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The Dichotomous Nature of Silver in the 21st Century

Keywords: commodity market; gold; inflation; silver

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Abstract

Theoretical background: Silver has a great importance in the real economy, i.e. in photography, medicine, electrical, electronic and chemical industry. The growing importance of renewable energy sources and the development of solar panels, accumulators and batteries means that the role of silver is significantly strengthened. At the same time, it is also used as an investment asset providing variety in portfolios, on numerous occasions being a cheaper substitute for gold. Researchers are studying connections between those two resources and providing different perspectives on their future based on real economy and the financial market.

Purpose of the article: The purpose of this article is to assess the current role of silver in the economy and answer the question of its investment prospective.

Research methods: The research methods include elements of descriptive statistics and Pearson's linear correlation between the prices of silver, gold and copper of the EUR/USD exchange rate and the Dollar Index. The research period is from 2000 to 2023. The analyzed data are daily. A measure of the amount of money in circulation in the United States is the M2 index, which includes cash in circulation and deposits. The inflation will be shown by the Consumer Price Index. The research method is also critical analysis of the subject literature.

Main findings: We found that the change in the price of silver is strongly dependent on the USD, and specifically on its supply. A significant increase in the price of silver in the analysed period is related to the ongoing process of quantitative easing and financialization, understood as a growing volume of futures contracts. The occurrence of silver and copper in nature makes them dependent on each other, not only in determining prices, but also currently constitutes a barometer of industrial development. Thanks to the growing demand from industry, shortages of silver can result in serious consequences for production, for which reason they may decide to aggressively improve metal recycling efficiency or hoarding supply, which might push prices further up. However, investment use will not disappear due to its anti-inflation characteristics and may cause an increase in demand among investors who see gold as too expensive.

Introduction

The development of the world economy is strongly dependent on the commodity market. The key precious metals are gold and silver. The presence of gold in the global market is important from the point of view of macroeconomics (gold reserves), monetary systems or jewelry. Silver, on the other hand, is a strong substitute for gold along with a strong utility for the real economy (industry, electronics). The relationship between the prices of both raw materials is an important measure of the prices of goods and services in the era of global quantitative easing. The significance of the relationship between gold and silver prices (gold/silver ratio) will be critically analyzed in the context of its current usefulness in the economy. An increase in the money supply distorts the relation between values and prices. The role of silver in the 21st century is changing significantly. Showing changes in the use of silver along with the forecast and role for the international economy is the main goal of the work.

The analysis covers the period 2000–2023. Financial indicators such as money supply, inflation or exchange rate will refer to the world's largest economy – the United States. A significant research gap in silver research is the assessment of the

impact of the USD price in the context of the quotation of the price of this commodity. The relationship between the price of the dollar, silver, gold, copper, M2 money supply and the level of inflation in the US seems to be an important starting point for the study.

The historical increase in the supply of silver occurred after geographical discoveries in the 15th century. The opening of large silver mines in Bolivia, Mexico and Peru has led to an increase in global production (de Souza et al., 2013). The use of silver in finance has its origins in antiquity. This is due to the properties it had. Silver was a rare metal found on all continents, thanks to which it became recognizable and accepted by various civilizations in all places of the world. Resistance to weather conditions enabled long-term storage without loss of value (Mansfield, 2002). Thanks to its relatively high hardness and considerable plasticity, it allowed divisibility into smaller units. Due to its properties, it was difficult to forge, as well as practical in the conditions of the time. Also, an important feature of the silver and gold market is time-limited supply (Mamcarz, 2017). All these features made silver, along with gold, a metal used in monetary applications. This is confirmed by finds of coins from Ancient Greece (Athenian "Owls") (Flament & Marchetti, 2004), gold-silver alloy coins in Lydia (Hart, 1966) and silver denarii from Rome (Thomsen, 1959). It also played an important role during geographical discoveries, where the Spanish silver fleet, which mainly transported the mined and looted metal from the colonies, supplied its budget in this way. Silver also became the basis for the exchange of goods between colonial and Asian countries (Flynn & Giráldez, 2002). The end of the role of silver in monetary policy is the 19th century. The largest commodity exchanges on which silver is traded are SHFE and Comex. A list of all exchanges on which silver is traded is presented in Table 1.

