GOLD PLATINUM SILVER

Demand and Supply in the International Finance Market: *An Empirical Analysis*

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ABSTRACT

This paper presents and estimates three econometric models on Gold, Platinum and Silver. The purpose is to provide empirical analysis on the historical price movements of these three commodities and how they are affected by factors in the economy. While we are intrigued by all three precious metals, the main focus of the report is on Gold which continues to be a hot topic among investors, speculators, analysts and others. Great consideration has been given regarding Gold a long lived commodity in the international finance market. We used time series data from February 1976 to July 2007. Demand and supply factors were considered. Three separate regressions were run on the precious metals. We used the Consumer Price Index as Inflation Rate ("CPI"), Nominal Effective Exchange Rate ("NEER"), S&P GSCI Commodities Index (S&P), 3-Month U.S. Treasury Bill ("T-Bill"), and the World Gold Reserve ("WGR") as explanatory variables for all three precious metals. Financial Crisis and War were used as dummy variables. The CPI, NEER, S&P and T-Bill were most significant, while the WGR and dummy variables returned not significant on the Gold price. However, the CPI and NEER had the most impact on the Gold price. An increase in the CPI by 1% would result in an increase in the Gold price by 0.53497%, holding other variables constant. An increase in the NEER by 1% would lead to a decrease in the Gold price by -0.58529%, holding other variables constant. Silver and Platinum were secondary in our analysis. An increase of 1% in the CPI and S&P would increase the Platinum price, while other explanatory variables decreased the Platinum price. Overall, the CPI had the most impact on the price of Silver, increasing the price by 0.64749%, holding other variables constant. Our result also suggests that the weakening of the US dollar, speculation by investors, analysts and others regarding future economic pressure, growth in demand by investors other than Governments, and scarcity contributes to the increase of Gold price.

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1. INTRODUCTION

For many investors and curious individuals around the world, the historical price movements of Gold, Platinum and Silver are of paramount interest to explore and the phenomenon that they are long lived assets continue to ensue curiosity. These precious metals may possibly be around in the International Finance Market forever!

We would like to view Gold, Platinum and Silver as mature commodities on the market, since the demand and supply for these precious metals are forever revolving. The main focus of this report is on Gold. We can say Gold is a long lived and coveted metal that has been known throughout history for its beauty, malleability, scarcity, and resistance to corrosion and rust. These attributes by themselves have inculcated it in an enchantress bracket in the eyes of many individuals. Due to these exceptional and unique qualities, Gold has been a traditional currency of choice for many countries in the World. Gold continues to be a hot topic among investors, analysts, speculators and others in the economy. The history of Gold is important because it can provide you with so much historical information and it gives you a chance to explore something new or old regarding its behavior in the international finance market.

Through this report, the aim is to gain a broader perspective on political and economical factors that affect the price and performance of the three precious metals, but allocating more attention and deeper empirical analysis on Gold. We also want to understand the supply and demand concept of all three commodities, in order to predict future movements in the price of these commodities; particularly Gold. For example, we want to know what factors contributed to the increase in Gold price and what factors, if any, played a role in the depreciation of Gold price at any period. If we review the price of Gold, for instance, you will see that it had an impressive northward growth over the last three years. For example, the average price for one ounce of Gold was around US$362.00 only three years ago. Today, the price is around US$804.00. Platinum and Silver follow similar pattern in that the prices

have increased in value since 1976. Platinum has become one of the precious metals of choice of the "World of Celebrities". It is one of the most elegant and finest jewelry and an expensive metal. The price of a troy ounce of Platinum three years ago was around US$740. Today the price of Platinum is on average US$1,440.00 per troy ounce. In an advancing economy, many industries depend on its use. Similar to Gold, Platinum has reserved its place in history as it is also a long lived commodity. The investment performance of this commodity is interesting to explore. The use of Silver in industrial advancement and as a jewelry is also revolving. The price of a troy ounce of Silver three years ago was around US$6. Today the price of Platinum is on average US$14.00 per troy ounce.

These three precious metals are multi-purpose and are important in today's economy. It is interesting to understand the demand and supply elements of the three precious metals as commodities in the international finance market. The privilege of having an opportunity to explore these three precious metals in the international finance market can only be advantageous. This report attempts to manifest and impart our findings on all three precious metals, focusing on Gold mainly.

To facilitate with our empirical analysis, we have divided this report in five (5) sections: Section one (1) gives an introduction on the subjects. Section two (2) describes our econometric models and data sources. In section three (3), we further provide detailed discussion of our estimation results and model adequacy, examining important features such as the R-Square, Adjusted R-Square, t-test statistics, significance of the estimated coefficients and some descriptive analysis. We further provide impartial predictions in Section 4, and finally we conclude our report in section 5.

