union

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ABSTRACT

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<p>The aim of this research is to examine the relationships between gold price, oil price, Euro, US dollar and stock market index in the EU from September 2003 to July 2016. This relationship is identified by simultaneous equations. Besides, the research also takes attention to other factors such as interest rate, gross import of oil the European Union Consumer price index (CPI) to examine their effects on each asset</p> <p>The interactions between Euro, gold price, oil price, stock market prices and US dollar are found in the research. Firstly, oil price has a positive effect on stock market prices and a negative impact on gold price. Secondly, US dollar and oil price affect positively gold price which is negatively impacted by stock market prices. Thirdly, both gold price and stock market prices impact positively US dollar which is negatively affected by oil price. Finally, Euro also plays an important role in financial and economic status because it has negative impacts on the stock market prices and the gold price and a positive effect on the oil price.</p> <p>This research is extremely important for investors, managers and decision makers because they can forecast the changes of economic factors in the future. The tool which is used for this research is Eview 6.</p>		

Key words: Eview 6, gold price, oil price, simultaneous equations, stock market

CONCEPT DEFINITIONS

- Eview 6: (Econometric Views) is a statistical package used for Windows to analyze statistic time-series data. It is developed by Quantitative Micro Software.
- Simultaneous equations: are used in mathematics and also known as system of equations. In my research, simultaneous linear equations are used.
- Stock market: a place where buyer and seller meet together to exchange their company's stock.

ABSTRACT

CONCEPT DEFINITIONS

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1 INTRODUCTION

Oil and gold prices play an important role in not only financial activities but also all sectors of the European economy. Consumption, investment, and industrial production and investment are affected directly by the changes of oil and gold price where volatilities of gold and oil impact the stock market index. A few implications are made in the capital market of the US. Inflation and unemployment could be explained by the volatilities of gold and oil price (Ebrahim 2014). Oil and gold are considered popular traded commodities as well as important economic indicators.

Euro and gold are used as an alternative investment to US dollar. The relationship between movements in Euro and gold price has increased since 2000. This relationship is even stronger since 2003 when the gold price grew up to 400 US dollar. During this period with some economic news, the investors used major currencies to react to economic events (Merrick 2005). At that time, Euro had been concerned the best choice alternative currency to US dollar. In other hands, it could get more benefits if US dollar was weaker. With the volatilities of US dollar, Euro comes to as the alternative investment so the correlation between gold and Euro may be clearer.

A stock market is a place where the sellers and buyers meet each other to trade stocks and bonds. Investors come to stock market and then buy, hold the stock for a time to sell it at the higher price. Gold price, oil prices, Euro, stock prices are always considered by most of the investors because they are important factors reflecting the situation of the whole global economy. Nowadays investors become to pay attention to commodity market as a hedge against the changes of economy and avoid risks on the financial market. They are remarkably related with each other in the business cycle (Cabrero, Emmanuel & Gourinchas 2008). In this framework, the price of these assets could be crucial parts on expecting future scenarios of the world economy and the field of investment.

This research assesses the price movements of the commodities and the assets of the real figures, practical economy and financial factors. Therefore, finding the great significant evidence in the relationship between gold prices, oil prices, Euro and stock prices which help investors, managers as well as policy makers in their expectation of movement prices.

Impressing the interdependent relationships between assets in all markets is the aim of the study. I try to examine these relationships in the European area by simultaneous approaches. I first brief the lit-

erature related to these relationships and discuss the results of the previous researchers in other regions such as the United States, Pakistan, Vietnam, China, etc. The study is based on the motivations of the global economy and then collecting data from the EU area to compare to other regions. Indeed, I collect data from Brent crude oil price, gold prices, US dollar index, Euro index and the stock market index in the EU market. Besides, other factors related to the predicted world economic state such as monetary policy, gross import of oil, interest rate are also collected to examine their influences to the economic sectors.

The paper is organized into six sections. The first section shows the literatures of the interdependent relationships between these assets. The second section reviews how to collect data and statistical analysis. The fourth section is to introduce and explain the empirical methodology. The fifth section is to analyze the results from the methodology and the conclusions of the research are presented in the final section.

2 LITERATURE

There are a lot of researches concerning the relationship between Euro, gold price, oil price, US dollar and stock market prices. In this section, I will bring several empirical researches related to the aim of this report.

2.1 Oil price and US dollar

The relation between oil price and US dollar is examined by Coudert, Mignon and Penot (2007). They found that from 1974 to 2004, there was a long-term relationship between the oil price and US dollar exchange rate. Particularly, an increase of oil price led to an appreciation of US dollar the long time. Golub (1983) also revealed that the increase of oil price made the demand of US dollar went up because oil price is denominated by US dollar. However, Krugman (1983) supposed that the relation between oil price and US dollar is based on the movements of exchange rate market and the abilities of oil exporters. This means that when oil price increase, possibilities of investment of oil exporters will be expanded. According to Krugman, the current account movement determine the exchange rate movements. Rising in oil price is one of the reasons of deterioration in current account resulting in the decrease of US dollar exchange rate.

When studying the co-integration between the oil price and US dollar, Zhang (2013) found that there exists the relation between oil price and US dollar in a long time if two structural breaks, in November 1986 and February 2005 are controlled. Fratzscher et al. (2014) found that since the early 2000s there is a bidirectional causality between oil price and US dollar. In addition, stock market return and risk have significant effects on both oil price and US dollar. Their results reveal that the relation between oil prices and US dollar move in two directions: 10% increase in the oil price creates to 0.28% depreciation of US dollar, and a 1% depreciation of US dollar leads to the rise of oil prices by 0.73%. Similar to Fratzscher, Akram (2009) also pointed out that when a US dollar is weaker, the commodity prices will be higher.

2.2 Oil price and Stock market price

There are various researches confirming the interdependency between stock market prices and oil price. Gomes (2014) investigated the interactive relationships between stock market prices and oil price by using BEKK-GARCH(1,1) model. They found that there is a significant interaction between oil and frontier stock markets. Malik and Hammoudeh (2007) examined that Gulf stock markets are affected by oil markets from 1994 to 2001 by using GARCH model but they found that the results are matched to the case of Saudi Arabia. Saudi Arabia is considered an important oil market in the world. Masih, De Mello, and Peters (2011) used data from 1998 to 2005 to find the relationship between oil price and stock market prices. By using VECM, they found that company's profitability is negatively affected by oil price shocks in two different ways. The first one is a direct negative effect because of the increase in production costs. And the second way is an indirect negative effect because profit margins are supposed to decrease by investors and then investors will make some decisions impacting stock markets. Basher and Sadorsky (2006) confirmed strongly that in emerging economies stock price returns were influenced by oil price risk. This result is extremely useful for individual investors as well as policymakers. Ravichandran and Alkhathlan (2010) observed the changes of Gulf Cooperation Council stock markets (GCC) based on the changes of oil price. The changes of oil price affect the movement of macroeconomic indicators and then these indicators continue to have the impact on stock markets.

Kapusuzoglu (2011) studied and examined both short-term relationships and long-term dynamics between National 30, National 50 and National 100 Index from Istanbul Stock Exchange (ISE) and Brent oil price. Through Johansen test, the author determined that there was a long-term relationship between oil price and each index because the test was accepted. And then they used Granger causality analysis to observe the causality relationship between oil price and all index in stock markets, but the result pointed out that oil price did not lead to change all of three indexes. Varella Mollick and Abebe Assefa (2012) checked the relationship between the stock prices and oil price in the US market by using GARCH and DCCGARCH models from 1999 to 2011. They recognized that this relationship was different in 2 periods: before and after mid-2009 because there was the appearance of the financial crisis in 2008-2009. Before the financial crisis, stock returns are slightly negatively impacted by oil price but from mid-2009, stock returns are positively impacted by oil price.

