



MARKET TREND REPORT

IS THE GOLD:SILVER RATIO RELEVANT TODAY?

JULY 2026 | CONDUCTED BY: PRECIOUS METALS INSIGHTS

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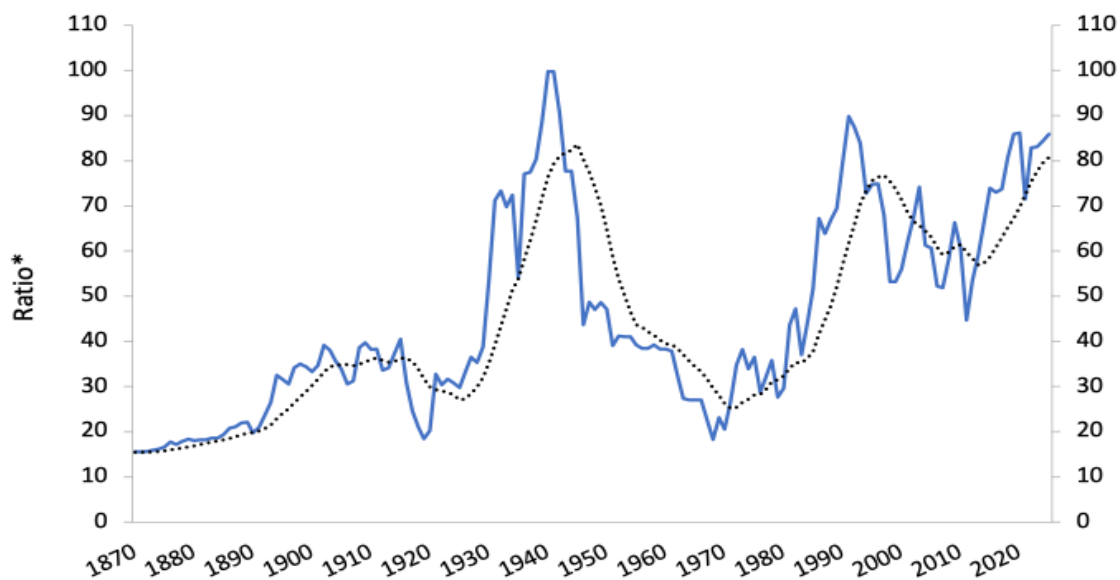
1. Introduction and Summary

“Although gold and silver are not by nature money, money is by nature gold and silver.”

This quote from Karl Marx’s *Das Kapital* sums up the intertwined history of these two precious metals. Gold and silver are “by nature” money. They are not just commodities that are produced and consumed, like wheat, oil or copper. Even under fiat currency regimes gold and silver remain monetary assets and societies have often fallen back on them when paper money systems have foundered. Consequently, fluctuations in the gold:silver ratio not only derive from changes in these metals’ supply and demand but also are a reflection of financial conditions and investor sentiment.

A historical review of the gold:silver ratio shows that from at least 3000 BCE through to well into the 19th century it was arguably the single most important financial indicator. The demise of formal bi-metallic or silver monetary standards in the 1871-1897 period (China being an exception) significantly reduced its profile. The ending of the Gold Standard and, later in 1971, its successor the Gold Exchange Standard, finally broke the official monetary link with precious metals. However, notwithstanding this formal demonetization, the private sector has never broken off its relationship with gold and silver. Moreover, in gold’s case, in spite of heavy net sales from 1989-2008, central banks have in the era of purely fiat currency maintained high gold holdings and, in aggregate, even added to bullion reserves, such that their market value currently exceeds that of central banks’ US Treasury holdings.

Gold:Silver Ratio 1870-2025



*Annual average and 10-year moving average from 1870 to 2025

Source: LBMA; Lawrence H. Officer & Samuel H. Williamson, *MeasuringWorth*, 2026; *Precious Metals Insights*

Besides the historical pedigree of these two precious metals as monetary assets, the relevance of the gold:silver ratio in the modern era can also be attested to by the strong correlation between their prices.

Indeed, as this report details, the correlation has grown and become more stable over the past 20 years, with a coefficient of 0.795 using daily log returns for gold and silver prices between January 2006 and May 2026. In addition, and most importantly, the gold:silver ratio is not a “random walk” but mean reverting – a Johansen Cointegration Test¹ on the data from January 1970 to May 2026 generated a long-run equilibrium for the ratio of 59.65. Periods of disequilibrium therefore indicate over- or undervaluation of gold or silver. Moreover, despite the massive inflation in the price scales for these precious metals over the past 56 years, the core gold:silver relationship is still bound to a central axis.

Section 3.1.2 of this report contains a detailed analysis of the drivers of changes in the gold:silver ratio. The most important of these are the ratio of gold:silver bullion stocks and the closely associated ratio of gold:silver investment demand. The gold:silver price ratio is positively correlated with these two ratios, e.g., a higher ratio of above-ground gold to silver bullion stocks is associated with a higher gold:silver ratio and vice versa. (Monetary demand for the precious metal trumps the conventional mechanics of higher inventories on prices in pure commodity markets.) Moreover, a rise (or fall) in the gold:silver bullion stocks ratio may not only reflect the relative strength of gold and silver investment demand but also the level of official sector demand (or supply), which, effectively, since the early 1970s, is of relevance only to gold.

A Vector Error Correction Model² showed that while the gold:silver relationship is anchored to a long-run equilibrium of 59.65, shorter-run changes in relative investment demand systematically drive the ratio into and out of disequilibrium. Statistical analysis shows that over the January 1980-May 2026 period the gold:silver ratio is positively correlated with gold investment demand and negatively correlated with silver investment demand. From 1980 to 2000, the connection is stronger with silver, which saw a huge swing from accumulation by investors to massive net dishoarding over that period. In contrast, from 2000 onwards, the statistical relationship is much closer with gold investment.

While there is a solid statistical link between the gold:silver ratio and the ratio of gold:silver fabrication demand as a percentage of total demand (a meaningful negative correlation) one can argue that it is of lesser significance. Firstly, from a purely mathematical perspective, within total demand, fabrication is simply a “residual” from the investment/bullion demand referred to above. Secondly, fabrication demand is usually more of a reactive than proactive component of supply/demand, particularly for silver, where its large industrial component makes it less price elastic in the short term than jewelry-dominated gold. While over the longer run, structural shifts in fabrication demand (or, for that matter, mine supply) have an impact on gold and silver prices and vice versa, the record shows that in the modern era, the more dominant influence almost always comes from the monetary side. This is enhanced by the fact that the silver market is smaller and less liquid than the gold market, meaning that inflows or outflows of capital from silver generally produce far greater short-term changes in the price with a corresponding impact on the gold:silver ratio.

Given the dominant monetary influence, it might be expected that there would be a strong correlation between the gold:silver ratio and economic indicators. Analysis of the data for January 1970 to May 2026 suggests otherwise. The paradox is largely explained by the proportional co-movement effect of two highly correlated precious metals that tend to move in the same direction in response to exogenous economic stimuli. It is only when there is either an opposite or especially pronounced reaction from either gold or silver that there could be a significant correlation with the triggering economic event. This helps explain why the regression analyses of the ratio against inflation and interest rates (nominal and real) generate no correlation not only over the full 56 years of data analyzed but also within shorter time frames.

Similarly, movements in the US Dollar index do not systematically dictate or explain changes in the gold:silver ratio over the 1970-2026 period as a whole. While both gold and silver prices individually have strong negative correlations with the US dollar, they generally moved in the same direction, meaning the gold:silver ratio remained largely independent of dollar movements most of the time. A partial exception exists for the January 2006-May 2026 period, where there is a significant but weak 0.12 correlation coefficient. The greater financialization of gold and silver over the last two decades may explain the emergence of this bond. It should be noted in this regard that 2006 saw the launch of the first silver ETF.

