Platinum As an Effective Inflation Hedge?

Yanran Wang*

Jinan University – University of Birmingham Joint Institute, Jinan University, Guangzhou, 510000, China

*Corresponding author: wangyanran2019054434@stu2019.jnu.edu.cn

Keywords: Platinum, Hedge, Expected inflation, unexpected inflation, Actual inflation.

Abstract: Inflation has always been an investors' major concern. Increased financialization of financial markets has gradually changed platinum into an investment asset. Platinum, sharing similar characteristics with gold, could be a good inflation hedge too. Motivated by a lack of detailed research, this study investigates the hedging efficiency of platinum against actual, expected, and unexpected inflation by regression analysis using monthly data. Platinum is examined both as an individual asset and in a well-diversified portfolio selected by the mean-variance approach. The study reveals the inadequacy of the hedging ability of platinum against actual and unexpected inflation. Furthermore, there is not enough evidence to conclude that platinum improves the portfolio's effectiveness in inflation hedging.

1. Introduction

A rational investor seeks to maximize returns while minimizing risk. According to Fisher, inflation, however, has been found to obstruct this goal. During the late 1970s, inflation was ranked as the top severe problem in the United States by public opinion polls [1]. Theoretical reasons suggest that inflation could potentially lower returns on investment assets and even affect the purchasing power as well as the standard of living of investors [2]. One major purpose of holding portfolios for average investors is hedging inflation.

Based on the goal of hedging inflation, assets could be divided into different groups. Inflation hedges are assets that can prevent investors' property from devaluation, i.e., inflation hedging assets increase in value as inflation increases. While there are a variety of financial instruments that not only fail to prevent the average investors from loss caused by inflation but also serve as perverse hedges, depreciating while inflation rises. Except for those two kinds mentioned above, some assets are not significantly correlated with inflation.

Fama and Schwert as well as Bodie have explored that common stock is rather a perverse hedging instrument than an inflation hedge [3,4]. Commodity and commodity futures can serve as an efficient hedge against inflation [5,6]. However, not all kinds of futures can act as inflation hedges. According to the research done by Herbst in 1985, hedging the Consumer Price Index changes with portfolios consisting of a small number of futures would be not viable [7]. Although traditionally viewed as a good inflation hedge, gold is not efficient in all places and at all times. The short-term hedging efficiency of gold itself is affected by other factors, such as the gold lease rate as well as the convenience yield [8]. Also, the rigidity between gold prices and the Consumer Price Index can affect the long-run inflation hedging efficiency of gold [9]. Accordingly, gold demand can be segmented into two parts. One is "use demand", in other words, gold would be directly used in the manufacture of jewelry, electrical components, etc. The other is what is called "asset demand", i.e., this precious metal is employed as a good investment by portfolio managers, individual investors, and even governments [8].

White precious metals, including Platinum, Palladium, and sliver, have slowly evolved from ordinary industrial inputs to investment assets as a consequence of the increased financialization of financial markets recently. Since white noble metals are regarded as commodities that have use demand, based on the definition of inflation, their prices rise in lockstep with the prices of all other regular assets. On the other hand, if they are considered as international currencies, their price would

rise since investors tend to drive down their cash holding to invest in precious metals during inflation. As investable assets, white noble metals can be an alternative to gold, and possibly a more efficient inflation hedge than gold. Recent research showed that platinum is a more effective long-run hedge compared to gold [10].

Nevertheless, few articles delved into the relationship between platinum prices and unexpected inflation rates. Given the significance of the results and the large range of prospective investors, the lack of research on platinum's inflation-hedging efficiency against unexpected inflation is astonishing. Therefore, this paper aims to explore the inflation-hedging efficiency of platinum as an individual asset and as a portion of mean-variance efficient portfolios against actual inflation, expected inflation as well as unexpected inflation by doing regression analysis. The hedging efficiency can be analysed better by separating inflation into two components.

The next section will discuss the data and method as well as develop the model applied to examine the hedging effectiveness. The third part of this paper will present and discuss the results. The fourth section includes a summary and a reference list.

2. Method

The nominal interest rate is made up of a proper equilibrium real interest rate as well as an expected inflation premium, according to Fisher [1]. The nominal return rate on an asset in an efficient market includes the best estimate of expected inflation in the future. In the research conducted by Fama and Schwert, treasury bills were assumed to be perfectly liquid and the T-bill rates were employed as an approximation for the predicted rate of inflation, and thus, the unexpected inflation rates were measured to be the difference between actual inflation rates and T-bill rates, calculated ex-post [3].

There is no agreement on the most accurate method for estimating inflation expectations. Both survey-based and regression-deduced results can be taken as good indicators of expected inflation rates. The advantages of both methods have been thoroughly explored in research conducted by Menil and Bhalla, Calson and Parkin, and Markiw et al. [11, 12, 13]. After assessing the advantages and disadvantages, in this research, the yield on one-month Treasury bills, supplied by Federal Reserve economic data, is applied as a measurement of anticipated inflation.