Table 1. The largest commodity exchanges in terms of silver trading in 2022

Exchange name	Turnover (millions of ounces)
LBMA (Great Britain)	93,741
SHFE (China)	91,037
CME (USA)	85,383
SGE T+D (China)	5,872
MCX (India)	4,347
CME Micro (USA)	2,000

Source: (World Silver Survey, 2023).

Trading on the listed exchanges includes futures contracts, spot trades or deferred contracts. It is possible to gain exposure to silver in the financial markets by investing in futures and forward contracts, ETF[1] (Exchange Traded Fund) and CFD[2]

[1] ETF is a fund designed to faithfully reproduce the underlying instrument.
[2] CFDs are futures derivatives that give a leveraged position on the underlying asset.

(Contract For Difference). Exposure to physical silver can be obtained by investing in bars (100 g, 250 g, 500 g, 1,000 g), bullion coins (¼, ½, 1 ounce). The most popular bullion coins are Vienna Philharmonic (Austria), Britannia (Great Britain), Eagle (USA), Maple Leaf (Canada), Kangaroo (Australia) (Orishev et al., 2021).

Silver losses from industrial sources to the environment amount to 2,500 tons per year (Purcell & Peters, 1998). This means that in the 1970s, about 36% of the silver supply used was lost. In 2011, recovered silver accounted for approximately 33% of the total supply (Grandell & Thorenz, 2014). Due to applications such as medicine, batteries, soldering materials, which lead to fragmentation and make it difficult to recycle silver that has already been used, the limited supply is a huge challenge for the industry. The raw material is lost at many stages of production, e.g. in fumes during refining, dissolving in water during purification, or also filings during processing. After market launch, the next exit channels are progressive wear and tear and subsequent disposal of manufactured components. However, regardless of the effectiveness of recycling for specific product groups, most of which have little impact on the demand for this metal, it is worth paying attention to the main share of electronic waste. They are extremely rich in them, they constitute a high share in the overall percentage of commodity consumption, and there are ways to smelt silver cheaply. The progressive increase in the production of electronic components requires the industry to achieve better percentage recovery results, now recycling is very inefficient, the general rate is 30–50%, while specifically for electronics it is only 10–15% (Graedel et al., 2011).

Table 2. Silver recycling by branch, length (years)

Sector-specific EOL recycling rates				Jewelry, coins
Vehicles	Electronics	Industrial application	Others	
0–5	10–15	40–60	40–60	90–00

Source: Authors' own study based on (Graedel et al., 2011).

The price of silver was one of the main factors in the profitability of solar panel production and determines the final price in the markets. This consumption is fixed at about 10 g per m². There are also types of cells that have a lower silver consumption, such as dye solar cells with (1 g/m²), however, have lower energy efficiency. The orientation of developed economies to renewable energy and greater independence from the supply of energy raw materials may multiply the consumption of silver for panels (in 2011 it is 2.2% of the silver market) and thus increase the supply deficit of the raw material (Grandell & Thorenz, 2014). The forward-looking view of Solar Power Europe also results in the dynamic growth of the entire industry, both currently (for 2021 it is 19%) and in the future (for the next four years, the expected average growth is about 18%). In this case, sealing the recovery process will become even more important.