The relationship between oil price and stock market returns is quite complicated because it also depends on the changes of economic events and the development of each country. Oil price, of course,

relies on the demand for oil in the market. There is the fact that the demand for oil is different in developed countries and emerging countries. Particularly, the growth of oil demands in developed countries will be slower than in the emerging countries. Totally, most of the researches revealed the significant interaction between oil price and stock market prices.

2.3 Oil price and gold price

Narayan, Narayan and Zheng (2010) found the evidence of the long-run relationship between gold and oil futures markets and oil spot through different maturity. They showed that when oil price increases, it creates pressures of inflation after that investors become to invest in some financial assets such as gold to protect their investment portfolios. Similarly, Reboredo (2013) concerned the hedging role of gold to against oil price changes. He showed that there is tail independence between the oil and gold markets meaning that gold can work as an effective hedge against the fluctuation of oil price.

Le and Chang (2012) collected data from May 1994 to April 2011 to test the effect of oil price on gold market by using vector autoregressive approach. The results performed that the appearance of oil price shocks had a significant and positive influence on real gold markets. These findings implied that the changes of oil price fluctuations can use to estimate the movements of gold price. Zhanga and Wei (2010) observed the data from 2000 to 2008 and they found that the significant coefficient which represents for the relation between the gold price and the crude oil price was 0.9295.

Kumar (2017) examined the relation between gold and oil prices in the India through ARDL tests and Granger causality tests. This relation was investigated in both short-run and long-run. Nonlinear Granger causality test pointed out that there was a strong bidirectional nonlinear relation between gold and oil prices while ARDL test revealed that compared to negative oil price shocks, positive oil price shocks have more significant effects on gold prices. In the long-time relationship, the author found emphasized that gold prices were more sensitive to rising oil prices. As a result, he concluded that the interaction between gold and oil prices is asymmetric and nonlinear.

2.4 Gold price and stock market prices

Akgül, Bildirici and Özdemir (2015) applied the Markov-Switching Bayesian VAR models to investigate the nonlinear relation between stock market index and gold prices. They found the strong linkage between gold prices and S&P 500 Stock Price Index in the analysis. Gilmore (2009), through vector error-correction model, examined the relationships between gold prices, stock price indices which are from companies producing gold mining and broad stock market indices. They revealed the evidence of the interaction between gold price and stock market price. In particular, both gold and stock prices restored the long-term relationship by adjusting to disturbances. In the short-term, these relationships were still running from total stock markets to the stock price of gold mining companies and then from the stock price of these companies to gold prices. Using data from BRICS countries, Chkili (2016) checked the role of gold in the stock market as a hedge against risks.

Yahyazadehfar and Babaie (2012) used variance autoregression model and Johansen- Joselius test from March 2001 to April 2011. They confirmed that stock prices can be affected by the gold price on Teheran Stock Exchange. They found the negative relationship between stock price and gold price. Smith (2001) provided the empirical examination of the relationship between gold price and stock price in the United States from January 1991 to October 2001. He found that gold prices and stock market price are not related in the long-term but this relation performed clearly in the short-term.

However when Choudhry, Hassan and Shabi (2015) estimated the relation between gold and stock market in the period of financial crisis, they realized that gold may be not efficient asset which was used to as a hedge in the period of the financial crisis because in this period the interdependence between gold returns and stock market volatility was weaker. Generally, gold may be worked as a safe haven against risks in the stock market in stable financial and economic conditions.

2.5 US dollar and stock market price

With the BEKK-MGARCH approaches, Chkili (2012) explored a significant transmission to the stock market from the foreign exchange market in emerging countries. He found that the relationship existed between two observed markets. Wang, Wang and Huang (2010) also examined the effects of some variables on stock market price such as gold price, crude oil price, and US dollar. The results

pointed out that there exist relation between these factors in Japan, Germany, China and Taiwan. Sekmen (2011) concerned about the role of US dollar as a hedge against the volatility of stock market prices because the increases in costs were associated with the risks in stock markets. As a result, they confirmed there was the negative relation between US dollar and stock market prices. The linkages between US dollar and stock market price in South Korea was found by Yoon and Kang (2013). From January 1990 to December 2009, they found the strong interaction between US dollar and stock prices returns. Their results also reported that the crisis of Asian currency since 1997 stimulated a relationship between the two these markets.

2.6 Additional factors

There are several additional factors which control the economic status such as Government bond yields, oil gross imports, oil future contracts, CPI (Consumer price index), interest rate. Oil prices are affected by oil gross imports and oil future contracts. Oil future contracts are to control the financialization process of oil markets and the future expectations of investors (Arfaoui and Rejeb 2016). Besides, the EU is one of the world's largest regions importing oil. The EU oil demand reached a peak of 15.1 million barrels per day in 2005 and fall to 12.5 million barrels per day (FIGURE 1). Therefore, the EU is confronting a dependence on oil gross imports from other regions and oil prices will be more vulnerable to the sizable supply shocks (Kiernan 2015).

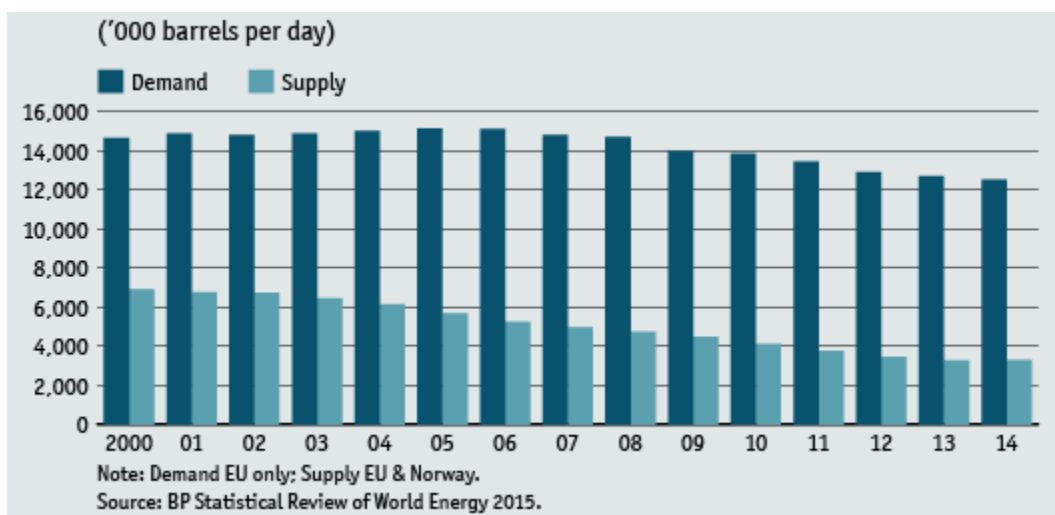


FIGURE 1: Oil in Europe from 2000 to 2014 (adapted from Kiernan 2015)

Interest rates are considered a tool for the government to manage and control the monetary policies simply because the government uses interest rate to against the high inflation or increase the invest-

ment (Arfaoui and Rejeb 2016). When interest rates are lower, companies find easier to borrow money. As a result, they tend to purchase assets and invest in Research & Development department to produce income that drives the increase of Stock market prices. By contrast, the higher interest rates can lead to the reduction of asset acquisition resulting in selling company stocks (Johnston 2010). Government bond yields and Stock market prices have the opposite direction. When Stock market prices increase in value, government bond yields will decrease. The reason why is stock market prices will increase when the economy is healthy. This means that consumers will buy more and the company can get the higher earnings in the booming economy. Consequently, the investors tend to sell bonds to buy stocks because they perceive the benefits of higher stock market prices. On the other hand, when investors are panic because of the economic degradation, they will sell stocks and buy government bond to minimize their risks (Amadeo 2017). Overall, stock market prices have significant relationship with interest rates and government bond yield.

Customer price index (CPI) is calculated by the average of prices of a basket of consumer goods as well as services. It is commonly known as an important factor related to inflation. When the inflation in the EU gets low, consumer spending and the economy are boosted to grow resulting in the positive effect on Euro. However, with the low inflation, European investors are not attracted by other foreign investments which increase the demand of foreign currencies including US dollar (Investopedia, 2017). Generally, CPI or inflation has major impacts on both nation's currency and the rates of foreign exchange.

