Study on the Purchasing Power of China's Gold Investment Product under the Background of International Financial Crisis

Qingyan Miao*

College of International Tourism and Public Administration, Hainan University, Haikou, China

*Corresponding author: 20223008151@hainanu.edu.cn

Abstract. Faced with the complex and changing international economic environment, especially under the dual pressure of the global economic crisis and inflation, people are more eager to achieve effective asset allocation that can avoid risks. As a traditional precious metal, gold is favored by many investors due to its unique historical status. In China, influenced by traditional culture, many people also tend to regard gold as an important part of asset allocation to cope with the uncertainty challenges during the economic crisis. However, there are different opinions in the academic community about the ability of gold to maintain during the international economic crisis. Therefore, this paper hopes to use regression analysis and descriptive statistics to analyze and compare the changes in various factors that may affect the real price of gold during the international economic crisis in different periods of the national economic crisis, so as to obtain the relationship between the changes in the real purchasing power of gold during the international economic crisis and its influencing factors. Finally, it is hoped that the research and experimental results of this paper will provide reference for many investors' future investment in gold products and investors' safe-haven asset allocation during the international financial crisis.

Keywords: International economic crisis; risk aversion; inflation; asset allocation.

1. Introduction

In recent years, affected by the international financial crisis and domestic inflation, how to effectively allocate investment and avoid risks has become a topic which has attracted increasing concern. As a special precious metal commodity, gold has multiple attributes of currency commodity and risk aversion. Influenced by traditional Chinese concepts, many people believe that it is a wise choice to use gold as a hedge asset against inflation during the global financial crisis.

More and more scholars are conducting research on whether gold can maintain purchasing power in severe economic situations. On the one hand, some scholars believe that gold does not have a good ability to hedge inflation. When the financial crisis bubble burst, gold could not hedge inflation and its price valuation also fell sharply. In other periods, its ability to resist inflation was also weaker than real estate and stocks [1]. On the other hand, other scholars believe that gold is a reliable tool to fight inflation. As a safe-haven asset, especially in a high-inflation environment, and should be included in any diversified investment structure [2, 3]. However, these studies not only are conflicting, but also focus mainly on the relationship between the US dollar and gold while they ignored the its effect in Chinese market.

Therefore, based on the purchasing power performance of gold in the Chinese market during previous international financial crises, this article hopes through regression analysis to find whether China's gold investment products can effectively hedge against inflation during international financial crises to provide assistance for Chinese investors' allocation of safe-haven assets.

2. Literature Review and Theoretical Analysis

Gold is the softest, most ductile, densest, most conductive, non-destructive and shiny metal. These unique characteristics have made gold popular throughout the whole history [4]. Today, gold investment has a rich variety of forms, including not only hard assets such as physical gold and spot gold, but also paper assets such as paper gold. Although it should admit that more than a century after the heyday of gold under the classical gold standard economic market, gold has lost its former glory

in the international monetary system. However, the loss of gold's decisive position in the formal monetary system does not mean that it also has lost its other potential value as an asset class [5].

The cause of the international economic crisis is a series of market dysfunctions caused by the relative overproduction of social production activities under the capitalist system. In today's highly developed credit currency system, the economic crisis first broke out in the financial field, and eventually manifested itself as an economic depression with relative overproduction and spread to the world. In order to pursue surplus value, capitalists reduced production and laid off employees on a large scale. Therefore, during the crisis, people suffered from a sharp rise in unemployment, soaring prices, a decline in purchasing power, and a collapse of the credit system. At the same time, the occurrence of international financial crises also shows obvious cyclicality, which can be divided into four stages: crisis, depression, recovery, and upsurge [6].

A hedge is “an asset that is, on average, uncorrelated or negatively correlated with another asset or portfolio” [7]. Whether China's gold investment products can effectively hedge against inflation during the international financial crisis needs to be viewed dialectically. On the one hand, gold investment today is a part of financial assets. Since the collapse of the Bretton Woods system in 1973, the gold market has undergone tremendous changes, and the fluctuations of gold prices have been significantly affected by global uncertainties [8]. In the international market that has left the gold standard and switched to credit currency, attention should be paid to the changes in the stability of purchasing power brought about by its changes in nature.

On the other hand, gold investment products have performed well during the international financial crisis. First of all, looking at the changes in gold prices over the past 30 years, taking the US dollar as an example, gold prices do have a strong hedging relationship with inflation [2, 3]. Secondly, consumer psychology also has a great impact on gold prices. As one of the world's largest gold consumers, Gold is so popular in China, especially during various financial crises. The economic downturn brought about by the crisis has affected the confidence of Chinese consumers. Out of the need to avoid risks, more investors have poured into the gold market [9]. This phenomenon has led to a general view that gold is an important tool for hedging and protecting assets from inflation.