Finally, a common opinion is that silver's far more important industrial offtake and the growth of its share in total demand have had an impact on the gold:silver ratio. The evidence for this is limited. Regression analysis for the ratio against the monthly JP Morgan Global Manufacturing PMI for the period September 2013 to May 2026 generates only a weak negative correlation between the two, with only very limited explanatory power for movements in the gold:silver ratio. Besides this, incorporating the formerly massive photographic offtake into the "industrial" category reveals that its share of fabrication demand over 2018-2025 (when the ratio averaged just under 83:1) compared to 1990-2025 increased only modestly and actually fell in term of its share of total silver demand. Nevertheless, the perception that silver has become more of an industrial metal may well have at the margin affected investor sentiment and thereby the gold:silver ratio.

The conclusion of this report is that the gold:silver ratio is still relevant today. Gold and silver remain important global monetary assets even if they are marginalized under the prevailing currency system. Specifically, the ratio between them contains important information about the market valuation of gold and silver and their position relative to equilibrium in the modern era.

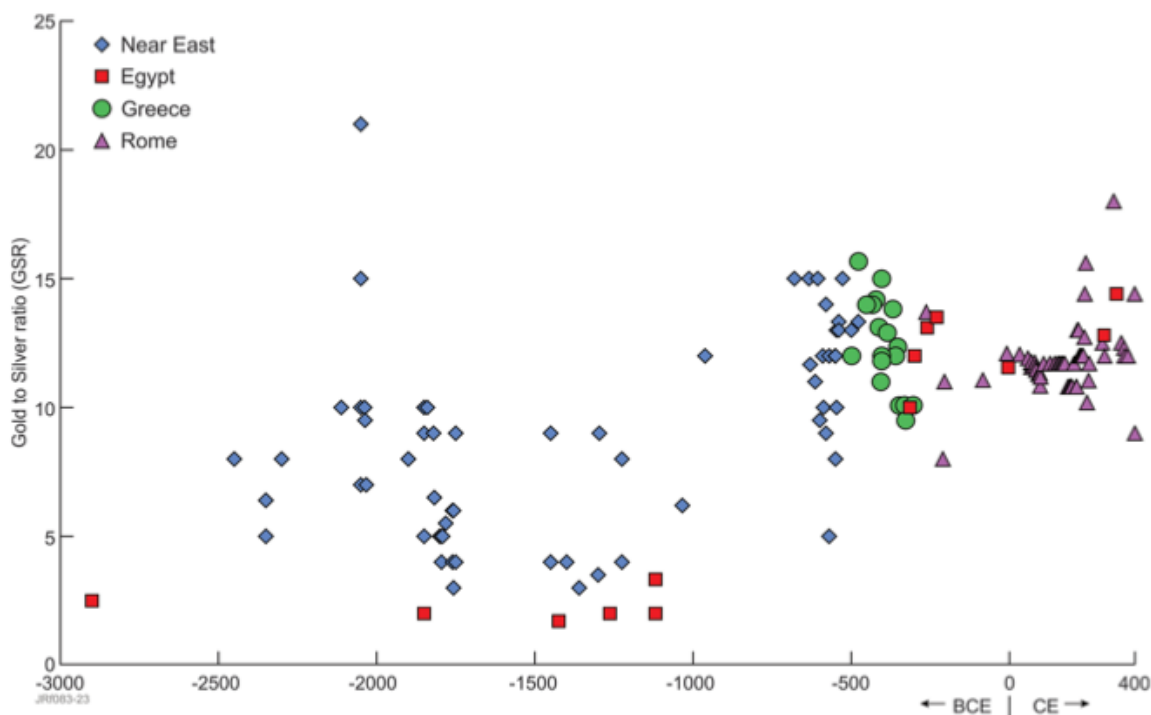
1. The Johansen Cointegration Test is a statistical procedure used to determine if two or more non-stationary time series share a stable, long-term relationship. It identifies whether multiple variables (like the prices of gold and silver) move together over time despite short-term fluctuations, preventing the issue of finding misleading or "spurious" correlations.
2. A Vector Error Correction Model (VECM) is a statistical model for variables that are cointegrated and estimates both the short-term dynamics between the variables and the exact speed at which they adjust back toward their long-term equilibrium following a temporary deviation. The model is widely used for pairs trading to predict how quickly a spread (like the gold:silver ratio) will mean-revert to its historical baseline.

2. Historical Review

The gold:silver ratio has been dubbed the “world’s oldest exchange rate.” While strictly speaking not the oldest form of money, these precious metals do have a unique historical pedigree as units of account, stores of value, and media of exchange. The earliest references to this special relationship between gold and silver date back nearly 5,000 years to ancient Egypt. Here, a relative abundance of gold, initially from the Eastern Desert and, especially, later the Nubian mines, coupled with a dearth of silver in the region, resulted in a gold:silver ratio of around 2.5:1, which prevailed over many centuries (see graph below). After roughly 1100 BCE, depletion of high-grade gold resources and Egypt losing control over Nubia resulted in a sharp increase in the Egyptian gold:silver ratio to 10-15:1.

Archaeological sources from Anatolia, Mesopotamia, and Persia indicate much higher gold:silver ratios between 2500-1100 BCE than in Egypt, ranging mostly from 3-10:1. By 3000 BCE, extraction using cupellation had been developed in Anatolia to separate silver from base metals. The spread of this technology in the ensuing centuries allowed numerous silver-rich lead deposits to be exploited across the Near East, Anatolia and, eventually, Greece. Consequently, silver established a key role as a “unit of account,” particularly in relation to the staple crop of barley in Mesopotamia, with a silver:barley ratio at the center of an early monetary system in the Fertile Crescent.

Gold:Silver Ratio 3000 BCE to 400 CE



Source: James Ross & Leigh Bettenay

The flow of precious metals between the Near East and Egypt as a result of trade or tribute had some impact on the gold:silver ratios of these regions. Those parts of the Near East that traded most

intensively with Egypt, such as the Levant, as a result tended to have lower ratios. Later, post-1100 BCE, the reduced availability of Nubian gold (referred to above) also led to the gold:silver ratio rising across the Near East.