Stepping into the future, more and more areas of life are covered by the use of silver. In terms of the intensification of sustainable development and care for the environment, the role of silver (and thus the price) and its connection with the real economy should grow. Silver nanowires are important in the electro-reduction of carbon dioxide (Conte et al., 2023). Discovered new ways of using silver have a positive impact on the market of this raw material, making it more and more interesting. Discovering further uses of silver in other fields such as biology as with the application of nanoparticles against plant pathogens transmitted by leaves and soil (Malandrakis et al., 2019). The important role of silver is also noticeable in bactericidal terms (Alavi & Hamblin, 2023). In the context of renewable energy development, silver will gain interest in the production of photovoltaic panels (Lee et al., 2023).

Literature review

Ciner (2001) emphasizes that after 1990, gold and silver should be treated as two separate markets that do not provide similar security and are not significantly correlated with each other. Pierdzioch et al. (2015) believe that this relationship exists, but its strength fluctuates in the analyzed period. It is indicated that there are moments when the said relationship almost completely disappears. Price predictability is therefore only partial and does not occur at the levels of past historical periods. A similar opinion is shared by Baur and Tran (2014), who noticed a high correlation in periods of crises and bubbles in the capital markets, which may lead to a long-term relationship. However, when these time frames are omitted from the research, the metal dependence largely disappears and is left to chance. It was also noted that the strength of the relationship was significantly weakened in the 1990s. On the other hand, Arendas (2016), based on a comparative analysis of investment strategies, where the signals of buy, sell and long positions in investments are determined by the gold/silver ratio, states that the longer the research period, the more advantageous is the strategy of paying attention to the signals generated by the indicator, while in the short term, it is better to ignore these signals. Based on the analysis of the literature, it can be concluded that the authors' opinions are very divided regarding the presence and strength of the correlation between gold and silver. According to economists such as Ciner, such a relationship actually existed, but it disappeared in the 1990s.

Precious metals such as silver and gold act as a safe haven not only for investors investing their funds on the commodity market but also for global shares of companies from the environmental, social and management sectors, i.e. in the ESG area (Lei et al., 2023). This is an important feature from the point of view of risk redistribution in the context of numerous crises and recessions.

Adrangi et al. (2003) examine the behavior of silver and gold during inflationary pressures and different levels of economic growth. Their research shows that the price of silver is more flexible and adapts faster to the current economic situation

than the price of gold, due to its direct application in industry. Ciner (2001) verifies the relationship between gold and silver in the capital market. In the research, he concludes that in the 1990s silver broke the long-term price trend with gold and thus became closer to industrial metals.

Lucey and Tulley (2006) analyze the relationship between silver and gold exchange rates in the years 1978–2002 and the degree of change in the strength of this relationship. Their research shows that in the long term the behavior of both metals is similar, but the characteristics of many shorter periods indicate a different nature of silver, related to a different purpose of its use in industry. Grandell and Thorenz (2014) calculate the supply needed to meet the demand for silver from the solar panel industry due to the high growth rate of this product branch. They also review the use and sources of the metal and how it can be expanded. It is also distinguished by the fact at which deposits silver is a by-product. It is mainly lead and zinc, copper and gold.

Hillier et al. (2006) point to the potential hedging and diversifying properties of silver, gold, and platinum. They occur due to the inverse correlation of returns on metals with returns on indices, but mainly during periods of excessive activity in the capital markets. Their research also shows that the greatest returns can occur with hybrid wallets with a small share of precious metals.

Dibooglu et al. (2022) verify the hedging capacity of gold, silver and the USD and the relationship between the stability of the economic condition and their returns. This stability is heralded by lower returns, while abnormally high returns indicate a crisis or economic panic. Their research confirms this hypothesis, while noting that silver has a much larger standard deviation of price than other assets studied. Hillier et al. (2006) see silver as an asset useful in diversifying an investment portfolio. In times of market uncertainty, it can serve as a portfolio stabilizer. From a risk management point of view, they can be used as a substitute for derivatives. Apergis and Apergis showed in their research how important silver is in the industry. On the example of the photovoltaic panel market, they showed the impact of industry demand on silver prices. However, the rising price of the metal may cause the search for an alternative, but currently technologies not based on silver have a shorter lifespan and so the efficiency of such a panel is much lower (Apergis & Apergis, 2019).