Nowadays, there is a lot of debate about the purchasing power of gold investment products during the international financial crisis. On the one hand, some scholars believe that gold is less able to resist inflation than real estate and stocks and performs poorly during financial crises [1]. On the other hand, other scholars believe that gold is a reliable tool to fight inflation and a safe-haven asset, especially in a high-inflation environment, and should be included in any diversified investment structure [2, 3]. However, these studies are first limited to the US inflation index in terms of data sources and use the London gold market afternoon pricing denominated in US dollars to measure. Therefore, in China, which has a different cultural background and economic structure, the previous researches not only cannot ensure the universality, but also ignore the impact of taxes, exchange rates and market consumption demand on international gold prices in the Chinese market. Secondly, the researches also ignored the differences between international financial crises of different causes when processing data.

To sum up, in order to study whether China's gold investment products can effectively hedge against inflation during the international financial crisis, the study uses linear regression and, based on the recent domestic gold market price, set the null hypothesis that China's gold investment products can effectively hedge against inflation during the international financial crisis.

H1: China’s gold investment products can effectively hedge against inflation during the international financial crisis.

3. Empirical Evidence

3.1. Data

This study constructs a monthly data set for six categories of variables (gold price, purchasing power index, interest rate, consumer confidence index, gold reserves, and China-US exchange rate), and they can be seen in Table 1.

Table 1. 6 types of variables

Variables Metrics	Variables Metrics
Gold price	Shanghai Gold Exchange closing price
Purchasing power index	Consumer Price Index (CPI)
Interest rate	China Bank Deposit Annual Interest Rate
Consumer confidence index	Consumer Confidence Index (CCI)
Gold reserves	China's total gold reserves
China-US exchange rate	One US dollar in RMB (average)

In order to make the data relationship and results clearer, the author used the AU9999 real price change rate instead of the AU9999 nominal price change rate, and analyzed the change rate of the original data of all variables. In addition, AU9999 real price change rate, AU9999 nominal price change rate, and consumer price index change rate can be obtained.

$$r_t = r_m - r_i \tag{1}$$

3.2. Experiment

The author used data from August 2007 to December 2010. In order to highlight the overall trend of the data and reduce the impact of the periodicity of time series data on the data fit, the author used the exponential smoothing method W=0.3 to obtain data for calculation.

A=AU9999 real price change rate

B=Consumer Price Index change rate

C=China Bank Deposit Annual Interest Rate Change Rate

D=Consumer Confidence Index Change Rate

E=Gold Reserve Change Rate

F=One US Dollar Converted to RMB (average) Change Rate

In order to explore the data characteristics of different variables during the international financial crisis and their impact on the real purchase rate of gold, this paper uses descriptive statistics to obtain the minimum and maximum values of the standard deviation of different invariant means during the entire economic crisis.

From the average value, the average value of the change rate of most variables is positive, only the change rate of the annual interest rate of Chinese bank deposits and the change rate of the average of one US dollar in RMB are negative. Since the United States is the origin of this international financial crisis, this can to a certain extent reflect the relative relationship between the currency exchange rate between the place where the international economic crisis occurred and other countries. This may be due to the fact that the US government issued and printed a large amount of currency to impact the economic crisis in its own country, and lowered the exchange rate to increase exports and reduce imports, increase GDP and make the economic crisis move abroad, resulting in the exchange rate of the country where the economic crisis originated and the depreciation of the currency. As for the change rate of the annual interest rate of Chinese bank deposits, since the bank interest rate is closely related to the national fiscal policy. This may be because the deficit economy policy adopted by the country in the international financial crisis and the macro-control implemented to stimulate consumption.

From the maximum and minimum values, it can be found that the change rates of these variables are all positive except the minimum value of the gold reserve change rate, and the minimum values

are all negative. This shows that different factors have increased and decreased during the entire economic crisis. Secondly, the largest maximum value is the change rate of gold reserves. The smallest minimum value is the change rate of consumer confidence index. During the entire economic crisis, gold reserves increased once and did not decrease. In contrast, the change rate of consumer confidence changed the most during the entire financial crisis.

In order to ensure the parabola of the time series, the author conducted ADF testing. Through the significance test method, the significance level was set to 5%. Secondly, the lags were set to 2, 8, and 7. After testing, it was found that C and D The p-value is too high, which means that the two-time series may be non-stationary. Therefore, it will not be used as a reference for regression analysis.