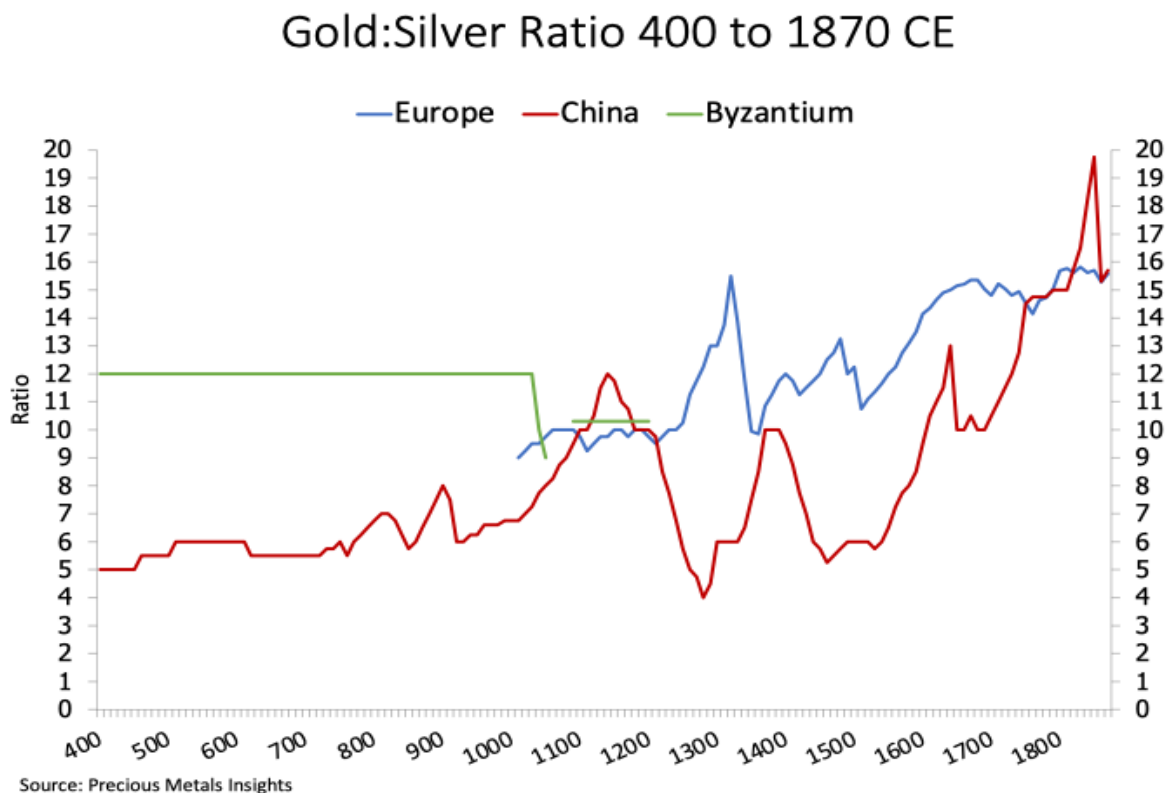
The next major shock to the gold:silver ratio occurred around 550 BCE. Until this time the purity of gold, unlike silver, was highly variable. Gold in its native state was usually naturally alloyed with silver (forming electrum) or copper. Gold's purity had to be estimated based on its malleability and, especially, colour. This "quality" issue had an important impact on the "reported" gold:silver ratio. The invention of salt cementation around 550 BCE by the Lydians enabled the separation of gold from silver and the production of high-purity gold. This improved the economic utility of gold and allowed it to become a far more widely used benchmark for value. Specifically, taking advantage of this development, the first coins to be minted in both gold and silver were issued under the reign of Croesus. From this point an increase in the gold:silver ratio occurred, typically into a 10-15:1 range. The discovery of a massive high-grade silver vein at the Athenian Laurion mines in 483 BCE and Alexander's huge minting of silver coins after capturing Persia's royal treasure in 331 BCE are also thought to have been factors in the relatively high gold:silver ratio in Greece, Anatolia and the Near East over the following centuries.

The shift higher in the gold:silver ratio in later antiquity is also visible from Roman records. In 333 BCE the Republic established a formal ratio of 10:1, based upon one gold Stater of 8.6g to twenty Drachmae, each of 4.3g. Julius Caesar in 46 BCE established a ratio of around 12:1 based upon one Aureus of a little over 8g being worth 25 Denarii, each of 3.9g. (Some sources quote a ratio of 11.5:1 based upon slightly different weights for the two coins concerned.) This gold:silver ratio remained the observable median through to 400 CE, although the historical record shows excursions both above and below this level due to fluctuating supplies of the precious metals and currency debasement.

In the early Medieval period, the Roman gold:silver ratio of 12:1 was broadly maintained in western Europe but eventually increased from this level in Byzantium and the Islamic polities to the east. In Byzantium the development of a gold based monetary system centred on the 4.45g gold Solidus coin, introduced by Constantine in 312 CE, with silver and, especially copper coins minted for more regular, daily transactions, saw effective gold:silver ratios fluctuating between 14.4:1 and 19:1. In 697 CE, the Umayyad caliphate established a rival currency, the gold Dinar, with a legal gold:silver ratio between it and the silver Dirham of 10:1, although the implicit precious metals value ratio at the inception of this new monetary system was actually 7:1. Over time the actual gold:silver ratios fluctuated and tended to increase as silver supplies became more abundant than gold ones.

In Medieval Europe gold:silver ratios were much of the time and in most parts of the region within a 12:1 to 14:1 range, with briefer episodes in certain jurisdictions above and below these levels. The structural shift in demand for gold coins with the introduction by Florence of the Florin in 1252 and the Venetian Ducat in 1284 coupled with a growth in trade saw the ratio climb to as high as 15:1 in Italy in the 1320s. A few decades later the ratio slumped across Europe in the wake of the 1346-1353 Black Death, which prompted a major liquidation of gold hoards and a collapse in trade financed with gold while labour rates, paid in silver, shot up due to the reduced workforce. This was a relatively short-lived period, however, as over the next century through to around 1480 hoarding by sovereigns coupled with a collapse in the supply of gold from local mines and imported from Africa drove the ratio back up to and then beyond 12:1. It then dropped back for a few decades as the 15th century shortage in Europe of gold and silver was initially resolved for gold by Portuguese seaborne imports of the metal from west Africa. However, a larger and much longer-lasting structural change to the gold:silver ratio in Europe came with the Spanish invasion of the Americas and, especially, the massive increase in silver supply following the discovery of the huge deposit at Potosi in 1545.

The peak of the production from what is known as the “Cerro Rico” was between 1580 and 1630, when Potosí produced 81% of the official silver of the viceroyalty of Peru and up to 60% of global production. In addition, Spain could count on growing output from its Mexican silver mines, such that even when production from Potosi began to decline, the absolute tonnage produced in Spanish America continued to climb through to a peak in the late 18th century. This wave of silver from the Americas had a dramatic effect on the gold:silver ratio, pushing it up from the median 11:1 that had typically ruled in Europe from the Roman era and again from at least 1000 to 1550 CE. During the first half of the 17th century, the ratio had consolidated around the 15:1 level, where it would stay until the beginning of the 19th century.



Why did this huge, sustained silver supply shock not drive the gold:silver ratio in Europe much higher? The answer largely lies with two major developments on the demand side for silver. First, after a period of acute shortage of precious metals to serve as currencies (to the end of the 15th century), the increased supply of silver coinage provided the means for an expansion in commerce and a far greater monetization of the economy. Hundreds of millions of Spanish “8 Reales” silver pieces were minted, with this coin becoming a de facto global currency for 250 years. Second, the growth in trade between Europe and Asia, especially China, created huge additional commercial demand for silver. Specifically, much of the expansion in trade with China was financed with silver. But, in addition, China offered easy profits for European merchants who could arbitrage the much lower gold:silver ratio that existed in China.

Due to its relative isolation from more silver-abundant parts of the world and limited international trade, China had long had far lower gold:silver ratios than those typical in Europe or the Near East. Records

show that the gold:silver ratio in China was close to 3:1 during the Han Dynasty (206 BC to 220 CE), at a time when in Rome it was around 11:1. And, for hundreds of years thereafter the ratio in China fluctuated between 5 to 7:1. While an expansion of silver production during the Song Dynasty (960 to 1279 CE) saw the ratio increase to over 10:1, during the succeeding Yuan Dynasty (1271-1368 CE) the occupation of Yunnan led to lower silver production and the ratio dropped back to below 5:1 at the end of the 13th century. The ratio briefly rose again under the early Ming Dynasty, which banned seaborne trade and the use of gold and silver for domestic commerce, at the same time aggressively enforcing the use of paper currency. The impact was that gold became relatively scarcer than silver and the gold:silver ratio increased. Excessive increases in the supply of paper currency eventually led to high inflation, and the Ming reversed course, opening the country to foreign trade and the use of silver again as a domestic currency. By the middle of the 15th century, the gold:silver ratio had fallen back to around 6:1, where it stayed for the next 100 years.