2. DESCRIPTION OF THE ECONOMETRIC MODELS AND DATA SOURCES

For this report, we chose three dependent variables which will be explained by five independent variables and two dummy variables. The following variables have been utilized.

CODE	LABEL	MEASUREMENT
Dependent Variables (Y):		
p_ch_g	Percentage change in price of Gold	This denotes the % change in the price of Gold..
p_ch_p	Percentage change in price of Platinum	This denotes the % change in the price of Platinum.
p_ch_s	Percentage change in price of Silver	This denotes the % change in the price of Silver.
Independent Variables (X)		
c_ch_c	Percentage change in Consumer Price Index (as Inflation Rate)	The percentage change in the consumer price index (as inflation) measures the percentage rate of change in the price of Platinum, Gold and Silver.
r_ch_neer	Percentage Change in the Nominal Effective Exchange Rate	The percentage change in the Nominal Effective Exchange rate[1] measures the impact of the NEER on the price of Platinum, Gold and Silver.
t_bill	U.S. Treasury Bill	U.S. Treasury Bill
r_ch_sp	Percentage change in the S&P 500 GSCI Commodities Index	The percentage change of the S&P 500 GSCI Commodities Index examines the impact of other commodities on the price of Platinum, Gold and Silver.
r_ch_reserves	% change in World Reserves Gold	Percentage change in World Gold Reserves.
Dummy Variables		
war	War	War is a dummy variable that takes the value **1** if war is an impacting factor or equals to **0** otherwise.
f_crisis	Financial Crisis	Financial Crisis is a dummy variable that takes the value **1** if a financial crisis is an impacting factor or equals to **0** otherwise.

Three econometric models were run to explain the percentage change in the price of Gold, Silver and Platinum, respectively, as follows:

(Percentage change in gold price) = β_1 +β_2*Percentage change in CPI +β_3*Percentage change in NEER +β_4*3-month T-bill Rate

[1] The nominal effective exchange rate (NEER) is defined as the exchange rate of the domestic currency vis-à-vis other currencies weighted by their share in the country's international trade.

$+\beta_5$Percentage change in GSCI $+\beta_6$*Percentage change in gold reserves $+\beta_7$*financial crisis $+\beta_8$*war + e_i

Our main focus is on Gold but the same variables were used for Platinum and Silver to see if they could be explained by the same econometric model. The dependent variables **p_ch_g** (Gold), **p_ch_s** (Silver) and **p_ch_p** (Platinum) describes the percentage change of the price of each commodity.

The independent variable **c_ch_c** is based on the Consumer Price Index ("CPI"). We chose to use the percentage change in the CPI to estimate the inflation rate which we believed would have an impact on the dependent variables.

The Nominal Effective Exchange Rate ("NEER") was chosen to see what impact the depreciation or appreciation of the US dollar would have on the precious metals. The NEER we used shows the movement of the US dollar compared to cross sections of the world currencies. By using the NEER we get rid of potential bilateral changes between just two currencies and we get a better understanding of how the US dollar is doing. The independent variable **r_ch_neer** is the percentage change of the NEER.

We wanted to see if the changes in interest rates would have any significant impact on the prices of Gold, Silver and Platinum. Therefore, the explanatory variable **t_bill** is the US Treasury Bill. The 3-month US T-bill gives a good indication of the level of interest rates.

The S&P 500 GSCI Commodities Index was chosen to see if changes in the underlying commodities market would have an impact on the price change of the dependent variables. The S&P 500 GSCI Commodities Index is often used as a benchmark for investments performance in the commodities market. "The index is calculated primarily on a world production-weighted basis and is comprised of the

principal physical commodities that are the subject of active, liquid futures markets. As a result, the index is widely recognized as a leading measure of general price movements and inflation in the world economy." (www2.standardandpoors.com). The variable **r_ch_sp** gives the percentage change of the S&P 500 GSCI Commodities Index.

r_ch_reserves is the percentage change of the worlds' Governments reserves of Gold. We wanted to see if the price of Gold, Silver and Platinum were affected by the Gold demand from the Governments. Obviously, the biggest impact was believed to be on the price of Gold but if there was a high or low demand from Governments to buy Gold, this might impact the price on Silver and Platinum as well.

For our regression model, we chose two dummy variables that are believed to have a significant impact on commodities prices. The first dummy variable is **war**. We decided to only focus on the most significant wars or conflicts that have occurred since 1976. The following war and conflicts are included: Soviet-Afghan War, the Falkland War, the Gulf War, US bombing of Iraq (1998), Kosovo conflict, September 11th and the Iraq War. For conflicts that have been lasting for more than 5-6 months we gave the label "1" month prior to the outbreak of the war and two months into the conflict. The reason for this was that we believed the markets can predict major conflict to occur and therefore the price of commodities will change before major combat operations take place. We did not want to use the label longer than two months into the conflict because we believed markets would quickly adjust to the situation. For conflicts that happened unexpectedly (such as September 11), they have not been market the month before but just in the time month it occurred. Civil wars have not been indicated in this project. For all other times, we gave the months the label 0.