Silver in the form of nanoparticles is used in medicine, food, textile, cosmetic and construction industries, thanks to its antiseptic properties. In the case of the pharmaceutical industry, silver nanoparticles are used, among others, in dressings, various types of hygiene preparations and as coatings for implants (Pulit-Prociak & Banach, 2016). The growing number of silver studies has a positive impact on the market. Silver nanoparticles, due to their unique physical, chemical, and biological properties, are very popular among people around the world. The increase in demand for nanoparticles, in turn, requires the need for a thorough analysis of the impact on human health (Sousa et al., 2022). Also important are the messages that illustrate the pejorative impact of the analyzed raw material (nanoparticles) on humans and animals. One example is the toxicity test of silver nanoparticles. The

authors investigated the preparation of a colloidal suspension of nanoparticles in the context of human and animal health. This, of course, does not negate the issue of the antimicrobial silver nanoparticles (Duran et al., 2019).

Over the centuries, gold and silver prices in the real economy have been characterized by similar price movements due to mutual substitution in monetary (Bürger, 1995) and investment applications. In ancient history, silver dominated the content of the means of exchange, within alloys with standardized proportions with other metals such as gold or copper. The first well-documented marginalization of this standard in modern times was the reforms in Britain, part of which was the establishment of the exchange of gold for silver by Newton (Fay, 1935), followed by the complete suspension of these standards begun in Great Britain through the Coinage Act of 1816 (Redish, 1990) and in the United States through the Coinage Act of 1873 (Friedman, 1990). The silver standard continued to move away from a global monetary policy based on bullion. The final blow was the suspension of the dollar's convertibility into gold by US central banks in 1971 (Irwin, 2012), ending the Bretton Woods System. Despite these factors, seeking to replace silver with gold in the monetary policy of many countries, silver maintained a constant price relationship with the other metal (Watson, 1967). Their interconnectedness in finance has been referred to as gold/silver ratio. The basic factor that caused such a stable similarity was the limited supply of raw material on the markets in pre-colonial times. In the countries of medieval Europe, this dependence remained at the level of 10–18:1, and price speculation related to metal flows to more developed countries was offset over time by the market (Watson, 1967). This is very close to the actual ratio of raw materials in the Earth's crust, defined at about 19:1, gold 0.004 mg/kg and silver 0.075 mg/kg (Haynes et al., 2016). A direct consequence was also standardization introduced by state institutions, which set their own exchange rates between metals, most often in the form of 16:1 (Bürger, 1995).

Most literature researchers confirm that in recent years this indicator has become more volatile and less reliable in the context of predicting further market movements. This may lead to the conclusion that the markets for these metals perform other functions and also have different characteristics due to the change in their use in the real economy, but they still conservatively belong to the common group of raw materials, precious metals.

Research methods

The authors adopted the following research hypothesis:

H1: Silver has significant investment potential, comparable to gold.

Furthermore, the article contains three research questions:

RQ1: Is the price of silver dependent on financial factors of the United States economy (EUR/USD exchange rate, USD index, inflation, money supply)?

RQ2: Is the gold/silver ratio currently an effective commodity market indicator?
RQ3: Is the silver market dependent on the global economic situation, i.e. industry?