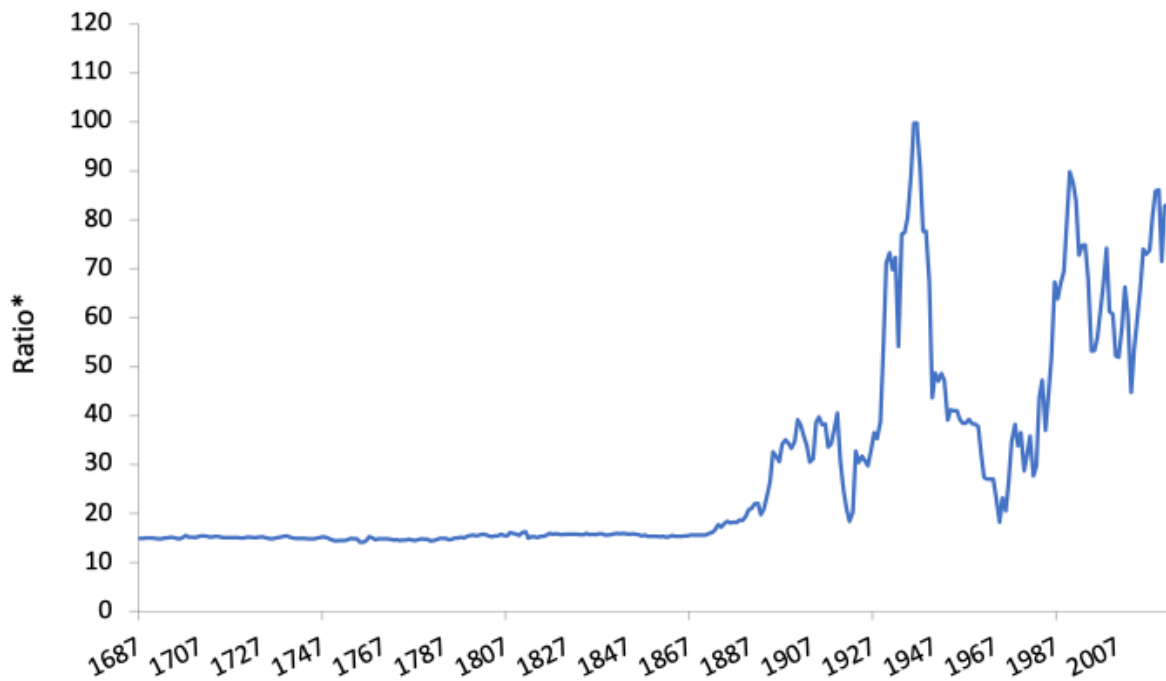
At this point, the additional supply of silver from the Americas began to impact the gold:silver ratio in China. Much of this silver was sent directly across the Pacific to the Philippines before being imported into China in exchange for gold, silk, and porcelain. The ratio in Europe was close to double that in China in the middle of the 16th century, offering a massive arbitrage opportunity. This gap closed only slowly due to the gold:silver ratio in Europe also rising because of the influx of silver from the Americas. Moreover, the Chinese government added fuel to the fire through the introduction of the “Single Whip Tax” in 1581, which mandated that all taxes be paid in the form of silver bullion. The structural shortage of silver in China caused by this shift in demand was exacerbated by supply-side developments in the 1630s and 1640s, including the impact of the ongoing war between Spain and the Netherlands and Japan radically curtailing its foreign trade, thereby reducing silver outflows. A sustained rise in the Chinese gold:silver ratio to converge with the prevailing European level of 15:1 occurred only nearly a century later, as foreign trade expanded and the country's silver supply became increasingly abundant. Indeed, the gold:silver ratio in China rose during the first half of the 19th century to 20:1 in spite of the substantial outflow of silver to pay for opium and war indemnities. This rise would seem counterintuitive, but the explanation is to be found in the huge increase in domestic gold hoarding that took place at a time of major political and economic upheaval in China, plus the indirect effect of the beginnings of the European transition from a silver to a gold monetary standard.

In Europe, from the mid-sixteenth century, a ratio of approximately 15:1 was in place until well into the 19th century. This value came to be enforced by laws in Britain (1717), France (1726 and 1785), and the United States (1792). The most important financial center during this era was the Netherlands, and the Bank of Amsterdam maintained a de facto gold:silver ratio of 14.65:1, providing an anchor for a bi-metallic monetary system in Europe. Although the French revolutionary wars ended this monetary era, in their aftermath, through to 1850 France supported a European silver/bi-metallic standard up until 1850 through the national Mint intervening in the precious metals markets to support a strict ratio of 15.5:1. A massive growth in gold supply stemming from the Californian (1848) and then Australian (1850) gold rushes ended this system but market forces kept the gold:silver ratio in Europe stable for another 20 years.

It was at this point that in 1871 the newly formed German Reich decided to shift from a silver to a gold monetary standard, using French war reparations (paid in gold) as a basis for this move. As Europe's pre-eminent economic power, Great Britain, had already been on the gold standard since 1821, this change by Germany decisively shifted the monetary balance in the region away from silver or bimetallism to gold. However, the gold:silver ratio initially did not rise dramatically, as other countries attempted to maintain silver-based monetary systems. It took the growth of South African gold production in the 1890s to force the remaining holdouts to adopt the Gold Standard. This paradox occurred because the increased supply of gold was readily absorbed by those central banks on the Gold Standard, with it

underpinning a growth in the (gold-backed) money supply and booming international trade. Austria-Hungary (1892), Russia (1897), and Japan (1897) all abandoned silver. By the end of the century, with the exception of China, all the major economies were on the Gold Standard and the gold:silver ratio had risen to an unprecedented 35:1.

Gold:Silver Ratio 1687-2025

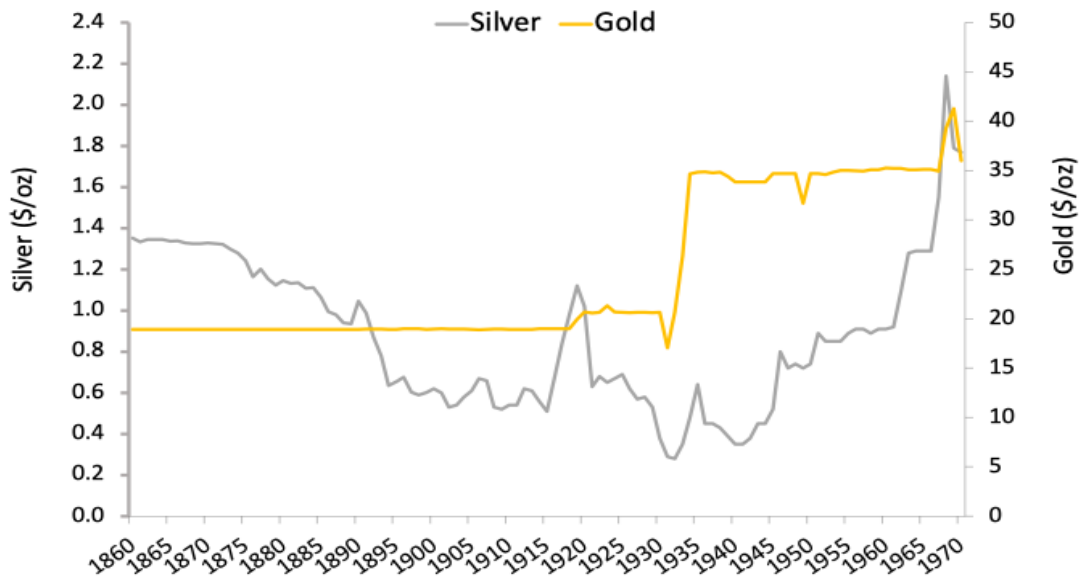


*Annual averages from 1687 to 2025

Source: MeasuringWorth; LBMA

During World War 1 the gold:silver ratio fell (by its end to 15:1) due to belligerents suspending gold convertibility and a shortage of silver in the face of higher demand for the white metal and reduced supply. Supply of silver at the time was constrained due to the impact of the Mexican civil war on mine production. Growth in demand was particularly driven by public hoarding of silver amid rising inflation and the British requirement to pay for Indian goods and services in silver rather than paper currency. The Mexican civil war ended in December 1920, and over the rest of the 1920s, the gold:silver ratio climbed back to its pre-war level as countries returned to the Gold Standard and financial conditions eventually normalized.

