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The relationship between silver prices and consumer price index: Evidence on China market

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Abstract:

This study examines the relationship between Chinese silver prices and inflation to help investors predict inflation in China and hedge risks during inflationary periods. This article constructs a regression model using the least squares method with silver price as the independent variable, consumer price index (CPI) as the dependent variable, and gold price as the control variable. According to the regression model, the research results indicate that in China, inflation risk cannot be predicted by the price of silver, and even investors cannot hedge their risk with silver during inflation periods. On the contrary, as a traditional precious metal, gold can predict inflation and provide hedging during this period. Based on these findings, this article suggests that Chinese investors should pay attention to the hedging differences between precious metals and make correct investment strategies based on the impact of silver and gold prices on inflation to cope with China's growing inflation risk.

Keywords: Silver price, Gold price, CPI, Regression model.

1. Introduction

In China, silver is widely used as an investment product in investment plans. Although silver does not have the strong preservation function of gold, it does not hinder Chinese investors' love for investing in silver. Perhaps the purpose is hedging risks; perhaps the investors are expected to make long-term profits, but there is no doubt that the investors are all doing it to make themselves profitable and thus increase their income level.

The global silver reserves have reached 530,000 tons, of which China's silver reserves are 41000 tons, accounting for about 8%. Among these 8%, the physical investment demand for silver in China accounts for approximately 27%. Silver, a globally recognized universal currency, is undoubtedly becoming increasingly important for Chinese investors in the rapidly developing economic market. In order to continuously improve the investment level of Chinese people in silver and understand the relationship between silver prices, CPI, and inflation rates, it has become a basic condition for investors to invest in silver. This study explores the linear relationship between silver prices and CPI and inflation rates, aiming to explore to what extent China's CPI and inflation rates can help Chinese investors invest in silver. Specifically, this study will explore the impact of Chinese silver prices on CPI and inflation rates.

2. Literature Review

Precious metals are a feasible financial asset for investment diversification and hedging against various market risks due to the rise in market volatility in recent years and unfavorable economic and non-economic causes. At first, it appeared that gold was the primary metal for investment diversification because of its inherent and steady worth, whereas other precious metals, including silver and palladium, were only considered basic inputs in the manufacturing process. Nonetheless, since the introduction of platinum and palladium exchange-traded funds in August 2010 and silver exchange-traded funds in April 2006, interest in these precious metals has increased dramatically, claim Bilgin et al. [1]. The significance of precious metals as investment assets was reaffirmed by Lau et al., who also noted a notable increase in the physical demand for precious metals as investment assets in recent years, such as silver and palladium [2]. Moreover, it can be deduced from Gogolin and Kearney as well as Lucey et al. that precious metals have become actively traded securities as a result of the growing financialization of commodities markets [3, 4]. The significant importance of precious metals indicates their potential hedging potential in addressing inflation and other economic risks. Although according to Adekoya, Oliyide, and Tahir, silver and gold exhibit strong hedging capabilities when hedging against inflation risks [5]. However, Bampinas and Panagiotidis

suggest that in the long run, the hedging ability of US gold is stronger than that of the UK, but the hedging role of silver in the US is not significant [6]. Meanwhile, Bilgin et al. also pointed out that silver cannot be effectively used as a hedging tool [1].

From the above evidence, it can be seen that current research is mainly focused on developed countries, with only a few mathematicians studying developing countries. Research on the relationship between silver prices and CPI is especially scarce in China. According to Liu and Ma's research, China's inflation is influenced by the exchange rate between China and the United States and is experiencing significant fluctuations [7]. Meanwhile, Chen and Yang pointed out in their study that the price of iron ore also has a specific impact on inflation, and China should make good use of the price of iron ore to reduce inflationary pressure [8]. Based on this situation, this article focuses on the impact of silver prices on the Consumer Price Index, providing some suggestions for investors to improve their risk-hedging ability further and achieve profitability goals.

3. Methodology

3.1 Sample

This article selects data on the Consumer Price Index (CPI) from January 2013 to December 2023, sourced from China's National Bureau of Statistics (NBSC). The annual CPI data reflects the inflation trend over time, as shown in Table 1, the Consumer Price Index (CPI).

Table 1. China's CPI

Years	CPI
2013	594.8
2014	606.7
2015	615.2
2016	627.5
2017	637.5
2018	650.9
2019	669.8
2020	686.5
2021	692.7
2022	706.6
2023	708

The silver price data was collected from the Shanghai Gold Exchange, covering the average price of silver from January 2013 to December 2023. The daily closing price calculates the monthly average price (see Table 2).

Table 2. China's Silver price

Years	Silver Price(RMB/G)
2013	4.05618
2014	3.395
2015	3.25727
2016	3.968
2017	3.878
2018	3.5395
2019	4.128
2020	4.9895
2021	4.7465
2022	4.571

2023	5.876

The gold price data from January 2013 to December 2023 comes from the Shanghai Gold Exchange as well. Similar to the price of silver, the daily closing price is used to calculate the monthly average price (see Table 3).