We analyze three commodities, an exchange rate and financial index. The analysis of the silver market in the context of gold provides important conclusions in the area of the substitutability of raw materials and the use of gold in both jewelry and finance (as global reserves and a safe haven in times of recession and crises). Copper analysis will draw attention to a raw material that occurs in nature inextricably with silver and is an important indicator of industrial development). The study of the relationship between the EUR/USD rate and the Dollar Index may seem similar, but it is both about showing the price of the dollar and its strength in the second case. The quotation of silver in USD will be shown in the examined exchange rate (USD price expressed in euro) and the purchasing power of the dollar in relation to other international currencies: euro (EUR), Japanese yen (JPY), pound sterling (GBP), Canadian dollar (CAD), Swedish krona (SEK), Swiss franc (CHF) will be presented in the Dollar Index. Showing the price of silver in relation to changes in the dollar supply and inflation trends will show the real price of the raw material on the market. Aggregate M2 illustrates the increase in the total actual amount of cash in circulation that could cause increases in nominal prices of products, including silver and its costs for businesses. The study uses a narrow definition, omitting funds accumulated in funds, because they are not the direct cause of the increase in the absolute circulation of currency in the economy. Inflation and real prices of silver on the other hand illustrate the effectiveness of the hedge used to protect purchasing power of the investment funds. This approach to the study will allow us to distinguish the increase in silver prices dictated by market factors from the decline in the purchasing power parity of the USD.

To answer the research questions, it is worth analyzing and interpreting the linear correlation between silver, gold, copper, the EUR/USD rate and the Dollar Index. The analysis of the linear relationship will indicate whether there are relationships between silver and financial indicators (dollar exchange rate, Dollar Index) and key commodities (gold and copper). Gold is an important substitute showing the trends of the financial market and geopolitics, while copper is a raw material illustrating the mood in the economy, mainly in industry. To prove whether the determined correlation coefficient is statistically significant, it is necessary to formulate an alternative and null hypothesis meaning that there is no correlation between the parameters.

$H0: \rho = 0$

$H1: \rho \neq 0$

The significance of the linear correlation coefficients was expressed as:[3]

[3] The critical value was calculated for the $1–0.5\alpha$ quantile and n-2 degrees of freedom using Student's t tables.

$$t = \frac{r\sqrt{n-2}}{\sqrt{1-r^2}}$$

where:

r – the value of the Pearson's linear correlation coefficient calculated on the basis of the sample,

n – total number of observations.

The adopted significance level ($\alpha = 0.05$) is the most frequently chosen in econometric studies (Brooks, 2019).

Table 3. The level of linear relationship between the examined assets in the years 2000–2023

	Gold	Silver	EUR/USD	Dollar Index	Copper
Gold	1				
Silver	0.8775* [0.0231]	1			
EUR/USD	0.2044* [0.0026]	0.439171* [0.0061]	1		
Dollar Index	-0.2065* [0.2065]	-0.4670* [-0.0068]	-0.9803* [-0.0088]	1	
Copper	0.8160* [0.0178]	0.8502* [0.0205]	0.5248* [0.5249]	-0.5082* [0.0052]	1

*statistically significant values at the adopted level of p = 0.05; the critical values are given in square brackets.

Source: Authors' own study based on Refinitiv Eikon data.

All obtained results are statistically significant according to the levels presented. To supplement and enhance our research, we also perform technical analysis of gold/silver ratio chart and M2 to silver price chart and silver to silver discounted by CPI inflation.

Results

The research results suggest a strong positive correlation between studied metals, especially between gold and silver and gold and copper. This may signify that there are vital factors influencing simultaneously the prices of all of them. Based on our research and other literature it may contain both financial and economic aspects such as that both silver and gold are common as an investment commodity and a protection against inflation. There is also the fact that both copper and silver are mined together within ore deposits which influences supply of them. The other silver correlations are moderately strong, silver and EUR/USD being positively correlated, silver and Dollar Index being negatively correlated. Silver and its futures are commonly indexed using USD, so the strengthening of the USD might be turning away investors from other regions, especially eurozone from investing in silver to other assets priced in

local currencies. It may also be a sign of the effect of silver price on the industries, which use it in production. There also exists a similar correlation in gold, but to a much smaller degree, therefore suggesting the problem of exchange rate is less significant for gold investors. Inversely, copper displays a stronger correlation than silver, this may highlight its industrial use. Summarizing, silver exhibits common qualities with gold, being strongly correlated with other metals, but also showing a stronger inverse correlation with the USD, being halfway between gold and copper.