Our second dummy variable is financial crisis denoted **f_crisis**. It can be very hard to determine what a financial crisis is and which countries should be affected for the term to make an impact on the prices of Gold, Silver and Platinum. For this project we decided to look at three financial crises that affected

the world economy and created a lot of uncertainty. The financial crisis was indicated from when it started and one year ahead. We gave the label 1 for the recessions in the late 1980's, the Asian financial crisis in 1997 and the early 2000 recession. For all other periods, we gave the months the label 0.

To retrieve data for the different variables, we used mainly two sources. The International Financial Statistics (IFS) database was used to get information on the explanatory variables. The majority of the variables were not given in percentage change, thus, SAS was used to compute the percentage difference based on the raw data from the IFS database. To find the monthly prices for Gold, Platinum and Silver, the DataStream database was used. SAS was also used to calculate the percentage change for these variables.

The values for dummy variables we had to read online articles and books to find the dates when different financial crisis and wars took place. We used sources such as lecture notes from our corporate finance class, books such as "The Intervention to Save Hong Kong", articles derived from the database ProQuest and www.wikipedia.org. We then had to judge by ourselves which conflicts and what time period to use.

Originally, the aim was to look at the historical prices of the precious metals as far back as possible. We hoped to be able to go back as far as early 1950's. For many of our variables we were unable to find data from this period, however, we could only find price data for Platinum starting from February 1976. Therefore, February 1976 was chosen as the start date of our empirical analysis.

Analyzing the monthly percentage change in Gold prices, we got a mean of 0.597 with a standard deviation of 5.56. The variance for Gold price was 30.92. For Silver we got a mean of 0.794 with a

standard deviation of 9.839. The Silver variance was 96.80. Platinum has a mean of 0.8857 and a standard deviation of 7.746. The variance for Platinum was 60.

3. ESTIMATION RESULTS AND MODEL ADEQUACY

3.1 GOLD

a. The econometric model:

$$(c_ch_g) = \beta_1 + \beta_2(c_ch_c_i) + \beta_3(r_ch_neer_i) + \beta_4 r_t_i + \beta_5(r_ch_sp_i) + \beta_6 r_ch_reserves_i + \beta_7 f_crisis_i + \beta_8 war_i + e_i$$

b. Interpretation of the R-Square:

$R^2 = 0.1718$: This means that 17.18% of the variation in the log price is explained by the explanatory variables in the model. As per our finding, the R^2 will be a lot higher if we do not use percentage change for the Gold price. However, it has been perceived in this report to be more important to use percentage change because econometric model is generally better explained in percentage change. For this regression model, the adjusted R^2 is 0.1560.

c. Interpretation of the coefficient estimates:

1. The positive coefficient of **(c_ch_c),** 0.53497, suggests that an increase in monthly % change of the consumer price index of 1 percent will lead to an increase to the Gold price by 0.53497 percent, holding other variables constant.
2. The coefficient of **(r_ch_neer)** is –0.58529, which is negative suggesting that an increase in the monthly % change of Nominal Effective Exchange Rate by 1 percent will lead to a decrease in the Gold price by 0.58529 percent, holding other variables constant.
3. The negative coefficient of "**r_t**", -0.4837, suggests that an increase in 1 % of 3-Month US treasury bill will lead to a decrease in Gold price by 0.4837%, holding other variables constant.

4. The positive coefficient of **(r_ch_sp),** 0.23068, suggests that an increase in monthly % change of the S&P 500 GSCI Commodities index by 1 percent will lead to an increase in the Gold price by 0.23068 percent, holding other variables constant.

5. The negative coefficient of **(r_ch_reserves)**, -0.35955, suggests that an increase in 1 percent of monthly percentage change of world Gold reserves will lead to a decrease in Gold price by 0.35955%, holding other variables constant.
6. The coefficient of "**f_crisis**" is -0.30649, so the occurrence of financial crisis will lead to a decrease in Gold price by a proportion of 0.30649, that is 30.649 percent, holding other variables constant.
7. The coefficient of "**war**" is -0.39264, so the occurrence of war will lead to a decrease in Gold price by a proportion of 0.39264, that is 39.264 percent, holding other variables constant.

d. Hypothesis Testing:

2-tailed test(5% significance level):