Gold and Silver Prices 1860-1970



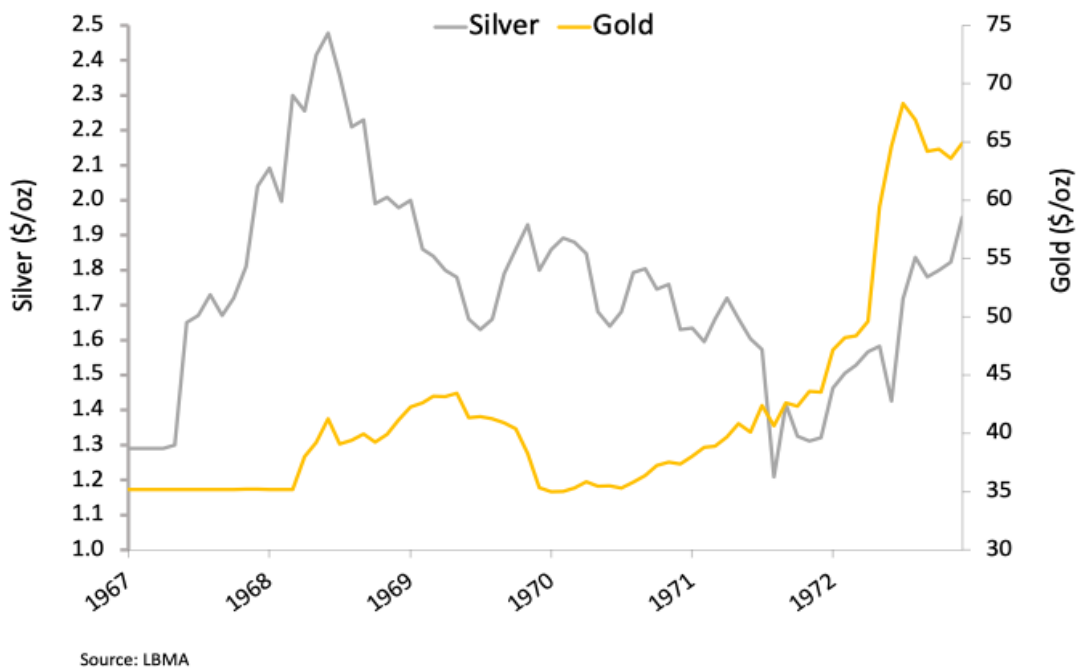
Source: LBMA; FRB St. Louis; Precious Metals Insights

The next series of shocks to the gold and silver markets saw the ratio soar from 38:1 in 1929 to a peak of 100:1 in 1940 and 1941. Initially, the shock came from the Great Depression and an associated collapse in silver industrial demand. Silver, which had averaged \$0.533 in 1929, fell to just \$0.282 in 1932. Then, in January 1934, the United States passed the Gold Reserve Act, which increased the official price of gold from \$20.67 to \$35.00. This was followed in June 1934 by the Silver Purchase Act, whereby the US pledged to purchase silver on the open market with the objective of having 25% of the value of its monetary reserves in silver. This policy initially pushed up the silver price and drove down the gold:silver ratio, it falling from 72:1 in 1934 to 54:1 in 1935. However, the second-order effect of this policy would be to accelerate the demonetization of silver, as existing holders of the metal cashed in at the higher prices and, especially, from the US sucking so much silver out of China that the country was forced off the Silver Standard in 1935. From 1935 to 1940, the silver price fell from an annual average of \$0.64 to \$0.35.

From its 1940-41 peak, over the following years, the gold:silver ratio was to decline dramatically. Increased industrial demand caused by the Second World War, coupled with an over 50% drop in silver mine production, created the conditions for a major fall in the gold:silver ratio, with the added stimulus to silver prices from the lifting of wartime price controls in the United States pushing it down further to an average of 44:1 in 1946. The first 15 years after WW2 saw the ratio settle at around the 40-mark during the 1950s. In contrast, from 1960's annual average of 38:1, a combination of rising silver prices and the fixed \$35.00/oz gold price resulted in the ratio dropping to a low of 18:1 in 1968. The stronger silver price in the 1960s was driven by a growing market deficit between modest growth in mine supply (through 1967) and rapidly rising fabrication demand (which more than doubled between 1960-65), the latter including the minting of substantial amounts of silver circulating coins. The annual average silver price jumped from \$0.91 in 1960 to \$1.29 in 1964. Importantly, \$1.29/oz was the level at which the US Treasury had established a price ceiling. Yet, notwithstanding huge sales from its silver stocks, it proved

impossible for the United States to maintain this price cap, and in 1967, the US Treasury abandoned its attempt to control the silver price. In the absence of intervention, the market price of silver soared, peaking at an annual average of \$2.14 in 1968 before ending the decade at \$1.79. Meanwhile, gold prices had been maintained at the \$35/oz level through to April 1968, when the post-war Gold Exchange Standard started to break down and a two-tier market was established. The free-market price increased, which, combined with silver dropping from its June peak, saw the gold:silver ratio climb through to the middle of 1969. While for that year as a whole the ratio averaged 22.9:1, by December 1969 it had fallen to 19.6 due to a slide in gold prices. And, the new decade started on a strong note for silver, with the ratio dropping to just 18.5 in February 1970, its lowest level since 1919.

Gold and Silver Prices January 1967 to December 1972



3. The Gold:Silver Ratio Since 1971

Over the past 55 years the gold:silver ratio has seen a daily low of 16.7:1 (on January 18, 1980) and a daily high of 125.7 (on March 18, 2020). The median ratio, basis monthly averages, between January 1971 and May 2026 has been 62.9:1. However, this average tells us little about the trends in the ratio over more than five decades. A closer inspection of the data, together with the application of statistical tools, reveals several distinct periods in the evolution of the gold:silver ratio over the period under review. These can be summarized as follows:

- 1971-1993: A tendency for the ratio to increase from a very low level after the gold price is freed from the official price of \$35/oz, punctuated by a temporary fall when the Hunt Brothers attempt to corner the silver market in 1979-80. Thereafter, silver drops faster and harder than gold, causing the ratio to increase, reaching a high of nearly 100:1 in February 1991.
- 1994-2001: Gold under pressure from official sales and producer hedging generally underperforms silver; news of Warren Buffet's purchase of 129.7 Moz silver results in the ratio plummeting below 40:1 in February 1998.
- 2002-2017: The ratio moves up and down in 3–5-year cycles for each leg but generally stays within a narrower range, much of the time between roughly 60 and 70:1 (average 63), with no discernible longer-term trend.
- 2018-2025: A ratcheting up of the ratio's trading range to around 80 to 90:1 (with a Covid-induced spike to well over 100:1). Initially and in part because of flat industrial demand for silver during the 2018-19 slowdown in global manufacturing but more importantly due to relatively weaker investment demand for silver than for gold and growth in official gold purchases.
- December 2025-May 2026: The gold:silver ratio has moved lower, averaging 60.5:1 as silver investment/speculation has grown. It is too early to determine whether this is the beginning of a new trend and/or a reversion to the mean for the ratio.