The significant interdependence of silver and copper gives an opportunity to increase the importance of silver, and thus its price, in the development of the global industry. This is vital information from the point of view of the state of the world economy, i.e. the development of India and China.

Adding to that, relating our findings to gold/silver ratio from the previous centuries, as we entered the 21st century, irreversible changes in monetary policy took place, which meant that we no longer have to deal with the gold/silver ratio at such levels as in the 19th and 20th centuries. However, it can be noticed some repeatability in the channels (Figure 1) in which this ratio moves and the value of the 80:1 level for trends, which is both the level of support and resistance.

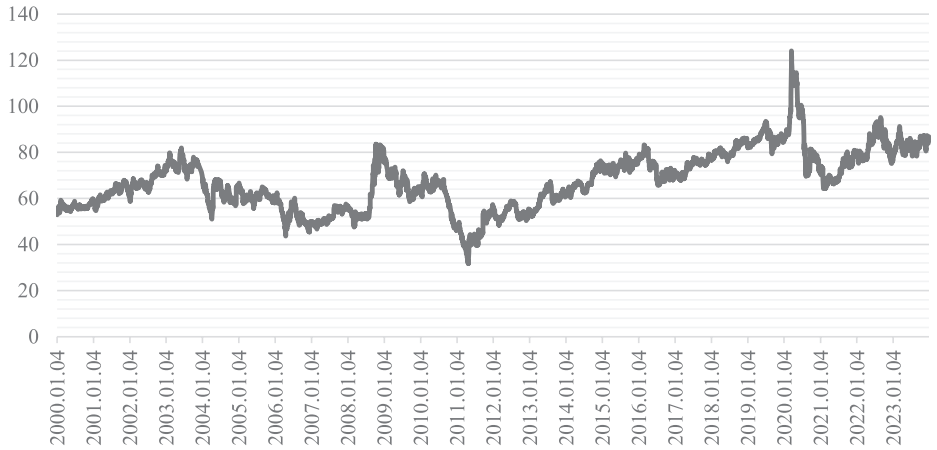

Figure 1. Price relation between gold and silver (gold/silver ratio) in the period 2000–2023

Source: Authors' own study based on Refinitiv Eikon data.

Due to some of the events, such as the eurozone crisis and the coronavirus pandemic, there were deviations from these levels, but then over time there was a regression to the average, which caused a return to this range. Due to these premises, despite the fact it can be predicted that the relation of silver to gold in current times is not constant in the short term, especially during extraordinary events, it still finds a long-term correlation in periods of calm.

In the case of silver market analysis, another indicator that may be important in determining the impact of external and non-market factors on its price is the money supply as measured by aggregate M2 (cash in circulation and deposits) in the United States (Figure 2).