Variable :	**c_ch_c**	**r_ch_neer**	**r_t**	**r_ch_sp**	**r_ch_reserves**	**f_crisis**	**war**
H0 :	β2 = 0	β3 = 0	β4 = 0	β5 = 0	β6 = 0	β7 = 0	β8 = 0
H1 :	β2 ≠0	β3 ≠0	β4 ≠0	β5 ≠0	β6 ≠0	β7 ≠0	β8 ≠0
critical value :	1.96643	1.96643	1.96643	1.96643	1.96643	1.96643	1.96643
t value :	3.82	-4.94	-3.1	4.42	-0.21	-0.34	-0.31
Result :	Reject H0	Reject H0	Reject H0	Reject H0	Not reject H0	Not reject H0	Not reject H0

After performing hypothesis testing for 2-tailed test with 5% significance level, we found that **c_ch_c**, **r_ch_neer** and **r_ch_sp** are significantly different from 0. It means that these factors will affect the percentage change of Gold price significantly.

On the other hand, **r_ch_reserves**, **f_crisis** and war are not significantly different from 0. This means world Gold reserves, financial crisis and war do not affect the percentage change of Gold price significantly.

The signs of the following coefficients are not consistent with our intuition:

r_ch_reserves: As the increase in the gold reserve of the governments constitutes an important demand for gold, we expect the gold price to increase when the governments' gold reserve increases." In addition, the 2-tailed test shows us that "**r_ch_reserves**" is not significantly different from 0. It is totally not consistent with our intuition.

f_crisis: We expected that financial crisis is one of a significant factor in affecting the Gold price because people will feel more save to invest in Gold during financial crisis and some investors will use Gold do hedging. However, the 2-tailed test shows that it is not significantly different from 0.

war: In reviewing the data from 1976 to 2007, it shows that the price does not significantly change around the outbreak of the war and conflicts. It is out of our expectation because we thought war is one of a significant factor to influence the Gold price. According to the article "Forecasting the Price of Gold: A Fundamentalist Approach", war is related to the Gold price. However, according to our 2-tailed test, war is insignificant for Gold price. We think that maybe our definition war period is different and further study may require.

Left-tailed test(5% significance level):

VARIABLE	:	**r_ch_neer**	**r_t**
H0	:	β3 ≥ 0	β4 ≥ 0
H1	:	β3 < 0	β4 < 0
critical value	:	1.649	1.649
t value formula	:	=(-0.58529-0)/(0.11837)	=(-0.40837-0)/(0.13162)
t value	:	-4.944580553	-3.102643975
Result	:	Reject H0	Reject H0

Base on the left-tailed test of variable "**r_ch_neer**" and **r_t**". We conclude that we should reject the null hypothesis. That is, when "**r_ch_neer**" or "**r_t**" increase by 1%, the percentage change of Gold price will decrease by 0.58529 or 0.40837 respectively, holding other variables constant.

The signs of the above coefficients are consistent with our intuition:

r_ch_neer: When the monthly percentage change of nominal effective exchange rate for US$ increases, it means USD depreciates. As a result, the price of Gold in US$ will decrease.

r_t: When the rate of 3-month US T-bill increases, it will give investors higher return to invest in T-bills rather than others. Therefore, investors may shift from investing in Gold to invest in T-bills which is risk free. In this case, the percentage change of Gold price will drop.

Right-tailed test(5% Significance Level):

VARIABLE	:	**c_ch_c**	**r_ch_sp**
H0	:	β2 ≤ 0	β5 ≤ 0
H1	:	β2 > 0	β5 > 0
critical value	:	1.649	1.649
t value formula	:	=(0.53497-0)/(0.13996)	=(0.23068-0)/(0.05220)
t value	:	3.822306373	4.419157088
Result	:	Reject H0	Reject H0

Base on the right-tailed test of variable "**c_ch_c**" and "**r_ch_sp**", we conclude that we should reject H0. That is, when "**c_ch_c**" or "**r_ch_sp**" increase by 1%, the Gold price will increase by 0.53497% or 0.23068% respectively, holding other variable constant.

The signs of the above coefficients are consistent with our intuition:

c_ch_c: When the monthly percentage change of Consumer Price Index increase, it means there is inflation and overall product price will increase. In this case, it makes sense that Gold price will increase and therefore having positive sign for the coefficient.

r_ch_sp: When the monthly percentage change of S&P 500 GSCI Commodities Index increase, it means prices of commodities are overall increases. Gold, as one of the commodities, should be increased in price also. Therefore, it also makes sense that coefficient is having a positive sign.