Actual inflation is calculated using the official Consumer Price Index released by the U.S. Bureau of Labor Statistics. Unexpected inflation is then defined as the difference between the above two inflation rates. The most common platinum price, London Metal Exchange US Dollar morning price of platinum per troy ounce is used. In terms of risk reduction, other than including only platinum in their portfolios, most rational investors tend to invest only a proportion of their wealth in platinum. To examine the efficiency of platinum in mixed-asset portfolios, the mean-variance approach is applied to find the tangency portfolio, namely the optimal portfolio with the highest possible Sharpe ratio. S&P 500 and Russell 2000 are applied to represent common stocks and small stocks respectively. 10-year treasury bonds and gold prices are also used. Due to data availability, the study employs monthly data of the period between October 2001 and December 2021.

Assuming that short selling is not allowed, two efficient portfolios consisting of various assets are created through the mean-variance approach. By calculating and comparing Sharpe ratios, efficient portfolios are obtained. Portfolio 1 includes government bonds, common stocks, small stocks, gold, and one-month Treasury bills. While portfolio 2 consists of all the five assets in portfolio 1 as well as platinum.

The monthly prices of each asset are used to calculate the monthly returns respectively. The return r_t is calculated as the logarithmic difference of the monthly price P_t:

$$r_t = \ln(P_t) - \ln(P_{t-1}) \tag{1}$$

To compensate for autoregressive disturbances, regression equations are constructed using the Cochran-Orcutt method to examine the impact of actual, predicted, and unanticipated inflation on

asset returns. The following equations are computed for each of the three forms of inflation and each of the assets:

For actual inflation:

$$RA_{jt} = a_0 + b_1 * CPI_t + e_t \quad (2)$$

For expected inflation:

$$RA_{jt} = a_0 + b_2 * OMTB_t + e_t \quad (3)$$

For unexpected inflation:

$$RA_{jt} = a_0 + b_3 * (CPI_t - OMTB_t) + e_t \quad (4)$$

where:

RA_{jt} is the nominal return of asset j from time t - 1 to time t,

CPI_t is the actual inflation rate calculated from the Consumer Price Index at time t, and

$OMTB_t$ is the anticipated inflation rate estimated by the one-month Treasury bill rate during the period from time t – 1 to time t.

The efficiency of hedging differs depending on the type of inflation. Using t-test to test the significance, the following definitions apply, as implied by equations (2) through (4):

• An asset is classified as the complete positive inflation-hedging instrument on the condition that its beta coefficient is positive and not significantly distinct from positive one.

• An asset is categorized as the complete negative inflation-hedging instrument on the condition that it has a slope coefficient that is negative and is not significantly distinct from negative one.

• An asset is considered to be a partial positive inflation-hedging tool if the slope is positive and significantly different from positive one and zero.

• An asset is partial negative on the condition that its slope coefficient is less than zero and significantly differs from negative one as well as zero.

• An asset is of indeterminant type on the condition that the slope is not statistically different from zero.

A 95% confidence interval is applied to examine what kind of hedge a particular investment instrument is.

3. Results and Discussion

Table 1 shows the mean returns and standard deviations of monthly return rates for the assets, as well as the three kinds of inflation rates during the period from October 2001 to December 2021.

As shown in Table 1, all assets listed have positive return rates except for long-term government bond, which is represented by 10-year treasury bonds. It is worth noting that long-term government bond provides the highest standard deviation compared with other assets examined. As standard deviation is widely recognized as the best measurement of variability, it is strange that treasury bond was more volatile than common stocks and small stocks, the two types of assets that are believed by the public to be most risky. Future research could be based on this finding and unveil the reasons behind this strange phenomenon.

The mean return on platinum is exactly 0.3 percent per month in this time frame, and it is outperformed by all assets except for that on the long-term government bond. Also, it presents the second largest standard deviation, indicating that it is risky to have only platinum in the portfolio. This should not be surprising because platinum is an undiversified individual asset, while common stocks and small stocks are represented by stock indexes composed of a large number of stocks.

The market's estimate of inflation for the entire period is not so accurate because only fifty-five percent of the mean actual inflation rate could be explained by the anticipated inflation rate. The numerical value of the percentage is calculated by dividing the mean return of expected inflation into that of actual inflation. All asset returns fall short of inflation.