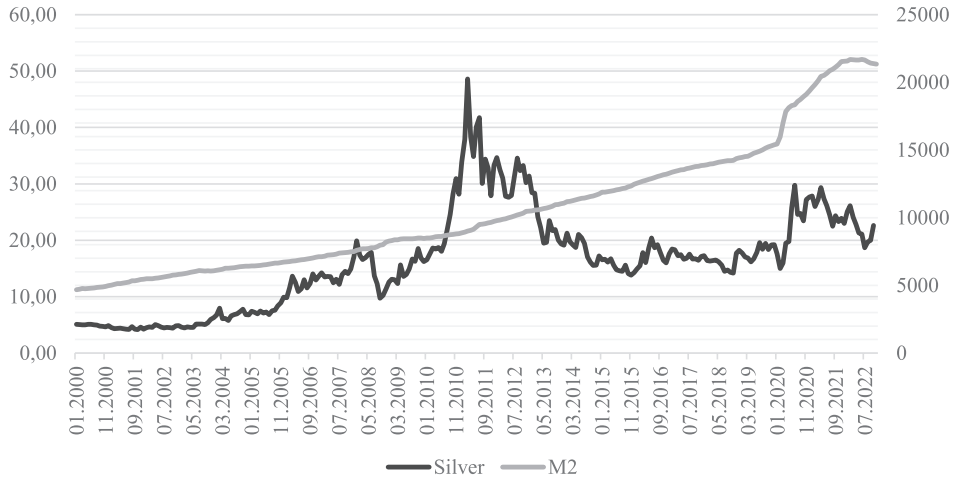

Figure 2. Silver price and USD supply measured by M2

Source: Authors' own study based on Federal Reserve Board.

The reaction of silver to the growth of money during the period under review is quite ambivalent. The only concrete stimulus whose impact on both instruments can be visually seen is quantitative easing as a consequence of the pandemic crisis in 2020. This situation was certainly influenced by significant silver appreciation pressure in 2011. High speculation on the commodity market pushed the price of silver above the level of 40 USD. The growing amplitude of prices on the silver market is related to the increasing volume of futures transactions on global stock exchanges and the ongoing process of financialization of the commodity market (Złoty, 2021). Moreover, the financial sector (understood as the money supply in the economy) is an increasing determinant of silver prices. Comparing the beginning and end of the period under review, an analogous increase in silver prices and the supply of the USD is clearly visible (445% increase in the price of silver and 446% increase in the money supply).

Figure 3 shows the nominal price of silver including inflation. It is difficult to directly refer to the effectiveness of silver's inflation hedge in the period under review because much depends on the adopted horizon in which it will be kept.

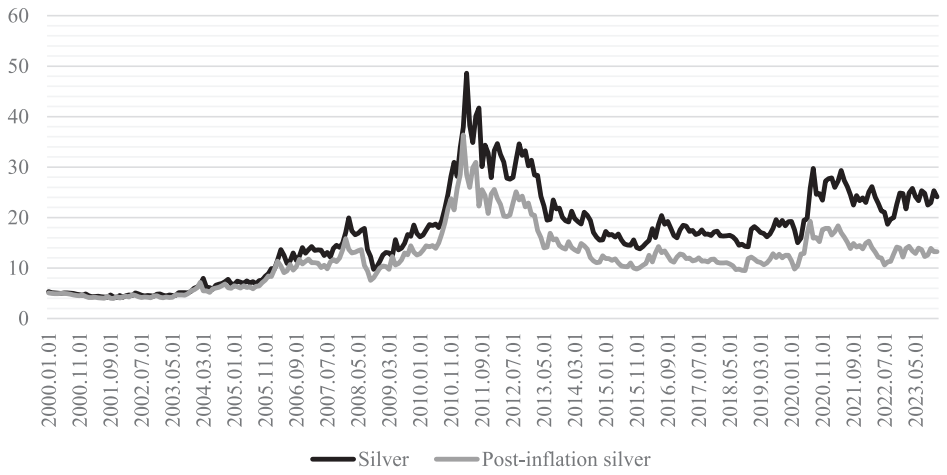

Figure 3. Spot silver price comparison due to CPI inflation in the United States

Source: Authors' own study based on Refinitiv Eikon data.

There were situations where both nominally and in real terms the spot price of silver lost so much (in the period 2011–2019) that even the 9-year horizon was not able to ensure that the value was maintained. The most harmful periods for investors in this case were the periods 2011–2015 and the second half of 2008.

However, looking at the overall trend during the research period, you can see an upward trend, even relative to the real value of silver. This may indicate that by analyzing the degree to which silver protects the investor against inflation, it can be optimally measured in a similar way as in gold – by examining a sufficiently wide time period.

Discussions

Relating our findings to other authors, we conclude that Ciner's (2001) conclusions that silver and gold are not significantly correlated and that silver does not provide similar protection against inflation should now be updated as it is true that the correlation is currently weaker than before, but still significant.