3.2.1 Whole time

As shown Table2 and Table 3, the study conducts a separate simple linear regression analysis on the change rate of the real price of AU9999 and the change rate of the consumer price index, and found that P=0.086. There is a significant linear relationship between the two, with a coefficient of 0.938. This means that during the 2008 international economic crisis, for every one unit increase in the change rate of China's consumer price index, the real price change rate of gold AU9999 will increase by 0.938 units. Therefore, during the international economic crisis in 2008, the real price change rate of China's gold AU9999 will not only not decline due to inflation, but will further increase in value.

Table 2. Overall descriptive statistics during the 2008 international economic crisis

Variable	Obs	Mean	Std. dev.	Min	Max
A	41	0.0177	0.0177	-0.0395	0.0573
B	41	0.0002	0.0051	-0.0128	0.0085
C	41	-0.0005	0.0406	-0.1164	0.0811
D	41	0.0022	0.0081	-0.0125	0.0380
E	41	0.0184	0.0467	0	0.2270
F	41	-0.0030	0.0035	-0.0105	9.40e-06

Table 3. The change rate of gold price and purchasing power during the economic crisis

A	Coefficient	Std. err.	t	P>|t|	[95% conf.	interval]
B	0.9368	0.5324	1.76	0.086	-0.1402	2.0137
_ cons	0.0175	0.0027	6.49	0.000	0.0121	0.0230

During the 2008 global economic crisis, different countries entered recession at different times. For example, the United States fell into recession in the first quarter of 2008, the United Kingdom, Germany, and France fell into recession in the second quarter of 2008, and most emerging market economies fell into recession in the third or fourth quarter of 2008 [10]. In order to study the differences in the relationship between variables at different stages of the crisis, the author divides the economic crisis into crisis preparation period, recession period, and recovery period based on the monthly macroeconomic prosperity index before and after the Chinese economic crisis (shown in Table 4).

Table 4. Period division

Period division	time
Preparatory period	2007.11——2008.9
Decline period	2008.10——2009.10
Recovery period	2009.11— —2010.9

3.2.2 Period

To determine the specific characteristics of each factor in different time periods of the international economic crisis, this paper obtains the following results through segmented descriptive statistics. In the preparatory period of this national economic crisis, except for the change rate of the consumer confidence index and the change rate of one dollar to RMB (average), the change rates of other variables are all positive. The change rates of various variables show the characteristics of inflation, the increase in the annual interest rate change rate of Chinese bank deposits, the decrease in consumer confidence, and the depreciation of the US dollar during this period. All the information can be seen in Table 5.

Table 5. Descriptive statistics of the 2008 International Economic Crisis Preparatory Period

Variable	Obs	Mean	Std. dev.	Min	Max
A	14	0.0167	0.0207	-0.0206	0.0498
B	14	0.0017	0.0044	-0.0063	0.0085
C	14	0.0293	0.0277	0.0020	0.0811
D	14	-0.0010	0.0032	-0.0058	0.0062
E	14	0	0	0	0
F	14	-0.0067	0.0032	-0.0105	-0.0007

Table 6. Regression analysis of the change rate of gold price and purchasing power index

A	Coefficient	Std. err.	t	P>|t|	[95% conf. interval]	
B	2.2648	1.1655	1.94	0.076	-0.2747	4.8044
_ cons	0.0130	0.0054	2.42	0.033	0.0013	0.0247

During the recession period of this national economic crisis which can be seen in Table 6, except for the change rate of the consumer price index, the change rate of the annual interest rate of Chinese bank deposits and the change rate of one US dollar to RMB (average), which are negative, the change rates of other variables are all positive. The change rates of various variables show the characteristics of deflation during this period, the change rate of the annual interest rate of Chinese bank deposits has decreased, consumer confidence has increased, gold reserves have increased, and the US dollar has continued to depreciate but the magnitude has decreased. All the information can be seen in Table 7 and Table 8.