Table 1. Mean Returns and Standard Deviations of Monthly Nominal Return Rates: October 2001-December 2021

	Mean Return (%)	Standard Deviation (%)
Long-Term Government Bond	-0.48	10.33
Common Stocks	0.59	4.30
Small Stocks	0.64	5.77
Gold	0.77	3.71
Platinum	0.30	5.80
Actual Inflation	2.14	1.37
Expected Inflation	1.17	1.45
Unexpected Inflation	0.97	1.61

The hedging efficiency against actual inflation is exhibited in Table 2. As presented in the last column of Table 2, the examined assets provide different types of inflation hedges. Long-term government bond has such a large standard error that its hedging ability is indeterminant. As for the other four assets, they all have negative beta coefficients that are significantly different from zero as well as negative one, and as a result, they are categorized as the partial negative hedge type. The negative beta coefficients indicate that if these four assets were to be included in portfolios hedging against inflation, short-selling is required. On average, a one-percent increase in actual inflation is correlated with a 0.957 percent decrease in platinum. It is noticeable that platinum provides the largest R square, but the numerical value is too small to conclude that actual inflation is a good explanation for Platinum price changes, indicating that there is little relationship between platinum prices and actual inflation.

Table 2. Hedging Efficiency against Actual Inflation: October 2001-December 2021

Asset Type	Constant	Beta Coefficient	Standard Error	R Square	Type of Hedge
G-Bond	1.350	-0.844	0.485	0.012	Indeterminant
Common Stocks	1.683	-0.494	0.199	0.025	Partial Negative
Small Stocks	2.136	-0.669	0.265	0.026	Partial Negative
Gold	1.099	-0.159	0.175	0.003	Partial Negative
Platinum	2.345	-0.957	0.267	0.051	Partial Negative

Table 3 examines the hedging efficiency against anticipated inflation. Compared with the results in Table 2, Table 3 contains two more positive hedges. Gold and platinum are partial positive hedges against expected inflation. For Platinum, on average, a one-percent rise in anticipated inflation is related to a 0.313 percent rise in the price of platinum. The R square of platinum in Table 3 is even smaller than that in Table 2, indicating that the proportion of changes in platinum prices explained by actual inflation is much larger than that of expected inflation.

Table 3. Hedging Efficiency against Expected Inflation: October 2001-December 2021

Asset Type	Constant	Beta Coefficient	Standard Error	R Square	Type of Hedge
G-Bond	-0.049	-0.349	0.460	0.002	Indeterminant
Common Stocks	0.863	-0.202	0.189	0.005	Partial Negative
Small Stocks	0.992	-0.245	0.253	0.004	Partial Negative
Gold	0.357	0.344	0.164	0.018	Partial Positive
Platinum	-0.068	0.313	0.258	0.006	Partial Positive

As shown in Table 4, types of hedging against unexpected inflation are the same as those against actual inflation. All assets except for the government bond are partial negative hedges. As for

platinum, on average, a one-percent increase in unexpected inflation is related to a 0.943 decrease in platinum price. Also, the R square of platinum in Table 4 is the highest from Table 2 to Table 4. The numerical value is 0.068, indicating that less than 7 percent of the variability of platinum prices could be explained by the changes in unexpected inflation. From the standpoint of possible hedging, this R square must still be considered too low.

Table 4. Hedging Efficiency against Unexpected Inflation: October 2001-December 2021

Asset Type	Constant	Beta Coefficient	Standard Error	R Square	Type of Hedge
G-Bond	-0.141	-0.326	0.413	0.003	Indeterminant
Common Stocks	0.813	-0.192	0.170	0.005	Partial Negative
Small Stocks	0.980	-0.284	0.227	0.006	Partial Negative
Gold	1.140	-0.392	0.147	0.029	Partial Negative
Platinum	1.211	-0.943	0.224	0.068	Partial Negative

In terms of risk reduction, other than including only platinum in their portfolios, most rational investors tend to invest only a proportion of their wealth in platinum. Two efficient portfolios consisting of various assets are created through the mean-variance approach. By calculating and comparing Sharpe ratios, the efficient portfolios, as defined in the previous section, are obtained. The proportions of the two portfolios are exhibited in Table 5.

Table 5. The asset ratios of a portfolio 1 & 2

	Common Stocks (%)	Small Stocks (%)	Gold (%)	G-Bonds (%)	T-Bills (%)	Platinum (%)
Portfolio 1	1.31	2.40	1.33	1.27	93.69	--
Portfolio 2	7.76	1.95	0.60	1.17	85.11	3.42

The two portfolios found are regressed against actual, anticipated, and unanticipated inflation rates respectively. And the regression results are shown in Table 6, Table 7, and Table 8. Neither of the two portfolios has significant protection against actual and expected inflation. They are both partial positive hedges against unexpected inflation. The R squares of the two portfolios regressed against unexpected inflation are larger than those against the other two kinds of inflation. However, it is still too small to conclude that an explanatory relationship exists. Since the hedging type of the two portfolios is the same and the R squares are about the same, the information is not enough to judge whether including platinum can improve hedging ability or not.