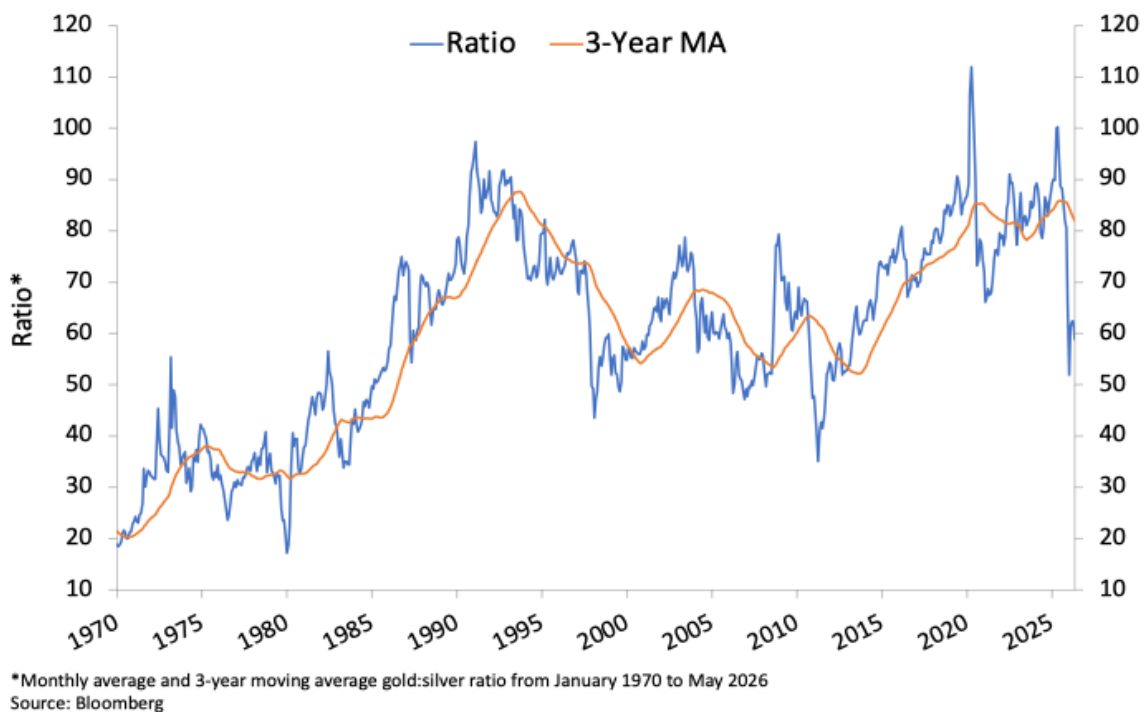
1971 was a watershed year for the gold:silver ratio because from that date on the gold price was no longer fixed by law but set by market forces. While the decision by President Nixon in August 1971 to suspend the dollar's convertibility into gold marked the formal end of the Gold Exchange Standard, this had been foreshadowed by the collapse of the London Gold Pool in March 1968 and the establishment of a two-tier system for gold – a private free market and an official one still using the \$35/oz price. (The day before this collapse, March 14, 1968, the gold:silver ratio dropped to 16.3:1.) However, it was only with President Nixon's final severing of the official dollar:gold link that the gold price could really break free. It did so in spectacular fashion. By 1974, the annual average price was \$159/oz. Although silver prices also rose over this period, gold's explosive move saw the ratio between the two metals jump to an average of 34:1 in 1974.

Gold:Silver Ratio, Monthly, Dec-1969 to May-2026



The next major development in the relationship between gold and silver occurred at the end of the decade, specifically between September 1979 and March 1980. Both metals rose dramatically to fresh highs at a time of rampant inflation, negative real interest rates and US dollar weakness. Silver's increase, however, was turbocharged by the Hunt Brothers and their partners buying, at its peak, close to 200 million ounces of silver. The speculative frenzy this triggered drove the price from \$11 at the beginning of September 1979 to a London peak of \$49.45 on January 18, 1980. Based on the London a.m. fix for gold of \$825.50 on the same day, this resulted in a gold:silver ratio of 16.7:1, the lowest recorded since March 1968. In order to defeat the Hunts' attempt to corner the silver market, US commodity exchanges changed delivery rules and raised margin requirements. This had a dramatic effect: the Hunts' inability to meet a \$100 million margin call triggered a 50% fall in the silver price on March 27, 1980. The gold:silver ratio had already moved up since its January low, but now it soared, returning to a monthly average of 34.5:1 in April and 40.6:1 in May.

Ratio Jan-1970 to May-2026 and 3-Year Moving Average



Over the remainder of the decade and through to the 1990s the gold:silver ratio reflected the volatility of both metals in what was a general downtrend from their previous highs. Silver's decline, though, was more pronounced and quicker, the gold:silver ratio therefore tending to be high and over double its 1970s average of 32:1 through to the late 1990s. In February 1991, the silver price fell decisively below \$4/oz, and the ratio spiked to a monthly average of 97.3:1, its highest level in nearly 50 years. (Significantly, on a daily basis, the ratio got very close to but did not quite reach 100.0:1 that month.) The ratio subsequently fluctuated mainly between 80:1-90:1 through to December 1993, when silver's sustained recovery above the \$5 level pushed it down to a range of 65:1-80:1 for an extended period. In the final years of the decade gold's slump below \$300/oz on a combination of central bank selling and producer hedging saw several months when the gold:silver ratio fell well below the 50:1 mark.

In the early 2000s, the ratio increased again to reach the upper 70s, as in the wake of September 1999's Central Bank Gold Agreement, gold recovered and then, in 2002, bounded above the \$300 level, while silver traded once again below \$5/oz. Then, from late 2003 to the Fall of 2008, silver not only caught up with gold but outperformed the yellow metal. The multi-year bullion dishoarding from the private and government sectors came to an end, and industrial demand for silver grew strongly. In both 2006 and 2007 the gold:silver ratio dipped for a while below the 50:1 mark. The collapse of Lehman Brothers in September 2008 and the initiation of the Global Financial Crisis marked a turning point for the ratio. Gold prices soared, but silver was initially dragged down by the slump in GDP growth and industrial production, its price only recovering slowly as eventually it too saw a rise in investment demand. The gold:silver ratio spiked to 79:1 in December 2008.