Table 7. Descriptive statistics of the 2008 International Economic Crisis Recession Period

Variable	Obs	Mean	Std. dev.	Min	Max
A	13	0.0154	0.0224	-0.0395	0.0573
B	13	-0.0050	0.0042	-0.0128	0.0016
C	13	-0.0404	0.0398	-0.1164	-0.0032
D	13	0.0072	0.0105	-0.0051	0.0379
E	13	0.0534	0.0726	0	0.2271
F	13	-0.0010	0.0010	-0.0034	-0.0001

Table 8. Regression analysis of the gold price and the rate of change of the US-China exchange rate

A	Coefficient	Std. err.	t	P>|t|	[95% conf. interval]	
F	14.9624	5.0059	2.99	0.012	3.9445	25.9803
_ cons	0.0286	0.0065	4.37	0.001	0.0142	0.0430

During the recovery period of this national economic crisis, except for the average change rate of RMB (average) of one US dollar, which was negative, the change rates of other variables were all positive. The change rates of various variables showed the characteristics of inflation, the increase in the annual interest rate of Chinese bank deposits, the improvement of consumer confidence, the

increase in gold reserves, and the continued depreciation of the US dollar but with an increasing amplitude. All the information can be seen in Table 9 and Table 10.

Table 9. Descriptive Statistics of the 2008 International Economic Crisis Recovery Period

Variable	Obs	Mean	Std. dev.	Min	Max
A	14	0.0208	0.0078	0.0052	0.0334
B	14	0.0036	0.0016	0.0018	0.0070
C	14	0.0068	0.0156	-0.0022	0.0463
D	14	0.0009	0.0071	-0.0125	0.0121
E	14	0.0044	0.0056	0.0002	0.0187
F	14	-0.0014	0.0018	-0.0050	9.40e-06

Table 10. Regression Analysis of the change rate of gold price and purchasing power index

	Coefficient	Std. err.	t	P>|t|	[95% conf. interval]	
B	-2.6047	1.2007	-2.17	0.051	-5.2209	0.0114
_ cons	0.0301	0.0047	6.46	0.000	0.0200	0.0403

3.2.3 CPI regression analysis

By summarizing the regression analysis data of the independent variable consumer price index change rate overall and in different periods and the dependent variable AU9999 real price change rate, the author derived the Table 11.

Table 11. CPI regression comparing analysis

CPI change rate	Coefficient	P>|t|
Overall	0.9368	0.086
Preparatory period	2.2648	0.076
Recession period	0.9333	0.564
Recovery period	-2.6047	0.051

Overall, the consumer price index change rate and the AU9999 real price change rate show a significant positive correlation, with a coefficient of approximately 0.937. From the perspective of the division of different periods, the strength of the relationship and the size of the coefficient between the two also have different characteristics. In the preparatory period, there is a significant positive correlation between the two, and the coefficient is large. During the preparatory period, for every unit increase in the consumer price index change rate, the AU9999 real price change rate will increase by 2.26 units.

In the preparatory period, there is a significant positive correlation between the two, and the coefficient is large. During the preparatory period, for every unit increase in the consumer price index change rate, the AU9999 real price change rate will increase by 2.26 units. During the recession period, there is no significant correlation between the two, and the coefficient is small at about 0.93.

During the recovery period, the two show a significant negative correlation, and the absolute value of the coefficient is large. During the recovery period, for every unit increase in the consumer price index change rate, the AU9999 real price change rate will decrease by 2.6 units. In addition, during the recession, there is a significant positive correlation between the real price change rate of AU9999 and the exchange rate between China and the United States, and the coefficient is huge. Although the p-values in the regression analysis of other factors are large, the influence of these factors cannot be ruled out. Especially after the recovery period, macro fiscal policies have a huge impact on different independent variables.

4. Conclusion

During the 2008 international economic crisis, the real price change rate of China's gold AU9999 steadily increased in value. In the descriptive statistics of the variables during the international economic crisis, the mean of the real price change rate of AU9999 was not only positive but also increased significantly compared with the change rates of other variables. Secondly, in terms of different periods, the real price change rate of AU9999 has remained positive from the beginning of the international economic crisis to the industrial recovery.

Secondly, variables change significantly during the international economic crisis, and the actual returns on investment products also change accordingly. The preparation period, recession period, and recovery period each have their own characteristics, and the data between the same variable groups vary greatly. As far as the rate of change of the consumer price index is concerned, the resistance of gold investment to it changes dramatically in different periods. Therefore, according to the 2008 international economic crisis, gold investment products can indeed effectively resist inflation. Nonetheless, optimizing investments based on the return characteristics of investment products in different periods can obviously further increase investment returns.

The real growth of gold is affected by many variables. As shown in some literature, the real growth rate of gold is also affected by supply and demand, consumer confidence, bank interest rates, gold reserves and exchange rates. The increase or decrease of these variables is not only closely related to the domestic and foreign economic environment during the international economic crisis, but also greatly affected by the national fiscal policy under the international economic environment. For example, during the recession, although the real price of gold can maintain growth, it has no obvious hedging ability after the recession and is greatly affected by the exchange rate between China and the United States.

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