Table 6. Hedging Efficiency against Actual Inflation: October 2001-December 2021

Asset Type	Constant	Beta Coefficient	Standard Error	R Square	Type of Hedge
Portfolio 1	-4.907	13.326	9.979	0.007	Indeterminant
Portfolio 2	-4.278	12.043	9.066	0.007	Indeterminant

Table 7. Hedging Efficiency against Expected Inflation: October 2001-December 2021

Asset Type	Constant	Beta Coefficient	Standard Error	R Square	Type of Hedge
Portfolio 1	39.567	-13.638	9.415	0.007	Indeterminant
Portfolio 2	35.993	-12.393	8.553	0.009	Indeterminant

Table 8. Hedging Efficiency against Unexpected Inflation: October 2001-December 2021

Asset Type	Constant	Beta Coefficient	Standard Error	R Square	Type of Hedge
Portfolio 1	3.609	20.633	8.399	0.024	Partial Positive
Portfolio 2	3.364	18.701	7.630	0.024	Partial Positive

4. Conclusion

This study examines the inflation hedge ability of platinum against actual, expected, and unexpected inflation by regression analysis. In particular, platinum is tested both as a single asset and as a part of a diversified mean-variance efficient portfolio. The results show that for the chosen period,

platinum provides some protection against expected inflation, while can hedge a small proportion of the other two kinds of inflation by short selling. Including platinum into portfolios cannot improve the inflation resistance ability significantly. The outcome prompts a rethink of the relationship between platinum and inflation. The above results are limited by the chosen time. Future research could be done using different or longer time intervals. Annual data could be applied to test the long-term hedging efficiency of platinum.

References

[1] I. Fisher, The Theory of Interest, New York: MacMillan, 1930.

[2] E. F. Fama, M. R. Gibbons, Inflation, real returns and capital investment, Journal of Monetary Economics, Vol. 9, no. 3, 1982, pp. 297 - 323. DOI: https: //doi.org/10.1016/0304 - 3932 (82) 90021 - 6.

[3] E. F. Fama, G. W. Schwert, Asset returns and inflation, Journal of Financial Economics, vol. 5, no. 2, 1977, pp. 115 – 146, DOI: https: //doi.org/10.1016/0304 - 405X (77) 90014 - 9.

[4] Z. Bodie, Common stocks as a hedge against inflation, The Journal of Finance, vol. 31, no. 2, 1976, pp. 459 – 470. DOI: https://doi.org/10.1111/j.1540-6261.1976.tb01899.x.

[5] A. Zaremba, Z. Umar, M. Mikutowski, Inflation hedging with commodities: A wavelet analysis of seven centuries worth of data. Economics Letters, vol. 181, 2019, pp. 90–94. DOI: https://doi.org/10.1016/j.econlet.2019.05.002.

[6] Z. Bodie, Commodity futures as a hedge against inflation, The Journal of Portfolio Management, vol. 9, no. 3, 1983, pp. 12 – 17. DOI: https://doi.org/10.3905/jpm.9.3.12.

[7] A. F. Herbst, Hedging against Price Index Inflation with Futures Contracts, Journal of Futures Markets, vol. 5, no. 4, 1985, pp. 489 – 504. DOI: https://doi.org/10.1002/fut.3990050401.

[8] D. Ghosh, E.J. Levin, P. Mac millan, R.E. Wright, Gold as an inflation hedge? Studies in Economics and Finance, vol. 22, 2004, pp. 1–25. DOI: https://doi.org/10.1108/eb043380.

[9] K.-M. Wang, Y.-M. Lee, T.-B. N. Thi, Time and place where gold acts as an inflation hedge: An application of long-run and short-run threshold model, Economic Modelling, vol. 28, no. 3, 2011, pp. 806–819. DOI: https://doi.org/10.1016/j.econmod.2010.10.008.

[10] M. H. Bilgin, F. Gogolin, M. C. K. Lau, S. A. Vigne, Time-variation in the relationship between white precious metals and inflation: A cross-country analysis, Journal of International Financial Markets, Institutions and Money, vol. 56, 2018, pp. 55-70. DOI: https://doi.org/10.1016/j.intfin.2018.03.001.

[11] G. de Menil, S. S. Bhalla, Direct Measurement of Popular Price Expectations, The American Economic Review, vol. 65, no. 1, 1975, pp. 169 - 180. DOI: https://www.jstor.org/stable/1806405.

[12] J. A. Carlson, M. Parkin, Inflation Expectations. Economica, vol. 42, no. 166, 1975, pp. 123 – 138. DOI: https: //doi.org/10.2307/2553588.

[13] N. G. Mankiw, R. Reis, J. Wolfers, Disagreement about Inflation Expectations, NBER Macroeconomics Annual, vol. 18, 2003, pp. 209 – 248. DOI: https://doi.org/10.1086/ma.18.3585256.