3 DATA ANALYSIS

Data is considered the main information to test the hypotheses. It is collected to answer the questions of the main topic. In this section, the interdependent relationships between observed assets are predicted through 8 hypotheses. Next, data statistics will summarize the sample by using mathematical indexes such as mean, median, maximum, minimum, and so on. The sources of data are also included in this section.

3.1 Declaration of hypothesis

In this part, 8 hypotheses are given to estimate the relationship between oil price, US dollar, gold price, stock market prices and Euro. These hypotheses are based on the visual observations and the explanations from previous researchers. This part will discuss and depict the interdependencies of each relation.

3.1.1 Oil price and US dollar:

Crude oil is quoted in US dollar so that the increase or the decrease in the price of crude oil will affect the value of US dollar. The relationship between oil price and the exchange rate will be stronger in nations which do not have oil reserves such as Japan and even be weaker in nations which have significant reserves such as Canada, Russia, and Brazil. In particular, oil manufacturers tend to decrease the amount of exported oil in dollar and increase the price of oil when a depreciation of US dollar occurs because they do not want to lose their purchasing power (Arfaoui and Rejeb 2016). On the other hand, on the period of US dollar depreciation, the imported goods will become cheaper than the domestic goods, as a result, the demand for imported oil will dramatically grow up.

When the depreciation in US dollar affects oil price, oil futures may be considered as a hedge to protect oil exporters and suppliers against the risk of the exchange rate. The US dollar depreciation leads to the decrease of the returns of financial assets in US dollar resulting in the increase of the attention oil as well as other commodities from investors (Breitenfellner 2008). The relationship between US dollar and oil price is seen as a wealth effect (Krugman 1983). When the oil price increases, the

wealth will be transferred from importers to exporters. This means that people may prefer to buy domestic oil than imported which leads to change the value of US dollars. In this paper, I exam the relationship between oil price and US dollar through US dollar index.

From a historical data, both US dollar index and oil price experienced a lot of fluctuation from 09/2003 to 09/2016. The oil price reached a peak at nearly USD 140 per barrel in 2008 and at the same time, US dollar index touched the lowest spot at approximately 70. From 09/2003 to 07/2008, the Brent crude oil price grew from USD 27.11 a barrel to USD 132.72 a barrel. US dollar index also declined slightly by 19.78 points in this period. Similarly, when the oil price decreased dramatically from USD 132.72 a barrel to USD 39.95 a barrel at the end of 2008, there was an increase of US dollar index to above 85 points. From 2009 to 2016, this trend still remains in the changes of oil price and US dollar index (FIGURE 2).

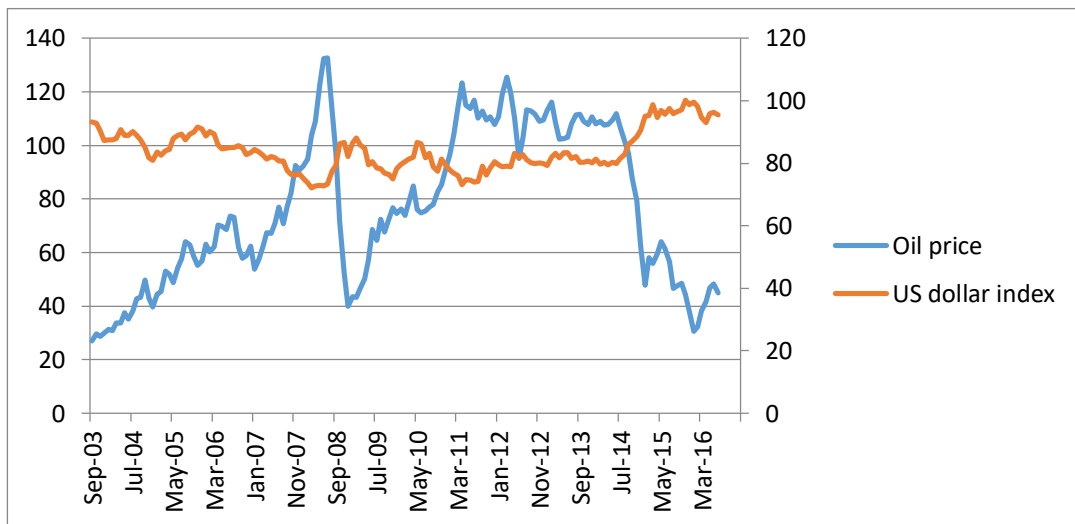


FIGURE 2. Oil price vs US dollar (adapted from Federal Reserve Bank of St. Louis and Investing.com)

Consequently, I expect to find a negative relationship between oil price and US dollar, so my first hypothesis:

Hypothesis 1: There is a negative relationship between oil price and US dollar.

3.1.2 Oil price and stock market prices

The increase in oil prices may influence negatively the economic growth because it is considered as one of the root cause to inflation. In this situation, companies' performance will not bring good results as expected resulting in the decreased efficiency in the stock market. Besides, the rise of oil prices contribute to push the cost of operating activities and profit margins will be reduced as a result. Arfaoui and Rejeb (2016) found that oil price can impact stock price by both direct and indirect way, for example affecting future cash flow or making a change in the discount factor (weight average cost of capital or interest rate). In addition, when the oil price rise, investors usually become more worried about the company's earnings which may cool down stock markets. Profits and losses of a business will be reviewed as an important information and be provided to investors as well as stock markets.

Economic and monetary development (2004) examined the negative relationship between oil price and stock returns. It observes EURO STOXX returns in the period of low/middle and high oil price from 1987 to 2004. From 1987, during the period of low/medium oil price, Euro STOXX index raised by about 1% per month, however, it decreased in high oil prices period. In addition, the relationship between oil price and stock returns is different in each sector, for example, high oil price seemed to affect weakly to utilities and energy sectors. By contrast, the telecom, the cyclical goods, and technology sectors performed the significant alternative in such circumstance.

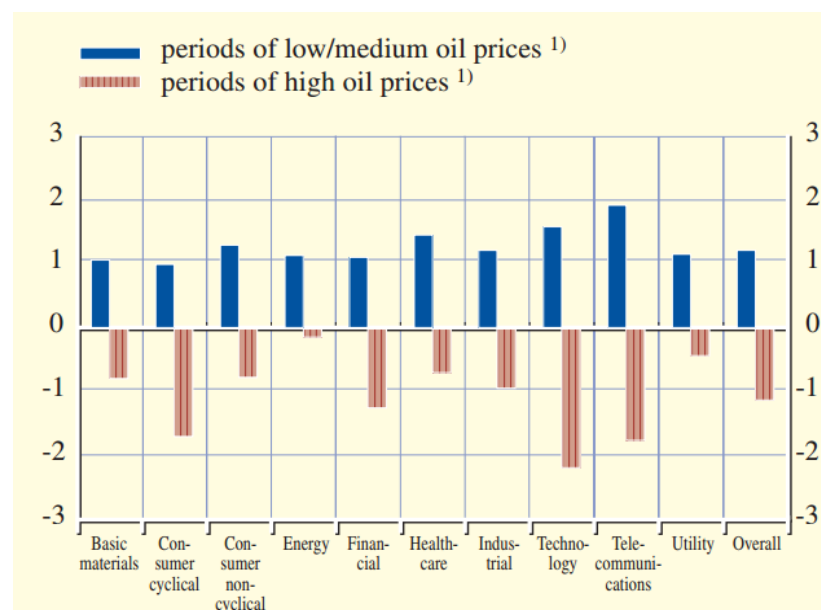


FIGURE 3. EURO STOXX and oil price (adapted from Economic and Monetary Development (2004))

As a result, I expect that the stock market prices consistent with the oil prices in my research.

Hypothesis 2: There is a negative relationship between stock market prices and oil prices.