One factor that could justify this theory is the different uses of both metals in a modern economy in which silver is an industrial metal and investment gold. This coincides with the actual, current use of silver, in 2020 bullion bars and coins are intended for only 14% of the metal's supply, and 63% are exclusively industrial processes, where silver is not their final product (Refinitiv Eikon, n.d.). Despite this, these precious metals are still seen among individual investors as one of the few reliable ways to hedge against inflation. Treating gold frequently as an escape from the turmoil of crises makes it reasonable to examine silver how it behaves during a recession (Plakandaras & Ji, 2022). The appreciation of the price of these raw ma-

terials during the COVID-19 pandemic seems to confirm the validity of the direction of this research (Drake, 2022). Regardless of short-term price movements, they are supposed to retain their value in the long term, as well as be inversely correlated with inflation. However, this is expected to occur due to the tendency of investors to buy metals during market uncertainty with inflationary trends, generating positive returns on investments from a sudden increase in demand (Adrangi et al., 2003). It is not a question of assessing the value of the dollar itself, but a general assessment of fiat money, which will change depending on the public's belief in its value. This rebound will be rather one-sided (gold/silver ratio shows the value of the dollar and not vice versa). However, the dollar can be considered representative of all currencies and counting according to CPI inflation one dollar now, it was worth 59 cents in 2000 (a decrease in value of 41%), compared to the change in the gold/silver ratio from 54:1 to 80:1 (an increase of 48%).

Conclusions

The main research hypothesis was positively verified. Silver has great investment potential, similar to gold. The high correlation of silver and gold indicates comparable changes in prices of these commodities in the analyzed period. Both metals are substitutes. Gold, apart from jewelry, is widely used in the monetary policy of countries in the context of reserves, while silver is characterized by growing interest from industry (medicine, batteries or photovoltaic panels), which makes this metal similar to gold but not the same investment asset, which is important in terms of risk diversification.

The role of silver in the economy is changing significantly. It is not only a substitute for gold, but also plays an important role in industry and electronics. The price of silver is strongly dependent on many factors. The Federal Reserve System's quantitative easing policy is of great importance, as it directly affects the price of the USD, which is the index currency of this metal. The growing use of silver in many industries is becoming increasingly vital. The process intensifying the amplitude of fluctuations and driving the significant increase in the price of silver is the process of financialization of the commodity market, understood as the growing volume of futures contracts on global exchanges, and significant speculations taking place on the futures market. Due to the increasing demand from industry, silver shortages can have serious consequences for production, which may cause prices to rise further. In this case, many companies, because of that may decide to aggressively improve metal recycling efficiency, which is done currently to a limited extent. Investment use seems to be a strong premise for many transactions due to the anti-inflationary properties of silver. This may be the reason for a further increase in demand among investors who choose silver as a leading investment instrument because they perceive gold as too expensive.

The significant relationship between silver and copper due to their common occurrence in nature gives silver a strong opportunity to increase demand. Copper, which is an indicator of industrial development, will evenly influence the price of silver, showing not only investment but also industrial potential, especially in areas of sustainable development owing to increasing importance of ESG factors. In the context of a strong relationship with gold, which should be treated as a strictly financial metal, silver makes a multi-faceted area of investment and real use in the economy, which is a key shock absorber both for recessions and prosperity in the international economy. Relating this to gold/silver ratio, that historically was staying at a near constant level, in the recent times the ratio was disturbed to higher levels minimizing the short-term relationship, especially in times of uncertainty, it still finds a long-term correlation in periods of calm. Our research also concludes that the correlation strength of silver with EUR/USD is halfway between gold and copper, signifying exchange rate and USD strength being a noteworthy factor in approximating investment and industrial use of the asset.

An undiscovered research field is the indication of common price determinants of silver and gold in the context of real use in industry. The confrontation of the demand for these metals on international commodity exchanges also seems to be a worthy area of future research in the context of diversification of investment portfolios containing both metals.

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