3.2 Platinum

a. The Econometric Model:

$$(c_ch_p) = \beta 1 + \beta 2(c_ch_c_i) + \beta 3(r_ch_NEER_i) + \beta 4 r_t_i + \beta 5(r_ch_sp_i) + \beta 6 r_ch_reserves_i + \beta 7 f_crisis_i + \beta 8 war_i + e_i$$

b. Interpretation of the R-Squares:

R^2 = 0.0825. This means that 8.25% of the variation in the log price is explained by the explanatory variables in the model. Compare with the R^2 of Gold, it is quite low and out of our expectation. The reason of this is because most of the variable is not significantly different to 0 according to the p-value. For this regression model, the adjusted R^2 is 0.0650.

c. Discussion of Coefficient Estimates:

1. The positive coefficient of **(c_ch_c)**, 0.3293, suggests that an increase in monthly % change of the consumer price index of 1 percent will lead to an increase to the Platinum price by 0.3293 percent, holding other variables constant. The positive sign of coefficient is consistent with our intuition that when there is inflation, the price of Platinum will increase also. However, according to the output of SAS (table x), the p-value of **(c_ch_c)** is 0.1094, which is higher than 5% significant level. In this case, **(c_ch_c)** is not significantly different from 0.. That is, the Platinum price will not be affected by this variable.
2. The coefficient of **(r_ch_neer)** is –0.35633, which is negative suggesting that an increase in the monthly percentage change of nominal effective exchange rate by 1 percent will lead to a decrease in the Platinum price by 0.35633 percent, holding other variables constant. The negative sign of coefficient is consistent with our intuition that when USD depreciates, the price of Platinum in USD

will decrease also. According to the output of SAS (table x), the p-value of **(r_ch_neer)** is 0.0407, which is less than 5% significant level. In this case, **(r_ch_neer)** is significantly different from 0. That is, the Platinum price will be affected by the monthly percentage change of nominal effective exchange rate for USD.

3. The negative coefficient of "**r_t**", -0.31796, suggests that an increase in 1 % of 3-Month US Treasury Bill will lead to a decrease in Platinum price by 0.31796%, holding other variables constant. The negative sign of coefficient is not consistent with our intuition. We expected that investor will tend to invest more in T-bill when yield of t-bills increase. However, it is still explainable that when yield of t-bill decrease, the price of t-bill decrease. In this case, investor may shift to invest in other instrument which the price will increase. However, according to the output of SAS(table x), the p-value of "**r_t**" is 0.1003, which is higher than 5% significant level. In this case, "**r_t**" is not significantly different from 0. That is, the Platinum price will not be affected by this variable.

4. The positive coefficient of **(r_ch_sp)**, 0.33569, suggests that an increase in monthly % change of the S&P 500 GSCI Commodities Index by 1 percent will lead to an increase in the Platinum price by 0.33569 percent, holding other variables constant. The positive sign coefficient is consistent with our intuition that when monthly percentage change of the S&P 500 GSCI Commodities Index increases, the price of overall commodities should be increased. Platinum, as one of a commodity, should increase price accordingly. According to the output of SAS(table x), the p-value of ln(r_ch_sp) is 0.0001, which is less than 5% significant level. In this case, ln(r_ch_sp) is significantly different from 0. That is, the Platinum price will be affected by this variable.

5. The negative coefficient of **(r_ch_reserves**), -1.69373, suggests that an increase in 1 percent of monthly percentage change of world Gold reserves will lead to a decrease in Platinum price by 1.69373%, holding other variables constant. The negative sign of coefficient is not consistent with

our intuition. We expect that when Government Gold reserve increases, the Platinum price will be affected and increase. According to the output of SAS(table x), the p-value of **(r_ch_reserves)** is 0.4917, which is higher than 5% significant level. In this case, **(r_ch_reserves)** is not significantly different from 0. That is, the Platinum price will not be affected by this variable.

6. The coefficient of "**f_crisis**" is 0.31636, so the occurrence of financial crisis will lead to a decrease in Platinum price by a proportion of 0.31636, that is 31.636 percent, holding other variables constant. The positive sign of coefficient is consistent with our intuition that when there is financial crisis, investors will invest in Platinum rather than stock market. However, according to the output of SAS (table x), the p-value of "**f_crisis**" is 0.8107, which is higher than 5% significant level. In this case, "**f_crisis**" is not significantly different from 0. That is, the Platinum price will not be affected by this variable. This may because of the definition of the financial crisis, which we put a "1" into the data, is not significant.

7. The coefficient of "**war**" is -1.16657, so the occurrence of war will lead to a decrease in Platinum price by a proportion of 1.16657, that is 116.657 percent, holding other variables constant. The negative sign is not consistent with our intuition. We expected that when there is war, people will buy Platinum for save purpose. However, according to the output of SAS(table x), the p-value of "**war**" is 0.5348, which is higher than 5% significant level. That is, Platinum price will not be affected by war.