Table 3. China's Gold price

Years	Gold Price(RMB/G)
2013	237.77
2014	239.73
2015	224.69
2016	262.49
2017	273.63
2018	284.15
2019	341.34
2020	391.38
2021	371.62
2022	408.48
2023	478.75

3.2 Method

Choose data regression equation analysis as the analysis method. The following are the reasons for selecting this analysis.

According to Nunko and Ramkisson, regression equation analysis is simple to use, yields clear results, and can model independent and dependent variables and control variables [9]. At the same time, Ahn pointed out that regression model analysis can improve established conclusions based on a large amount of evidence and data, and the results obtained have strong objectivity [10].

In order to analyze the relationship between CPI, silver prices, and gold prices, this paper adopts a time series regression model. The specific form of the model is presented in Equation (1).

$$Y_t = \alpha + \beta_1 X_{1t} + \beta_2 X_{2t} + \epsilon_t \quad (1)$$

Where Y_t represents the dependent variable at time, which is CPI. X_{1t} denotes the independent variable representing the silver price at time. X_{2t} representing the control variable of the gold price at that time. α is the intercept term. β_1 and β_2 are the coefficients for the silver and gold prices, respectively. ϵ_t is the error term assumed to be normally distributed with a mean of zero and constant variance.

4. Analysis and discussion

This study aims to explore the relationship between Chinese silver prices and the Consumer Price Index (CPI). For this purpose, a regression analysis was conducted using the least squares method, with a focus on the impact of Chinese silver prices on CPI, whether there is a positive relationship, and whether future silver price fluctuations can be used as predictive information to guide people in avoiding the risks brought by inflation.

4.1 Analysis

Using the least squares method, the impact of silver prices on CPI and gold prices as a control variable on CPI can be determined, as shown in Table 4.

Table 4. The impact of silver prices on the consumer price index

Dependent Variable: CPI			
Method: Least Squares			
Date: 07/31/24 Time: 14:29			
Sample: 2013 2023			
Included observations: 11			

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	550.031	19.61433	28.04231	0.0000
SILVER_PRICE	-29.6903	10.33971	-2.87149	0.0208
GOLD_PRICE	0.71816	0.095709	7.503602	0.0001
R-squared	0.954282	Mean dependent var		654.2
Adjusted R-squared	0.942852	SD dependent var		40.88689
SE of regression	9.774242	Akaike info criterion		7.624379
Sum squared resid	764.2864	Schwarz criterion		7.732896
Log likelihood	-38.9341	Hannan-Quinn criter.		7.555974
F-statistic	83.49275	Durbin-Watson stat		1.348662
Prob(F-statistic)	0.000004			

According to Table 4, the specific form of the model is presented in Equation (2).

$$CPI_t = 550.031 - 29.6903 SilverPrice_t + 0.71816 GoldPrice_t \quad (2)$$

From the parameter estimation results, it can be seen that R-squared represents the goodness of fit, which is about 0.954. The closer the R-squared is to 1, the stronger the model's explanatory power; the closer it is to 0, the weaker the model's explanatory power. It can be seen that the model fits well. The F-statistic is used to test whether all independent variables in a regression model collectively have a significant impact on the dependent variable. According to the model, the F-statistic is 83.49, indicating that the independent variables significantly impact the dependent variable. Durbin Watson's stat represents the d statistic, which is used to detect autocorrelation in regression residual sequences. A small d statistic means a small accompanying probability, and the influence of the explanatory variable on the dependent variable is statistically significant. According to the regression model, the d statistic is 1.35. Therefore, the impact of silver and gold prices on the consumer price index is significant.

The parameters in the model indicate that for every 1 RMB increase in silver prices, China's CPI decreases by 29.69 units, and for every 1 RMB increase in gold prices, CPI increases by 0.72 units. It can be concluded that the impact of silver prices on CPI is negative, and the CPI index does not increase with the increase in silver prices. People cannot predict inflation and avoid inflationary pressures based on silver prices. On the other hand, the price of gold is positively correlated with CPI, and this impact is very significant. People can use the price of gold to predict inflation and hedge risks.

4.2 Discussion

Firstly, literature evidence was searched, and it was found that precious metals such as silver and palladium are increasingly important financial instruments for hedging against inflation today. For some African countries, silver prices can help investors avoid the risks brought by inflation, thereby increasing their returns during periods of inflation. At the same time, in research reports from developed countries, the role of silver shows the opposite trend, as silver cannot be used as a hedging tool during periods of inflation.

In order to investigate this topic further in practice, namely whether silver prices in China positively impact CPI, a least squares regression analysis was conducted. The introduction of its process, result limitations, and data analysis occupy the chapters of methodology, analysis, and discussion. The most important finding of regression analysis is that the price of silver in China does not show a positive correlation with CPI. If the price of silver rises, the CPI index will gradually decrease. This reflects that during periods of inflation, Chinese investors cannot purchase large amounts of silver for hedging purposes. However, the relationship between gold prices and CPI is exactly the opposite of silver prices. The rise in gold prices will drive up the CPI index, indicating that gold can help investors hedge against inflation. This result is mainly consistent with the literature analysis, which suggests that in economically developed countries or regions, silver prices do not have a significant guiding effect on inflation rates.