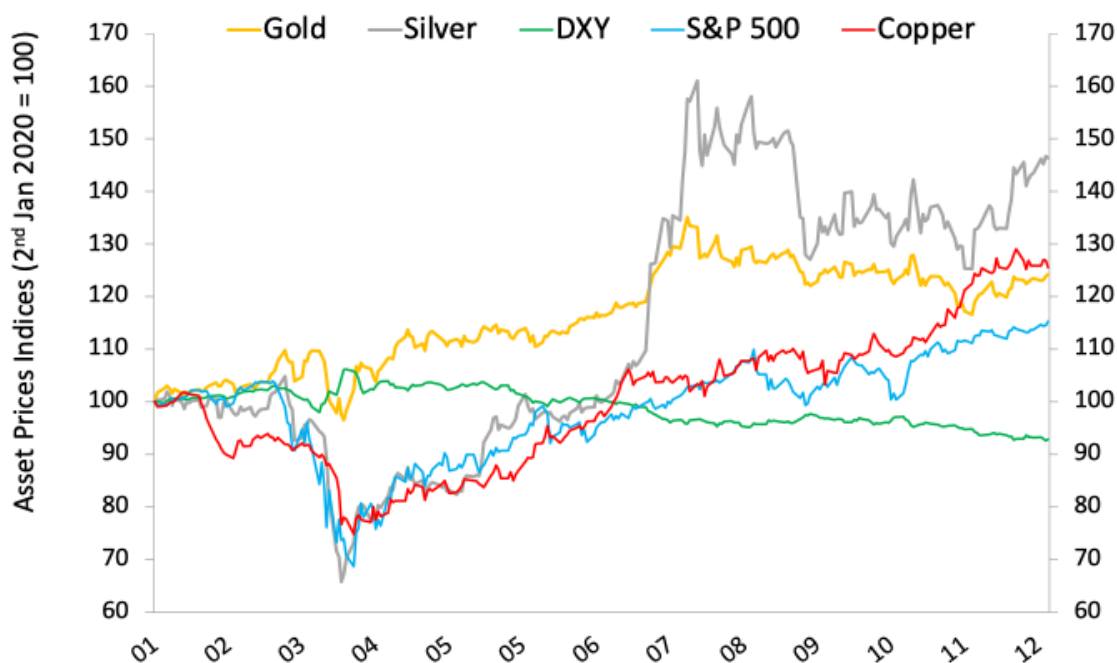
A year later, however, the tables had turned. By the fourth quarter of 2009, silver prices had rebounded strongly on the back of a wave of investment, which more than compensated for the slump that year in industrial demand. The gold:silver ratio ended the year at 65:1. Silver investment remained exceptionally strong over 2010-2012, but this was also a time of very elevated gold bullion demand from investors, as well as central banks. The relative strength of gold and silver bullion demand and their impact on prices for the metals were key determinants of the ratio's level during this time. Silver's greater attraction to speculators eventually saw it outperform gold, and in the fourth quarter of 2010 the ratio fell below 60:1, a level above which it would not trade until 2013. In the meantime, the ratio dropped further, with it moving into the 40s and then, during silver's spike in March and April 2011, spending several weeks in the 30s, registering a low of 31.7:1 on April 28, 2011.

The ratio had climbed back to above the 60:1 level in 2013 where it stayed until the fourth quarter of 2014 when it moved up and broke through 70:1. The following year saw a further rise to a peak of 77:1 during December. The ratio fell back in the first half of 2016 before rising again in the second half and then over much of 2017. These changes fitted within the pattern seen since the end of 1996 for the (monthly average) gold:silver ratio, namely cyclical movements within a range of roughly 50:1 to 80:1, with three exceptional spikes to the downside in February 1998, December 2006, and April 2011. A break from this pattern occurred in September 2018 when the ratio punched higher, registering an average of 84:1 that month. The break was confirmed during the fourth quarter of 2018 and more so in 2019 when the ratio traded at times above 90:1. Initially, the move higher in the ratio was caused by silver prices falling more sharply than gold ones in response to multiple Fed rate hikes and a stronger US dollar. However, in 2019, the driver appears to have been the powerful surge in gold investment demand (up 19% in volume year-on-year) compared to silver investment staying at the same level as in 2018.

The first half of 2020 saw extreme volatility in the gold:silver ratio. From a starting point a little below 90:1 in the space of three weeks, it shot up to an all-time peak of 125.7 on March 18. (Note: Basis the London a.m. gold fix and silver fix the high was 123.3 on March 19) The trigger for this was the impact of the COVID-19 pandemic on global financial markets. It is instructive to review the data for gold, silver, and other asset prices over this period. On February 24, gold and silver both registered cyclical price peaks of \$1,675 and \$18.88, respectively, generating a ratio of 88.7:1. By March 18, the gold price had fallen by 11% compared to silver's 37% decline. Over the same period, the DXY dollar index was up by just under 2%, the S&P 500 had dropped by 26%, copper fell 17%, and WTI oil was down a huge 60%. It can be seen from this that silver responded to the initial COVID-19 impact more like a commodity driven by economic concerns than as a safe-haven financial asset, like gold. (One might even argue that a good part of gold's initial 11% fall was caused by short-term liquidity factors.) Data from the futures market does not quite fit the period between peaks and troughs in precious metal prices, but the managed money gross long positions on Comex between February 25 and March 17 fell by 57% for silver, compared to 37% for gold. The outflow of speculative capital from silver was therefore proportionally far greater. It is also noteworthy that silver's recovery from its mid-March low point took far longer than did gold's. The silver price only broke its February 24 high in mid-July, gold taking out its equivalent in early April. This pattern of silver responding more violently to exogenous shocks is quite typical, as is its tendency to react first as a commodity and only later as a financial asset, partly in response to earlier moves in gold.

Daily Asset Prices in 2020

(indexed to 2nd January 2020 = 100)

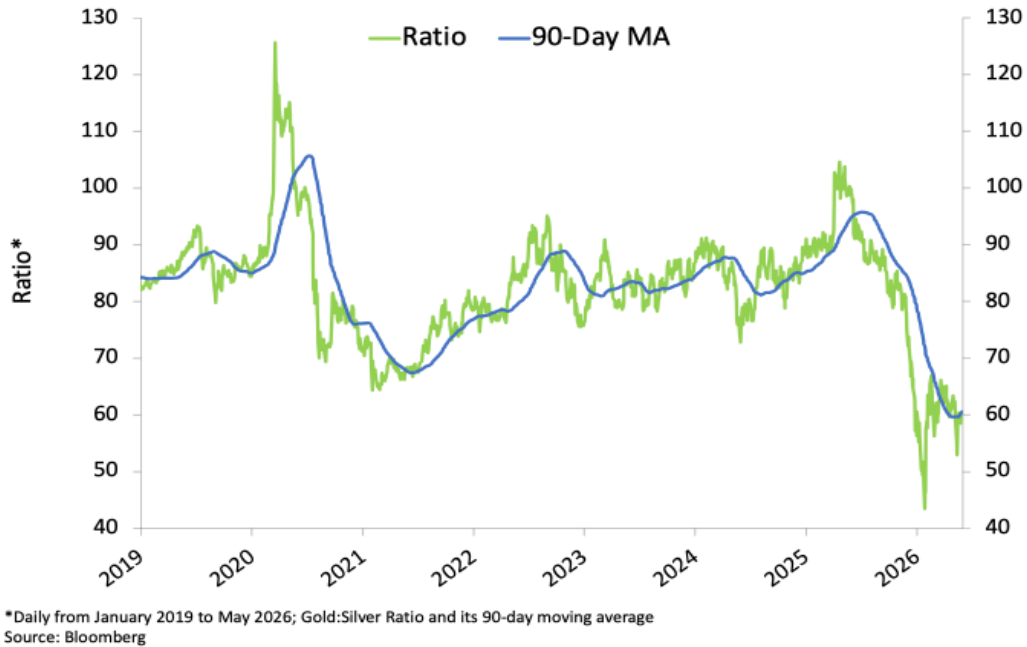


Source: Bloomberg

Silver's recovery from the initial Covid shock gathered pace over the July 2020 to May 2021 period, outperforming gold, with the ratio between the metals averaging 67.5:1 in the first half of 2021. The very strong year-on-year rebound in industrial fabrication must have played a part, as would have exceptionally high levels of silver bar and coin demand. In contrast, while gold investment was historically high in 2021, it was well down year-on-year compared to 2020's exceptional figure. While the ratio crept higher during the second half of 2021 and the first few months of 2022, it remained below 80:1. A major breakout above this threshold occurred in May 2022, and from that point, the gold:silver ratio trended strongly upward, peaking three years later above the 100:1 level. This move was almost certainly driven by the impact on the gold price of a major jump in central bank gold purchases in the wake of Russia's attack on Ukraine. In addition, net global silver investment more than halved in 2022, fell by 48% year-on-year in 2023, and remained at a similarly low level in 2024. Conversely, a pickup in silver investment demand in 2025 from the end of May onwards drove the ratio down to around the 80:1 mark in October.