3.3 SILVER

a. The Econometric Model:

(c_ch_s) = β1 +β2(c_ch_c*i*) +β3(r_ch_neer*i*) +β4r_t *i* +β5(r_ch_sp *i*)
+β6r_ch_reserves*i* +β7f_crisis *i* +β8war *i* + e *i*

b. Interpretation of the R-squares:

R^2 = 0.0649. This means that 6.49% of the variation in the log price is explained by the explanatory variables in the model. Compared with the R-Square of Gold, it is quite low and out of our expectation. The reason of this is because most of the variables are not significant different to 0 according to the p-value. For this regression model, the adjusted R^2 is 0.0471.

c. Discussion of Coefficient Estimates:

1. The positive coefficient of **(c_ch_c)**, 0.64749, suggests that an increase in monthly % change of the consumer price index of 1 percent will lead to an increase to the Silver price by 0.64749 percent, holding other variables constant. The positive sign of coefficient is consistent with our intuition that when there is inflation, the price of Platinum will increase also. According to the output of SAS (table x), the p-value of **(c_ch_c)** is 0.0143, which is less than 5% significant level. In this case, **(c_ch_c)** is significantly different from 0. We can conclude that the Silver price will be affected by this variable.
2. The coefficient of **(r_ch_neer)** is –0.08642, which is negative suggesting that an increase in the monthly percentage change of nominal effective exchange rate by 1 percent will lead to a decrease in the Silver price by 0.08642 percent, holding other variables constant. The negative sign of coefficient is consistent with our intuition that when USD depreciates, the price of Silver in USD will decrease also. However, the output of SAS (table x) shows that the p-value of **(r_ch_neer)** is 0.6980, which is higher than 5% significant level. In this case, **(r_ch_neer)** is not significantly different from 0. That is, the Silver price will not be affected by the monthly % change of nominal effective exchange rate for USD.

3. The negative coefficient of "**r_t**", -0.60343, suggests that an increase in 1 % of 3-month US treasury bill will lead to a decrease in Silver price by 0.60343%, holding other variables constant. The negative sign of coefficient is not consistent with our intuition. We expected that investor will tend to invest more in T-bill when yield of t-bills increase. However, it is still explainable that when yield of T-bill decrease, the price of t-bill decrease. In this case, investor may shift to invest in other instrument which the price will increase. According to the output of SAS (table x), the p-value of "**r_t**" is 0.0152, which is higher than 5% significant level. In this case, "r_t" is significantly different from 0. That is, the Silver price will be affected by this variable.

4. The positive coefficient of **(r_ch_sp),** 0.35174, suggests that an increase in monthly % change of the S&P 500 GSCI Commodities Index by 1 percent will lead to an increase in the Platinum price by 0.35174 percent, holding other variables constant. The positive sign coefficient is consistent with our intuition that when monthly percentage change of the S&P 500 GSCI Commodities Index increases, the price of overall commodities should be increased. Silver, as one of a commodity, should increase price accordingly. According to the output of SAS (table x), the p-value of **ln(r_ch_sp)** is 0.0004, which is less than 5% significant level. In this case, **(r_ch_sp)** is significantly different from 0. We conclude that the Silver price will be affected by this variable.

5. The negative coefficient of **(r_ch_reserves)**, -2.84447, suggests that an increase in 1 percent of monthly % change of world Silver reserves will lead to a decrease in Silver price by 2.84447%, holding other variables constant. The negative sign of coefficient is not consistent with our intuition. We expect that when government Gold reserve increase, the Silver price be affected and increase. According to the output of SAS (table x), the p-value of **(r_ch_reserves)** is 0.3679, which is higher than 5% significant level. In this case, **(r_ch_reserves)** is not significantly different from 0. That is, the Silver price will not be affected by this variable.

6. The coefficient of "**f_crisis**" is 0.20282, so the occurrence of financial crisis will lead to a decrease in Silver price by a proportion of 0.20282, that is 20.282 percent, holding other variables constant. The positive sign of coefficient is consistent with our intuition that when there is financial crisis, investors will invest in Platinum rather than Gold. However, according to the output of SAS (table x), the p-value of "**f_crisis**" is 0.90407, which is higher than 5% significant level. In this case, "**f_crisis**" is not significantly different from 0. That is, the Silver price will not be affected by this variable. This may because of the definition of the financial crisis, which we put a "1" into the data, is not significant.

7. The coefficient of "war" is -2.20292, so the occurrence of war will lead to a decrease in Gold price by a proportion of 2.20292, that is 220.292 percent, holding other variables constant. The negative sign is not consistent with our intuition. We expected that when there is war, people will buy Silver for save purpose. However, according to the output of SAS (table x), the p-value of "**war**" is 0.3609, which is higher than 5% significant level. That is, Silver price will not be affected by war.