3.1.3 Oil price and gold price

Like oil, the gold price is determined in US dollar so it is impacted by the change of US dollar. When US dollar increases, crude oil, and gold will be more expensive. Because they are dollar-denominated assets, they are significantly related together. Moreover, the inflation is considered as a connection between gold prices and oil prices. When oil price increases, the inflation also grows up. It is the fact that gold is seen as a hedge against inflation. This means that the gold price will rise in the high inflation period. Consequently, oil prices have an impact positively on gold prices (Meera 2015).

However, the relationship between oil prices and gold prices is quite complicated because in some cases, both oil and gold prices are reviewed as an inflation hedge. During the period of the high inflation rate, while oil is seen as a risky asset, gold is in the opposite position. Oil price will get high points and will be sold out but gold is bought more during this period. As a result, this correlation should be a negative way (Arfaoui and Rejeb 2016).

In addition, we should consider the effect of oil price on stock return of gold mining companies. Mining exploration needs energy from oil so that when the oil price rises, the extraction of gold will be more expensive. This means that the profit margin of mining companies is minimized remarkably resulting in the fall of their share prices. For example, the JNUG index used to measure the movement of gold price is also affected because of the changes in oil prices (Meera 2015).

According to Figure 3, we can recognize that the changes in oil prices and gold prices are quite similar from 2003 to 2016. However, while the oil price decreased dramatically from US dollar 103.64 per barrel to US dollar 39.95 per barrel from March 2008 to December 2008, the gold price rose slightly from September 2003 to September 2012 by EUR 951.7. It is noticeable that the correlation between oil prices and gold prices showed clearly from September 2003 to March 2008 and from December 2008 to March 2011.

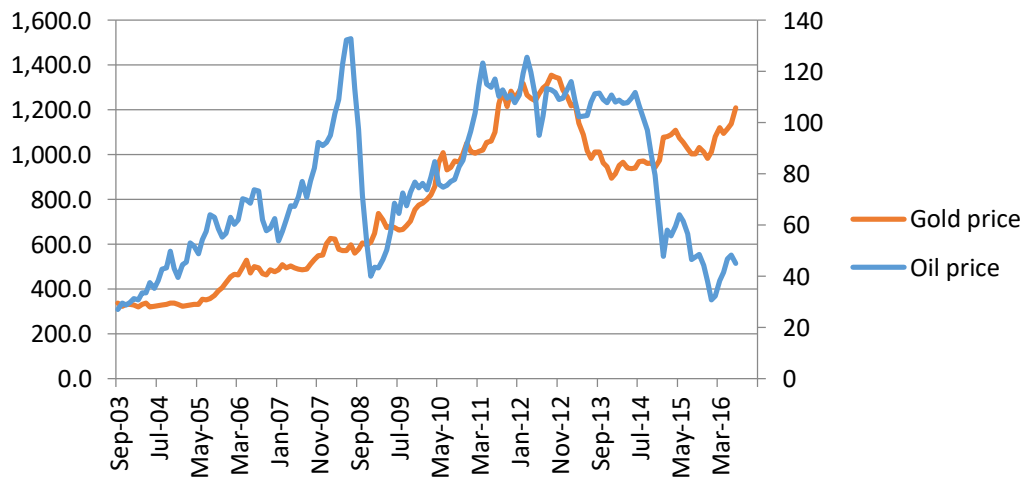


FIGURE 4. Gold price and oil price (adapted from LBMA World Gold Council and Federal Reserve Bank of St. Louis)

Overall, I predict to find a relationship between gold price and oil price in my observation so the next hypothesis is:

Hypothesis 3: Gold price and oil price have a close relationship

3.1.4 Gold price and stock market prices

Gold is perceived as a haven when the inflation reaches high range or the period of risk for the economy is coming. We cannot deny that when the global market moves downward, the price of the stock market will decline because stock exchange is no longer attractive to investors. Instead of investing in stock exchanges or foreign currencies, investors appreciate the value of gold leading to the increases in gold prices. This means that while the stock market prices fall, the price of gold grows up.

Therefore, I expect that gold price and stock markets price will move in a different direction from 2003 to 2016:

Hypothesis 4: There is a negative relationship between gold price and stock market prices

3.1.5 Gold price and US Dollar

There is the fact that if the value of US dollar fall compared to other currencies, the demand for commodities will go up. Gold is also a kind of commodities in the market, therefore as the value of

US dollar decreases, we need to have more dollars to buy gold. In other words, the gold will be more expensive because of the fall of US dollar. In addition, when US dollar loses its value, investors start looking for alternative assets. Gold is one of the valuable and pretty alternatives. Therefore, the gold price has a trend to move in opposite way to the movements of US dollar.

In the theory, the investors tend to shift their portfolio to gold, when US dollar gets the problem. Conversely, if US dollar is upward, investors and banks start paying attention to currency rather than gold resulting in the decline of the value of gold. However, the fluctuations of US dollar do not always cause the negative movements in gold prices. For example, in the case where the other currencies are uncertain but US dollar still remains stable, investors will use both US dollar and gold as a safe haven. In such a case, the relationship between US dollar and gold price is positive (Fraser 2013).

Although there are many factors affecting this relationship, I believe that gold price and US Dollar connect together in a certain direction.

Hypothesis 5: Gold price and US dollar move in the same direction

3.1.6 Euro and stock market prices

The stock market can affect Euro in many ways. For example, if the stock market in Europe begins getting higher points, investors who are from outside Europe are likely to expand their investment into Europe. This investment, of course, influence Euro positively because to join the European stock market foreign investors have to exchange their own domestic currency into Euro. Conversely, if European stock market goes down, investors will try to sell equities which are in Euro and then convert their money in Euro into their domestic currency. As a result, the fall of European stock market may negative effect on Euro. Generally, the stock market and Euro may change in the same direction.

However, the relationship between Euro and the stock market is also impacted by exports, profit from aboard and foreign capital. First of all, exporter companies can get benefits from a weaker euro so when Euro is depreciated, the stock price of the companies getting advantage from increased foreign sales may rise. Consequently, the stock market in Europe can receive positive impact from weaker euro. Secondly, most of the companies do business outside Europe cannot avoid the effect of

fluctuated exchange rate against Euro. For instance, a company earns 1 million dollars in their profit but Euro is depreciated. They, of course, earn an additional profit from this depreciation of Euro because they have to convert their profit in the dollar into Euro. The better profit leads to the positive looking for their equity. Thirdly, when Euro falls, some investors try to buy financial assets in European stock market and then wait for the stronger of Euro in the future. While Euro reach high spots, they hope to sell these assets in order to get higher return.

Totally, I expect that Euro and stock market prices are in the opposite sides, so my next hypothesis is:

Hypothesis 6: There is a negative relationship between Euro and stock market prices

3.1.7 Gold price and Euro

We cannot deny that gold is considered as one of the hedges against the depreciation of US dollar. However, US dollar is, nowadays, priced by other currencies including Euro because US dollar is valued regularly by its competitors in foreign exchange markets. Therefore, when Euro goes down, US dollar will increase. At the same time, the rise of US dollar makes gold less attractive because it cannot work as a role of hedge resulting in the decrease of the gold price. This means there is a close relationship between Euro and gold (James 2012).

James (2012) in “Gold, the Dollar, and Euro: The Bottom Line” observed the relationship between US dollar, Euro, and gold from August 2011 to July 2012. Euro affected US Dollar significantly negatively at the coefficient -0.92. Similarly, the relationship between US Dollar and gold is extremely strong with -0.72 coefficient. And the coefficient of the relationship between Euro and gold is +0.74. This means that there is a positive relationship between Euro and gold (FIGURE 5).