Based on the above information, the conclusion can be drawn that by analyzing the data of China in the past decade, it is found that the guiding role of silver prices in CPI is not significant, and it does not have the function of predicting inflation and hedging risks during inflation periods. On the contrary, as a traditional financial instrument, precious metals such as gold have stronger practical guidance significance. Because the price of gold positively correlates with CPI, investors can predict the period of inflation based on the price of gold. During periods of

inflation, investors can purchase gold to make a profit, as gold is scarce and widely recognized worldwide. On the contrary, during inflation, if investors have a large amount of silver, they should sell it as soon as possible because the special nature of silver prices can cause a significant drop in price during inflation, resulting in losses for investors. If silver prices rise significantly after experiencing inflation, it can also reflect that the country has already experienced inflation and the economy is recovering. At this time, investors can buy in large quantities to buy low and sell high in the future.

5. Conclusion

In today's world, the ability of precious metals as financial instruments to hedge risks is becoming increasingly important. In addition to gold, the ability of other emerging precious metals, such as silver and palladium, to hedge risks is becoming increasingly prominent. In the research of some scholars, it has been proven that silver, as an emerging precious metal, can hedge risks and effectively avoid inflation in Africa and some developing countries. In order to clarify whether silver can effectively hedge against inflation risks in China, this article explores the relationship between silver prices and the consumer price index.

This article selects data on China's consumer price index from 2013 to 2023 and data on China's silver and gold prices from 2013 to 2023 as samples. A least squares regression model was constructed with silver price as the independent variable, consumer price index as the dependent variable, and gold price as the control variable.

According to the regression model, this study explores how silver prices affect the Consumer Price Index in China. Resolving this issue is crucial as it provides insights into how silver prices cannot effectively serve as a hedging tool during inflationary periods and cannot predict inflation.

This study has contributed to hedging against inflation risks. Firstly, based on the construction of a regression model, the relationship between silver prices, gold prices, and the consumer price index was explored by combining them. Secondly, the findings of this exploration provide new insights for Chinese investors to avoid risks during periods of inflation. In addition, this study has demonstrated that silver does not have the same value preservation function as gold and cannot be used as a financial tool to hedge against inflation risks. This significantly impacts the protection of investors' assets during periods of inflation.

The study's limitations are constantly exposed with the continuous deepening of research. In this study, only data from the past decade was selected for data collection due to technological limitations and statistical data access. Therefore, the regression equation cannot obtain more accurate data, but fortunately, this error is relatively small and will not cause any bias in the results.

In addition, this study lacks preliminary research work. Although this article has found some references to support this topic, there are still not enough references to prove it. Due to the long history of most references, it is currently inconvenient to refer to them. Fortunately, the selected references are very close to the current time, which does not affect the accuracy of this article.

References

[1] Bilgin M. H, Gogolin F, Lau MCK, Vigne, SA. Time-variation in the relationship between white precious metals and inflation: a cross-country analysis. Journal of International Financial Markets, Institutions and Money, 2018, 56(SEP): 55-70.

[2] A, Marco Chi Keung Lau, et al. Return spillovers between white precious metal etfs: the role of oil, gold, and global equity. International Review of Financial Analysis, 2017, 52, 316-332.

[3] Gogolin Fabian and F Kearney. Does speculation impact what factors determine oil futures prices? Economics Letters, 2016, 144(Jul), 119-122.

[4] A, Brian M. Lucey, S. S. S. B and S. A. V. A. C. Gold and inflation(s) – a time-varying relationship. Economic Modelling, 2017, 67, 88-101.

[5] Adekoya, Oluwasegun Babatunde, J. A. Oliyide and H. Tahir. What do we know about the inflation-hedging property of precious metals in Africa? the case of leading producers of the commodities. Resources Policy, 2021, 72(4), 102120.

[6] Georgios, Bampinas, Theodore and Panagiotidis. Are gold and silver a hedge against inflation? a two-century perspective. International Review of Financial Analysis, 2015.

[7] Liu, Tie Ying, J. T. Ma and R. Frensch. Exchange rate and inflation between China and the United States: A bootstrap rolling-window approach, 2024.

[8] Chen, Yufeng and S. Yang. Time-varying effect of international iron ore price on China's inflation: a complete price chain with TVP-SVAR-SV model. Resources Policy, 2021, 73.

[9] Nunkoo, Robin and H. Ramkissoon. Structural equation modelling and regression analysis in tourism research. Current Issues in Tourism, 2012, 15(8), 777-802.

[10] Ahn, J. Beyond single equation regression analysis: path analysis and multistage regression analysis. American Journal of Pharmaceutical Education, 2002, 66(1), 37-42.