4. PREDECTION

We found four major factors that could be causing an increase in the Gold price over the past few years. They are

a) Growth in the demand for Gold by other investors in the market other than the Governments in the World;

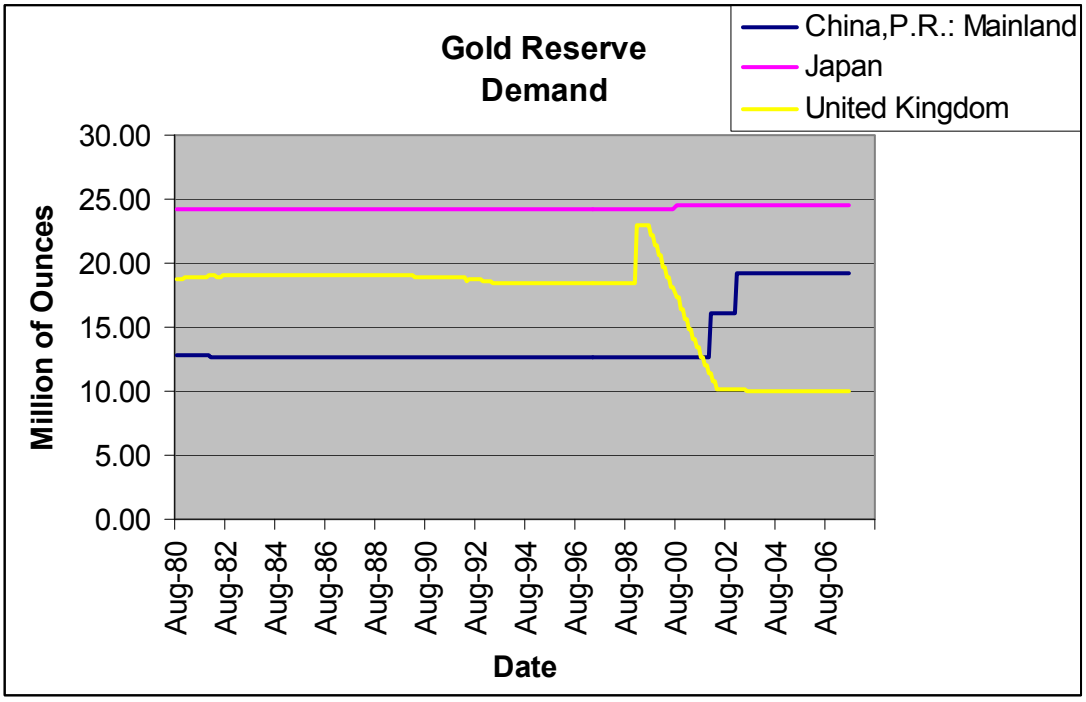
b) The weakening of the United States Dollar;

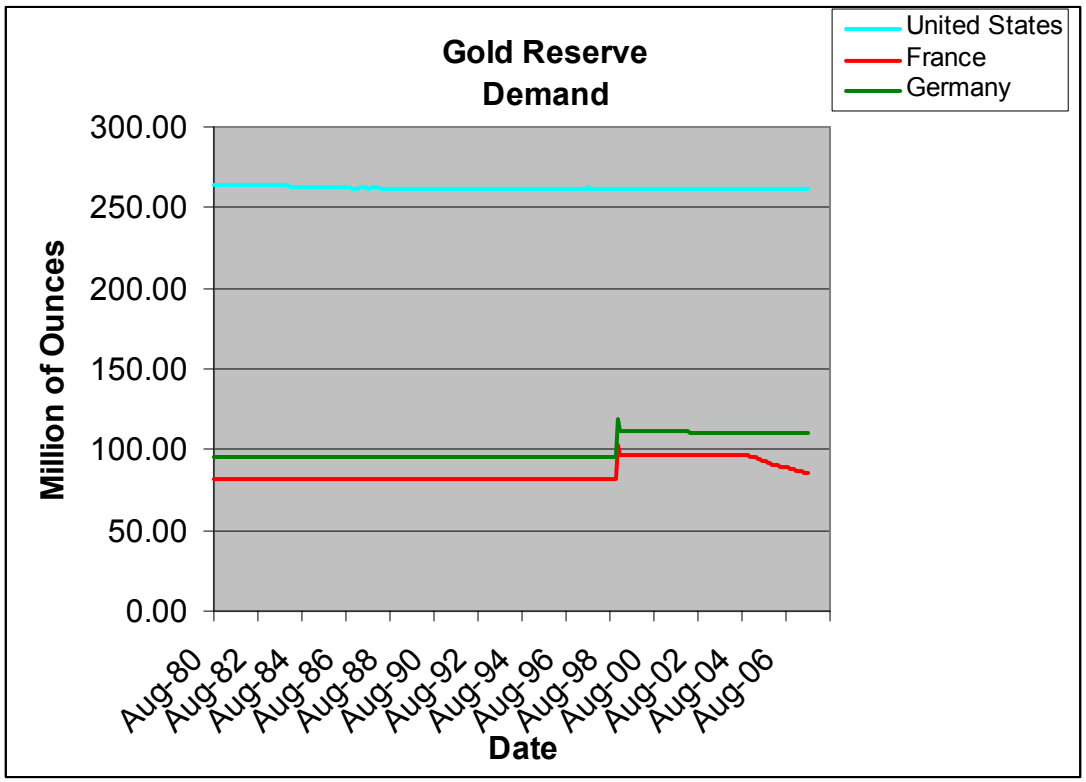
c) Speculation by analysts, speculators and other professional investors in the market may drive demand up for Gold; and