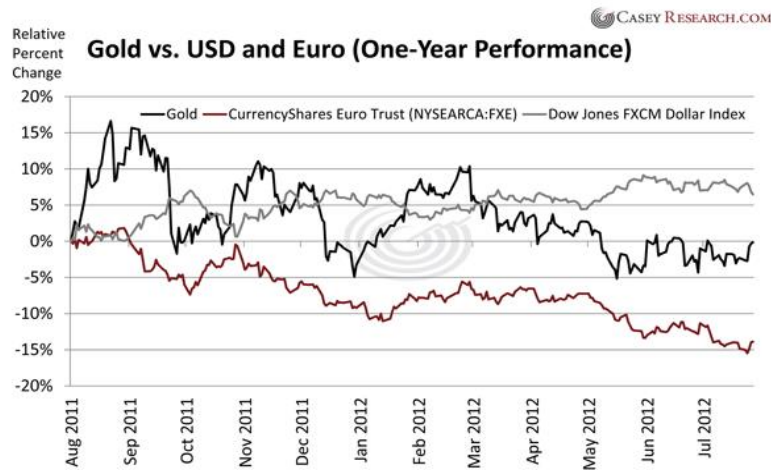


FIGURE 5. Gold and US dollar and Euro (adapted from James 2012)

Consequently, I expect that the close relationship between Euro and gold will be appeared in my research:

Hypothesis 7: There is a positive relationship between Euro and gold price

3.1.8 Euro and oil price

As the relationship between Euro and gold price, Euro relates to oil price through the impact of US dollar. From the above analysis of the relationship between Euro and gold price, I mentioned that the changes of Euro will have a negative impact on US dollar because Euro is considered as a competitor of US dollar in the foreign market. Meanwhile, as I revealed in the relationship between US dollar and oil price when US dollar depreciates, oil price will increase. Totally, the increase of Euro will change positively the oil price.

As can be seen from the figure 6, we can have an overview the movement of both oil price and Euro from September 2003 to July 2016. Both oil price and Euro reached the peak in the middle of 2008 of US dollar 132.32 a barrel and EUR 112.44, respectively. From 2010 to 2014, there are slight fluctuations in both oil price (from US dollar 76.17 a barrel to US dollar 62.34 a barrel) and Euro (from EUR 101.03 to EUR 95.23). However, from 2014 to 2016, while oil price experienced the sharp decline by US dollar 17.39 a barrel, Euro just went down slightly by EUR 8.05. Generally, from the figure 6, we can realize a signal of the relationship between oil price and Euro.

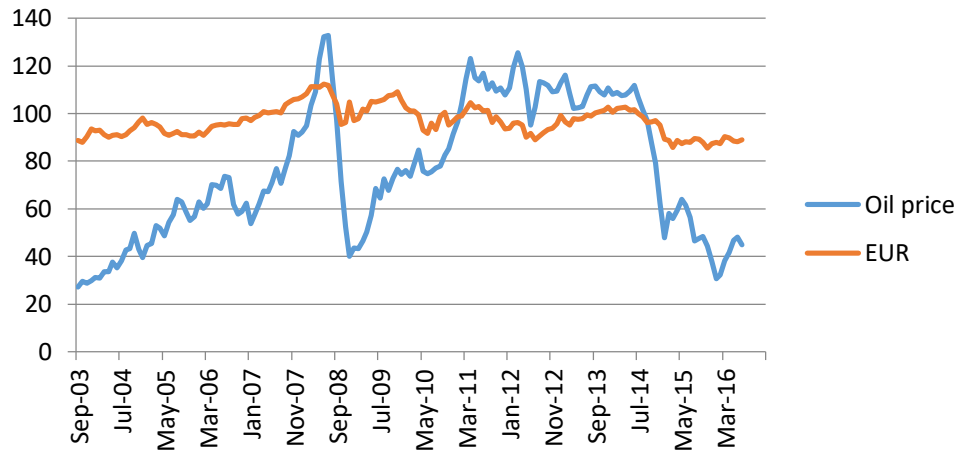


FIGURE 6. Euro vs oil price (adapted from Federal Reserve Bank of St. Louis and Investing.com)

As a result, my next hypothesis will be

Hypothesis 8: There is a positive relationship between Euro and oil price

3.2 The data

My observations are collected from monthly historical data from September 2003 to July 2016. The variables are gold price, oil price, US dollar index, EU Stoxx 600, Euro index. The sources of data are from LBMA World Gold Council (gold price), Federal Reserve Bank of St. Louis (oil price), Investing.com (US dollar index, Euro index and EU Stoxx 600).

Other additional factors are interest rate (from Federal Reserve Bank of St. Louis) represented for monetary policies, Consumer Price Index (from Federal Reserve Bank of St. Louis) controlled economic conditions, oil gross import (from European Commission) used to show economic outlooks, government bond (from European Central Bank) used to control risks because of banking and financial crises on the market and finally, oil future contracts (from investing.com) showed the financial process of oil markets and expectations of investors in the future.

Table 1 reports basic statistics of 5 variables: Euro (EUR), Gold price (GOLD), Stock market price (STOCK), Oil price (OIL), US Dollar (USD).

TABLE 1. Basic statistics of used variables (Part 1)

	EUR	GOLD	OIL	STOCK	USD
Medium	96.9	784.9	76.2	294.3	84.0
Median	96.3	800.8	72.8	286.5	82.7
Max	112.4	1355.4	132.7	399.9	100.2
Min	85.4	319.8	27.1	172.9	72.2
Skewness and Kurtosis	0.4 and 2.5	0.03 and 1.6	0.1 and 1.8	0.1 and 2.0	0.5 and 2.7
Jarque-Bera	5.3	12.0	10.5	6.0	8.4
Sum	15014.9	121657.6	11810.4	45618.3	13017.8
Augmented Dickey-Fuller test test	-0.15	1.34	-0.71	0.59	-0.05
Observations	155	155	155	155	155

Table 2 shows basic statistics of additional variables: Consumer Price Index (CPI), EU Government Bond yields (GB), interest rate (IR), oil future price (OIP) and oil gross import (OI).

TABLE 2. Basic statistics of variables (Part 2)

	CPI	GB	IR	OFP	OI
Medium	92.8	3.4	2.3	77.3	72576.7
Median	92.5	3.8	1.8	72.0	71994.0
Max	100.7	4.8	5.3	139.8	111026.4
Min	81.5	0.6	0.3	27.7	37710.0
Skewness and Kurtosis	-0.3 and 1.7	-1.1 and 3.0	0.4 and 2.1	0.1 and 1.8	-0.0 and 2.7
Jarque-Bera	12.3	30.0	8.8	9.5	0.7
Sum	14383.3	526.2	361.9	11979.6	1.12
Augmented Dickey-Fuller test test	1.12	-1.37	-1.08	-0.62	-8.88
Observations	155	155	155	155	155

From Jarque-Bera test, I recognized that the used variables have the skewness and kurtosis being in a normal distribution. ADF test in table 1 and table 2 is Augmented Dickey – Fuller which was proposed by Dickey & Fuller (1979). ADF test is used to test the stationarity in time series data. All used variables are stationary at the 5% level (TABLE 1 and TABLE 2).

Table 3 shows the correlation coefficient between variables. The correlation coefficients of all variables have the average value of 0.64%. The average value of correlation coefficients of main variables (Euro, gold price, oil price, stock market prices and US Dollar) is 3.57% while the additional variables have the average value of 1.3%. However, this table just brings superficially information and redundant information is absent in regression.

TABLE 3. Matrix correlations of all variables

Correlation	EUR	GOLD	OIL	STOCK	USD	CPI	GB	IR	OFFP	OI
EUR	1.000									
GOLD	-0.107	1.000								
OIL	0.529	0.563	1.000							
STOCK	-0.107	0.098	0.045	1.000						
USD	-0.854	-0.066	-0.724	0.266	1.000					
CPI	-0.004	0.912	0.529	0.305	0.011	1.000				
GB	0.535	-0.522	0.141	-0.486	-0.637	-0.649	1.000			
IR	0.390	-0.702	-0.068	-0.044	-0.371	-0.735	0.752	1.000		
OFFP	0.542	0.548	0.963	0.048	-0.746	0.490	0.168	-0.051	1.000	
OI	0.134	-0.819	-0.353	-0.325	-0.144	-0.887	0.669	0.702	-0.330	1.000

4 EMPIRICAL METHODOLOGY

To examine the relationship between factors, I first check the interdependent equations of each pair of factors. And then I investigate the total effect of all factors by simultaneous equations to find the interactions of all economic factors. The main mathematical method I use for my research is the linear regression with the significant level 5%. I use the Eview program to examine and check my hypotheses. The following table is an example of result table:

TABLE 4. The sample of result table

Dependent Variable				
Least Squares method				
Date:				
Time of observation				
The number of observations:				
Variable	Coefficient	Standard Error	t-Statistic	P-value
Variable				
C				

The standard errors (Std. Errors) in the result tables show the estimated standard errors of coefficients. It is used to measure the reliability of the coefficient results. The results will be unreliable if the standard errors are large. Besides, the T-statistic column in the table is used to test if a coefficient is equal to zero or not. T-statistic is the ratio of an estimated coefficient to its standard error. Generally, there are some ways to check the reliability of the estimated coefficients such as Standard errors, T-statistic, and p-value. In this research, I used p-value to examine the hypotheses. P-value is the probability of t-statistic drawing with the assumption that estimated coefficients are normally distributed. P-value is used to determine a probability to find the results of observation when the hypothesis is true. I choose the significant level at 5%. Therefore, 5% is considered as a statistical significance which means the probability of rejecting my hypothesis is 5% or I can confident with my results at 95%.

To find interdependent relationship between 8 pairs of factors:

- Oil price and gold price: $Oil_t = a_0 + a_1 Gold_t$ (1)

- Oil price and US dollar: $Oil_t = b_0 + b_1 USD_t$ (2)

- Gold price and US dollar: $Gold_t = c_0 + c_1USD_t$ (3)

- Stock market price and gold price: $Stock_t = d_0 + d_1Gold_t$ (4)

- Stock market price and oil price: $Stock_t = e_0 + e_1Oil_t$ (5)

- Euro and stock market price: $Euro_t = f_0 + f_1Stock_t$ (6)

- Euro and gold price: $Euro_t = g_0 + g_1Gold_t$ (7)

- Euro and oil price: $Euro_t = h_0 + h_1Oil_t$ (8)

The coefficient $a_1, b_1, c_1, d_1, e_1, f_1, g_1, h_1$ represent for the relationship between factors. If the coefficient $a_1, b_1, c_1, d_1, e_1, f_1, g_1$, or $h_1 > 0$ with p-value $< 5\%$, there is significant positive relationships between two factors. Conversely, if $a_1, b_1, c_1, d_1, e_1, f_1, g_1$, or $h_1 < 0$ with p-value $< 5\%$, the relationships we need to examine will be significant negative. Two factors do not relate to each other when p-value $> 5\%$.

Next, I use simultaneous equation approach to analyze my observation in which I investigate the interactions among factors: oil price, gold price, US dollar, Euro and the stock market price. I use following mathematical equations to examine my hypotheses:

$$Stock_t = \alpha_0 + \alpha_1Oil_t + \alpha_2Gold_t + \alpha_3USD_t + \alpha_4Z_{1t}^S \quad (9)$$

$$Oil_t = \beta_0 + \beta_1Stock_t + \beta_2Gold_t + \beta_3USD_t + \beta_4Z_{2t}^O \quad (10)$$

$$Gold_t = \gamma_0 + \gamma_1USD_t + \gamma_2Stock_t + \gamma_3Oil_t \quad (11)$$

$$USD_t = \delta_0 + \delta_1Gold_t + \delta_2Stock_t + \delta_3Oil_t + \delta_4Z_{4t}^U \quad (12)$$

$$EUR_t = \varepsilon_0 + \varepsilon_1Stock_t + \varepsilon_2Oil_t + \varepsilon_3Gold_t + \varepsilon_4Z_{5t}^E \quad (13)$$

Stock market prices, gold price, oil price, US Dollar index, Euro index are all endogenous variables. The variables Z_i ($i=1, \dots, 4$) represent for additional factors which control the economic status such as Government bond yields, oil gross imports, oil future contracts, CPI (Consumer price index), interest rate. Z_1^S represents for interest rate and Government bond yields, Z_2^O consists in oil gross imports and oil future contracts and finally Z_4^U and Z_5^E is viewed as a representation of consumer price index.

Expecting oil future contract, all variables are used at time “t” in the mathematic systems. Oil future contract is observed at “t+1” because oil future price is considered as the expectations of investors. They are overview of economic status and estimation of the investors in the future.

All coefficients of the equation 9 to equation 12 are accepted when their probability values are higher than 5%. I will focus on the significance of all coefficients in order to investigate the interactions among factors.

5 RESULTS

After using Eview 6 software, the results of the relationships between observed assets are shown in tables and figures. In this section, the numbers in the table results will be explained by mathematical meanings.

5.1 Interdependences between economic factors

Oil price and gold price (Equation 1)

Table 5 and Figure 7 show the relationship between oil price and gold price. Changes in gold price have positive and significant effect on oil price. The coefficient is 0.0495 at p-value < 5% meaning that when the gold price increases 1 unit, the oil price will rise 0.0495 units:

$$\text{OIL} = 0.0495 * \text{GOLD} + 37.321$$

TABLE 5. Interdependence between oil price and gold price

OIL				
Least Squares method				
Date: 03/28/17				
From 09/2003 to 07/2016				
The number of observations: 155				
Variable	Coefficient	Standard Error	t-Statistic	P-value
GOLD	0.0495	0.0059	8.4288	0.0000
C	37.321	4.9879	7.4823	0.0000

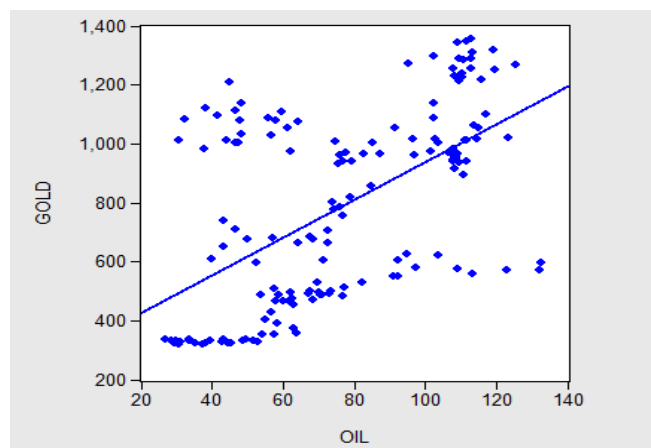


FIGURE 7. Interdependence between oil price and gold price

So there is a close relationship between gold price and oil price or the hypothesis 3 is accepted.

Oil and US dollar (Equation 2)

The correlation between oil and US Dollar is revealed in the figure 8 and table 6. The coefficient of USD (-3.1266) is lower than 0 and p-value is nearly 0 which means that US Dollar has significant and negative impact on the oil price. When US Dollar increases 1 unit, the oil price will declined 3.1266 units: $OIL = -3.1266 * USD + 338.781$

TABLE 6. Interdependence between oil price and US Dollar

OIL				
Least Squares method				
Date: 03/28/17				
From 09/2003 to 07/2016				
The number of observations: 155				
Variable	Coefficient	Standard Error	t-Statistic	P-value
USD	-3.1266	0.2407	-12.989	0.0000
C	338.781	20.279	16.706	0.0000

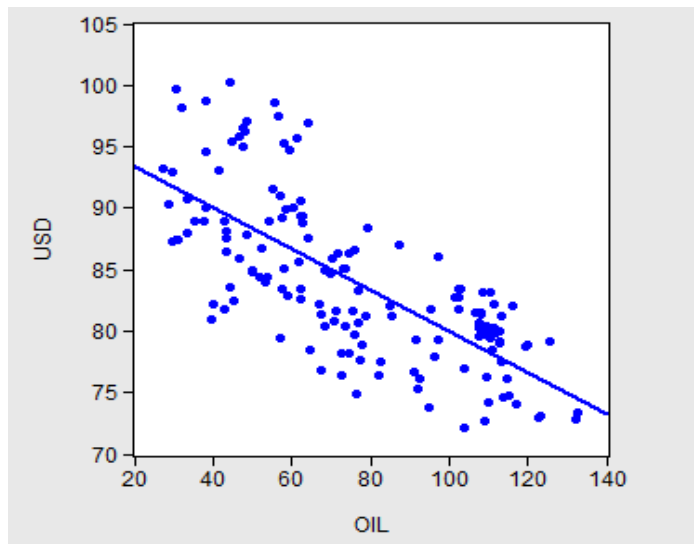


FIGURE 8. Interdependence between oil price and US dollar

With this result, we cannot reject the hypothesis 1 which said that there is a negative relationship between oil price and US dollar.