d) Exceptional Mainland China Factor: The Chinese Government is now moving towards holding more Gold as a reserve. This will drive up demand and increase scarcity of the precious metal.

Gold has proven to be a good savings vehicle and a great asset class for investors. Base on these findings, we can predict that the Gold price will continue to increase in value once there is a continuous demand for this commodity, the weakening of the United States Dollar and even a higher demand if worst yet the United States go into a recession in the near future. The prices of Platinum and Silver may follow similar pattern, especially in the event of a recession.

Although generally, the World Gold Reserve has been decreasing, the China Economy is booming and the Government has been moving towards holding more Gold. Therefore, there is an increase demand for the precious metal by the Chinese Government. Below are two charts illustrating the difference in demand for the People's Republic of China, Japan, United Kingdom, United States of America, Germany and France:





Note in the above charts that while the other countries' Gold reserve have been stable or declining, the People's Republic of China has been increasing their Gold reserve.

5. CONCLUSION

Economic factors play an important role in the price movement of Gold, Platinum and Silver. Our econometric models attempt to measure how much a variable can affect the demand and supply of all three commodities; with particular focus on Gold. These longstanding precious metals go way back in history during imperial times and are of paramount interest to explore continuously.

To gain a better understanding of these three precious metals, the Consumer Price Index (Inflation Rate), Nominal Effective Exchange Rate, U.S. Treasury Bill, S&P 500 GSCI Commodities Index; and World Gold Reserve were utilized as explanatory variables for all three econometric models. Also included were War and Financial Crisis as dummy variables. Our econometric models reveal that inflation affects the prices of all three precious metals more significantly than other explanatory

variables in the model. The inflation rate, however, showed the most significance for Platinum. Investors view holding Gold as a form of protection (insurance) in economic conditions, and it can be a good hedge when taking the Nominal Effective Exchange Rate into consideration. For instance, the price of Gold would go up when the dollar decreases, which would cause investors to seek coverage elsewhere. The prices of these three precious metals also agree with our intuition in that the prices would increase (by different amounts) when the S&P 500 Commodities GSCI Index increase by one percent. The expectation was for the World Gold Reserve to be significant in our model, but the output turns out to be not significant for each precious metal (by different amounts).

Below is a summary table for all three precious metals:

SUMMARY DATA			
MEASURE	**GOLD**	**PLATINUM**	**SILVER**
Mean	0.5974	0.8856	0.79
Standard Deviation	5.56	7.74	9.83
R^2	17.18%	8.25%	6.49%
Adjusted R^2	15.60%	6.50%	4.71%
VARIABLES			
c_ch_c	positive	no	positive
r_ch_neer	negative	negative	no
r_t	negative	no	negative
r_ch_sp	positive	positive	positive
r_ch_reserves	no	no	no
f_crisis	no	no	no
war	no	no	no

In reference to our econometric models, there were limitations in our report in that we expected for the world Gold reserve, financial crisis and war periods to have more significance in all three regression models. However, all three came back insignificant (although by different amounts). It can be challenging to pinpoint specific crisis and war periods, as some run concurrently or for very long period. Therefore, great consideration had to be taken when applying values to the crisis and war periods of interest.

We can deduce that higher inflation rate, weakening of the United States Dollar, the demand by individual investors (with an exception for the Government of the People's Republic of China), a future recession, and further speculation by analysts and other professional persons in the international finance market may continue to drive up the price of Gold. Base upon our regression model for Platinum and Silver, they are likely to be influenced by similar factors.

These three precious metals, Gold, Platinum and Silver, may undoubtedly continue to be of great interest and may continue to be a fascinating subject for empirical analysis.

6. REFERENCES

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