Gold price and US dollar (Equation 3)

According to the table result, the coefficient of regression equation of gold price and US dollar is (-3.241386) but p-value is too high. Therefore, we cannot accept our hypothesis 5 which expects that Gold price and US dollar move in the same direction. Or in other words, Gold price does not relate to US dollar in my framework from 2003 to 2016 (TABLE 7).

TABLE 7. Interdependence between Gold price and US dollar

GOLD				
Least Squares Method				
Date: 03/28/17				
From 09/2003 to 07/2016				
The number of observations: 155				
Variable	Coefficient	Standard Error	t-Statistic	P-value
USD	-3.241386	3.9599	-0.8186	0.4143
C	1057.119	333.5958	3.168862	0.0018

Gold price and Stock market price (Equation 4)

The same with the result of the interdependence between gold price and US dollar (p-value is too high), the coefficient of regression equation of stock market prices and gold price has no significance (TABLE 8). However, we cannot assert that there is no relationship between stock market prices and gold price because both factors are also influenced by many economic statuses. I will check again the interaction among factors in the next part of this research.

TABLE 8. Interdependence between Stock market price and Gold price

STOCK				
Least Squares method				
Date: 09/12/17				
Form 09/2003 to 07/2016				
The number of observations: 155				
Variable	Coefficient	Standard Error	t-Statistic	P-value.
GOLD	0.0166	0.0137	1.2160	0.2258
C	281.249	11.617	24.209	0.0000

Stock market price and oil price (Equation 5)

The coefficient is 0.0878 which is higher than 0 but the probability value is too high ($0.5750 > 5\%$). With insignificant coefficient, the hypothesis 2 estimating the negative relationship between stock markets and oil market price is rejected (TABLE 9). I think that the effect of oil price on Stock market could be controlled by other factors.

TABLE 9. Interdependence between stock market prices and oil price

STOCK				
Least Squares method				
Date: 09/12/17				
From 09/2003 to 07/2016				
The number of observations: 155				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
OIL	0.0878	0.1562	0.56186	0.5750
C	287.625	12.703	22.642	0.0000

Euro and Stock market price (Equation 6)

The coefficient is -0.01196 and probability value is 0.1845 (too high). As a result, the negative relationship between Euro and stock market prices in hypothesis 6 is rejected by 2-variable regression model (TABLE 10).

TABLE 10. Interdependence between the Euro and stock market prices

EUR				
Least Squares method				
Date: 09/12/17				
From 09/2003 to 07/2016				
The number of observations: 155				
Variable	Coefficient	Standard Error	t-Statistic	P-value
STOCK	-0.01196	0.0090	-1.333053	0.1845
C	100.389	2.686	37.37904	0.0000

Euro and gold price (Equation 7)

Table 11 reports the interdependence between Euro and gold price through the regression model. Although the negative coefficient (-0.0020) shows the negative relationship between Euro and gold price, the probability value is not good and higher than 5%. Consequently, hypothesis 7 is not able to be accepted.

TABLE 11. Interdependence between Euro and gold price

EUR				
Least Squares method				
Date: 09/12/17				
From 09/2003 to 07/2016				
The number of observations: 155				
Variable	Coefficient	Standard Error	t-Statistic	P-value
GOLD	-0.0020	0.0015	-1.3355	0.1837
C	98.469	1.2952	76.027	0.0000

Euro and oil price (Equation 8)

As can be seen from figure 9 and table 12, hypothesis 8 which expects there is a positive relationship between oil price and Euro cannot be rejected. The result of the regression equation is that the coefficient (0.114145) is higher than 0 and the probability value is lower than 5%. This means that when oil price increases 1 unit, the EUR will be expected to rise 0.114145 units. And this result could be confident at level of 95%.

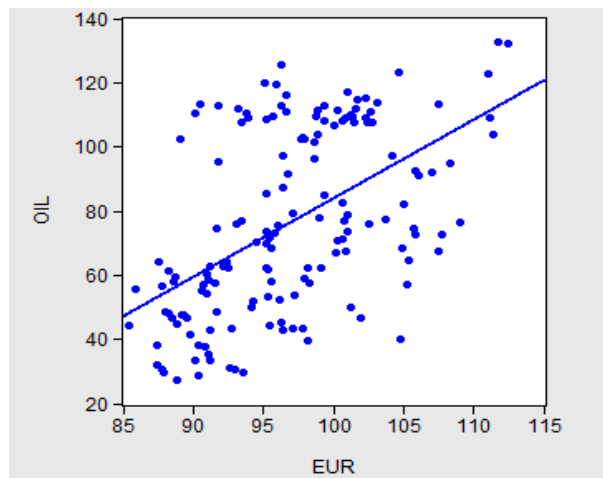


FIGURE 9. Interdependence between Euro and oil price

TABLE 12. Interdependence between Euro and oil price

EUR				
Least Squares method				
Date: 09/12/17				
From 09/2003 to 07/2016				
The number of observations: 155				
Variable	Coefficient	Standard Error	t-Statistic	P-value
OIL	0.114145	0.014809	7.707891	0.0000
C	88.17266	1.204364	73.21100	0.0000

5.2 The interaction of all factors

Factors that affect stock market prices (Equation 9)

Table 13 reports the result of the regression equation in which Stock market price is the dependent variable. The result shows Stock market price is significantly positively affected by oil price and Interest rate with the coefficient 1.093129 and 25.55493, respectively. By contrast, it is significantly and negatively influenced by Government bond.

However, the coefficient of US dollar is not significant to the relationship between stock market prices and US dollar in this equation system is rejected. Although I expect there is a negative relationship between stock market prices and oil price in hypothesis 2, the stock market is also controlled the economic and monetary policy such as interest rate and government bond yield. In other words, the stock market can be used as a speculative, or hedging actions.

$$\text{STOCK} = 1.093129 * \text{OIL} - 0.051059 * \text{GOLD} + 1.668465 * \text{USD} + 25.55493 * \text{IR} - 57.36242 * \text{GB} + 246.0322$$

TABLE 13. Estimated results of equation 9

STOCK				
Least Squares method				
Date: 09/12/17				
From 09/2003 to 07/2016				
The number of observations: 155				
Variable	Coefficient	Standard Error	t-Statistic	P-value
OIL	1.093129	0.235460	4.642533	0.0000
GOLD	-0.051059	0.019699	-2.592011	0.0105
USD	1.668465	1.055562	1.580641	0.1161
IR	25.55493	3.707896	6.892028	0.0000
GB	-57.36242	5.710198	-10.04561	0.0000
C	246.0322	113.4215	2.169185	0.0317

Factors that affect oil price (Equation 10)

As can be seen from table 14, it is pointed out that oil price is significantly negatively impacted by US dollar and significantly positively affected by oil future price. So as my estimation in the relationship between oil price and US dollar, we cannot deny the hypothesis 1. Supposing other factors remain no change, when US dollar increases 1 unit, oil price is estimated to decrease 0.477165.

Oil future price also controlled the change of oil price because when oil future price rise 1 unit, oil price will grow up 0.843239 at the high confidence level. However, this table reports that there are no significant effects of stock market prices and gold price on oil price. The explanation could be that the relationship among factors develops in a lot of ways depending on the economic status and the attitudes of investors.

$$\text{OIL} = 0.010269 * \text{STOCK} + 0.007197 * \text{GOLD} - 0.477165 * \text{USD} - 4.18\text{E-}05 * \text{OI} + 0.843239 * \text{OFP} + 45.45819$$

TABLE 14. Estimated result of equation 10

OIL				
Least Squares method				
Date: 09/12/17				
From 09/2003 to 07/2016				
The number of observations: 155				
Variable	Coefficient	Standard Error	t-Statistic	P-value
STOCK	0.010269	0.013901	0.738719	0.4612
GOLD	0.007197	0.004402	1.634812	0.1042
USD	-0.477165	0.204298	-2.335639	0.0208
OI	-4.18E-05	7.86E-05	-0.531401	0.5959
OFP	0.843239	0.055481	15.19875	0.0000
C	45.45819	20.57872	2.208990	0.0287

Factors that affect gold price

Table 15 shows the effect of US dollar, stock market prices and oil price to gold price. We can realize that both US dollar and oil price have significant and positive impacts on gold price. Supposing other factors have no change, when US dollar increase 1 unit, gold price will increase 40.67990 units. Similarly, if other factors are supposed to be stable, when oil price increases, gold price will be expected to rise 13.31586 units. Conversely, stock market prices effect significantly and negatively to gold price with the coefficient -1.031452.

$$\text{GOLD} = 40.67990 * \text{USD} - 1.031452 * \text{STOCK} + 13.31586 * \text{OIL} - 3342.703$$

TABLE 15. Estimated result of equation 11

GOLD				
Least Squares method				
Date: 09/12/17				
From 09/2003 to 07/2016				
The number of observations: 155				
Variable	Coefficient	Standard Error	t-Statistic	P-value
USD	40.67990	4.127309	9.856277	0.0000
STOCK	-1.031452	0.341224	-3.022802	0.0029
OIL	13.31586	0.922539	14.43393	0.0000
C	-3342.703	370.8172	-9.014422	0.0000

Factors that affect US dollar (Equation 12)

When investigating the interaction of gold price, stock market prices, oil price, CPI with the change of US dollar, I got the following result:

$$\text{USD} = 0.005325*\text{GOLD} + 0.025439*\text{STOCK} - 0.233530*\text{OIL} + 0.259370*\text{CPI} + 66.04538$$

TABLE 16. Estimated result of Equation 12

USD				
Least Squares method				
Date: 09/12/17				
From 09/2003 to 07/2016				
The number of observations: 155				
Variable	Coefficient	Standard Error	t-Statistic	P-value
GOLD	0.005325	0.002222	2.396117	0.0178
STOCK	0.025439	0.005531	4.599611	0.0000
OIL	-0.233530	0.010949	-21.32905	0.0000
CPI	0.259370	0.120777	2.147506	0.0334
C	66.04538	8.860036	7.454302	0.0000

All coefficients have significance because their probability values are higher than 5% as my expectation. While gold price, Stock market price, and CPI have positive effects on US dollar, the oil price negatively changes US Dollar. The negative effect of oil price to US dollar could be explained by the relationship between Euro and oil price (TABLE 16). As above explanation, Euro is one of the competitors of US dollar. When oil price goes up, Euro tends to decline. At the same time, the decrease of Euro leads to the increase of US dollar. Consequently, the increase of oil price makes the decline of US dollar. In other words, there is a negative relationship between US dollar and oil price.

Factors that affect Euro (Equation 13)

The result of Equation 13 is showed in table 17 and the following function:

$$\text{EUR} = -0.030106*\text{STOCK} + 0.181466*\text{OIL} - 0.024870*\text{GOLD} + 0.831767*\text{CPI} + 34.23905$$

TABLE 17. Estimated result of equation 13

EUR				
Least Squares method				
Date: 09/12/17				
From 09/2003 to 07/2016				
The number of observations: 155				
Variable	Coefficient	Standard Error	t-Statistic	P-value
STOCK	-0.030106	0.006731	-4.472641	0.0000
OIL	0.181466	0.013325	13.61805	0.0000
GOLD	-0.024870	0.002705	-9.195431	0.0000
CPI	0.831767	0.146992	5.658580	0.0000
C	34.23905	10.78313	3.175243	0.0018

Table 17 reports the estimation result of the regression in which Euro is the dependent variable. The result shows that stock market prices and gold price are significant negative influences on Euro with the coefficient (-0.030106) and (-0.024870) respectively. Conversely, oil price and CPI positively affect to Euro. All coefficients are significant because the probability values are nearly 0. These results are the same with my estimation in hypothesis 6 and hypothesis 8. However, the effect of oil price on Euro in the economic situation from September 2003 to July 2016 is also controlled by Government policies and the attitudes of investors.

6 CONCLUSION

All of the findings will be summarized to provide the overview of the research in this section. Next, I will give some recommendations from the results of my research. Finally, this research also has several limitations so some suggestions for further study will be provided to develop the research in the future. The relationships among economic factors such as US dollar, gold price, oil price, stock market prices and Euro are extremely important for making business decisions and investment. However, depending on the global economic status, these relationships are able to be different in each period of time.

This research aims to investigate the interaction between the economic factors by using the simultaneous approach from September 2003 to July 2016 with 155 observations. I found the significant interactions between Euro, gold price, oil price, stock market prices and US dollar. In particular, I found that stock market prices is positively impacted by oil price and interest rate but it is negatively affected by gold price and government bond. Oil price is concerned by negative changes in US dollar and positive changes in oil future price. As my expectation, gold price is positively affected by US dollar and oil price but the stock market prices has the negative impact on gold price. US dollar plays an important role in the economy because it may have direct impacts on factors or work as a connection between variables. US dollar is positively impacted by gold price, stock market prices and Consumer price index and negatively affected by oil price. Finally, I found that stock market prices and gold price negatively affect Euro which is positively influenced by oil price and Consumer price index.

The explanation for my findings could be from the increases of the uses of gold and oil for hedging or speculation especially in the period of this observation. From September 2003 to July 2016, the global economy experienced a number of difficulties such as the financial and economic crisis of 2008 and great recession from 2006 to 2013 in the Europe. As a result, the risk of doing business in Europe is increased faster leading the fell of investment in all markets. Investors and managers concern to invest in financial assets working as the hedge against the risks rather than opening and developing their investment. In general, all markets become dependent each other.

However, these relationships can change in the future following a lot of different directions because global commissions and governments are planning to implement a series of measures to fight against

the result of economic crisis and improve the productivity. The measures include tax cuts, investment or social measures.

From this research, I also have some recommendations. First of all, although we can explain the relationship between economic factors based on the theories, we need to consider the health of the current economy. For example, stock markets can be affected by the recent volatile events, especially political issues such as the election of the president or in the case of Brexit. The relationship between gold price, stock market prices, oil prices, US dollar, and Euro will alter in different circumstances. Thanks to the historical data, we can see the movements of these assets over the years. Therefore, investors and managers should analyze the theories, the current economic health, and the historical data before making the decision. Secondly, because all these assets have interactions with each other in many ways, we cannot study the changes of their prices in isolation. Therefore, I think that investors and managers should refer the changes of many assets to make the expectation and build their strategies. Finally, with the development of technologies, a lot of software is established to support managers and investors to analyze the movement of these assets. However, I think to get the high benefits, it also depends on their attitudes to risk.

In this research, I used the linear regression method to examine the relationship between variables, but this method only shows the straight-line relationships. Therefore, I want to study these relationships by a more complex way in the further research. The method can be GARCH or EGARCH model. The data were collected monthly from September 2003 to July 2016, so we just considered the economic issues in this period observed. Other studies will expand more observations and examine the latest events.

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