A more pronounced shift in the gold:silver ratio occurred from December to January 2026. The decisive break of the previous all-time high in November, silver consolidating above the \$50 level, and gold relatively becalmed set the scene for a remarkable speculatively driven run in the silver price. Measured from end-November to end-December 2025 silver gained 33.5%, gold eking out just a 3.6% rise over the same period. The gold:silver ratio ended the year a little below the 60:1 mark. January saw an even more powerful move in silver: from end-December to its peak of \$118.45 (basis the London fix) on January 29, the price rose by 64.5%. Gold at this point was also seeing a major increase in speculative interest, it too peaking on January 29 at \$5,501.7 (basis the London a.m. fix), up 27.7% from the end of December. In the meantime, the gold:silver ratio had reached its low point of 45.6:1 on January 27, 2026.

Gold:Silver Ratio, Daily, Jan-2019 to May-2026

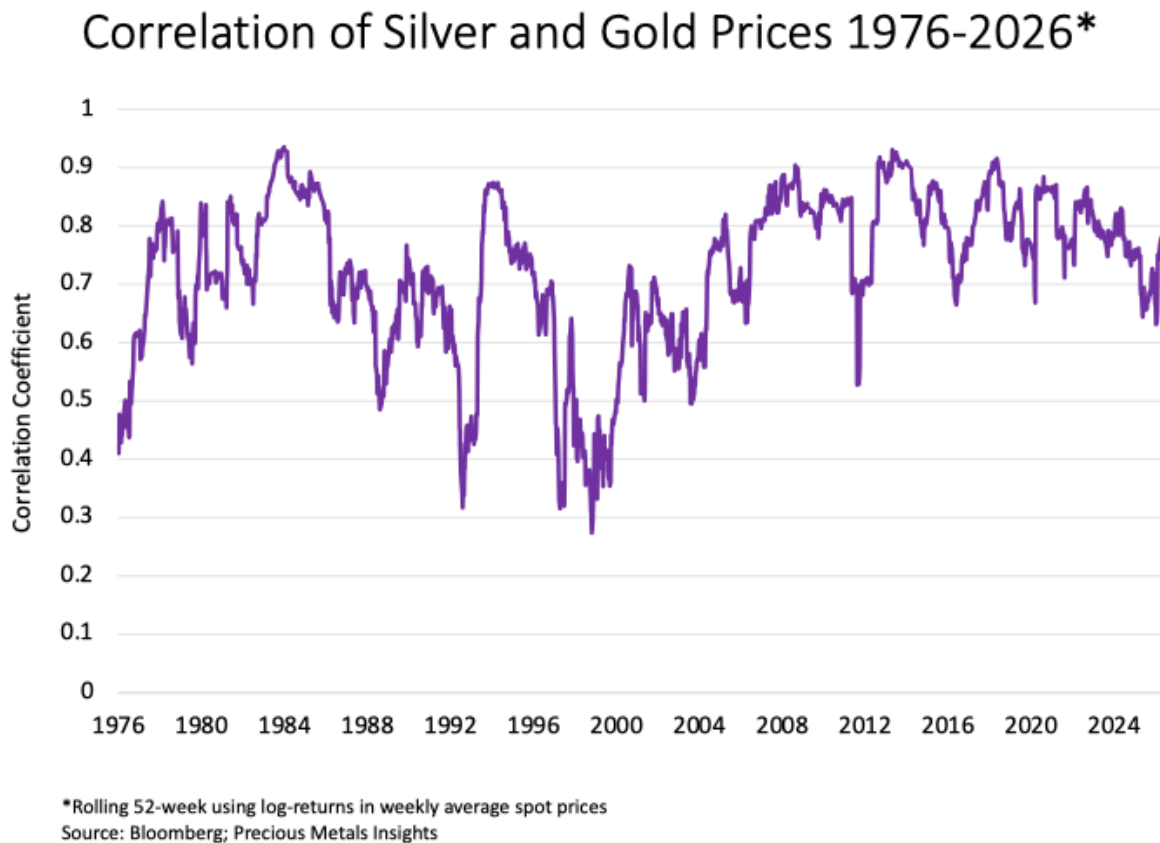


The collapse of the bubble in these precious metals prices has not surprisingly hit silver hardest. By the end of May, silver had fallen by 36% from its January peak, while gold's decline was 18%. This difference in performance drove the gold:silver ratio higher, ending May at 59.7:1. The average ratio from February to May 2026 was similar at 62:1 but still significantly lower than the levels of over 80:1 prevailing prior to the speculative frenzy in silver and later gold.

3.1.1. Statistical Analysis

As discussed in Chapter 2 of this report, the gold:silver ratio has an exceptionally long history. The close relationship between the two precious metals has been grounded in both custom and law. But to what extent do the data support the assumed link between gold and silver prices in the modern era?

To test this hypothesis, a correlation analysis was conducted using rolling 52-week log-returns of weekly average spot prices for both metals from January 1976 to May 2026. The results show a strong correlation between gold and silver prices. The mean average across the 2,633 data points was 0.725, with a median value of 0.750. Over the 50-year period, the correlation value has been quite volatile, particularly from the mid-1980s to the end of the 1990s, when the relationship between the two metals also tended to weaken. This may have owed something to the substantial shifts in the supply/demand for both precious metals during this period. The silver market is shifting from net investment to large-scale dishoarding, and the gold market has to digest a big jump in supply from central banks' sales and producer hedging in the 1990s. It is noteworthy that since then, the correlation between the two metals has tended to rise. The data show that the relationship has become stronger and more stable over the past 20 years, with the median correlation coefficient for 2005-2026 jumping to 0.812.



A similar exercise was conducted basis a rolling annual correlation using log-returns in daily spot prices for the period January 2005 to May 2026. This confirmed the stronger correlation over the last 20 years alluded to above. The median and mean average values for the period were both 0.795. Noteworthy in

the data is the much-reduced correlation between gold and silver from June 2025 through to January 2026, when silver prices moved from the mid-30s to a peak of \$114/oz.



Analysis of the weekly and daily price data, therefore, proves a high degree of correlation between gold and silver prices. However, this simply confirms that individual gold and silver prices generally move up and down together. It does not in itself prove that the gold:silver price ratio is a measure of relative performance. If it is not cointegrated, the ratio can behave exactly like a random walk, even while daily/weekly/monthly gold and silver prices move in near-perfect lockstep. Therefore, a cointegration analysis was performed on the data to determine whether there is indeed a long-term relationship between gold and silver price levels.

Percentage Deviation of Monthly Gold:Silver Ratio from Long-run Equilibrium*



*Johansen Vector Error Correction Framework (1970–2026), Trace Statistic: 62.05 vs 95% Critical Value: 15.49.

**Percentage deviation from Jan-1970 to May-2026 equilibrium gold:silver ratio of 59.65:1

Source: Bloomberg; Precious Metals Insights

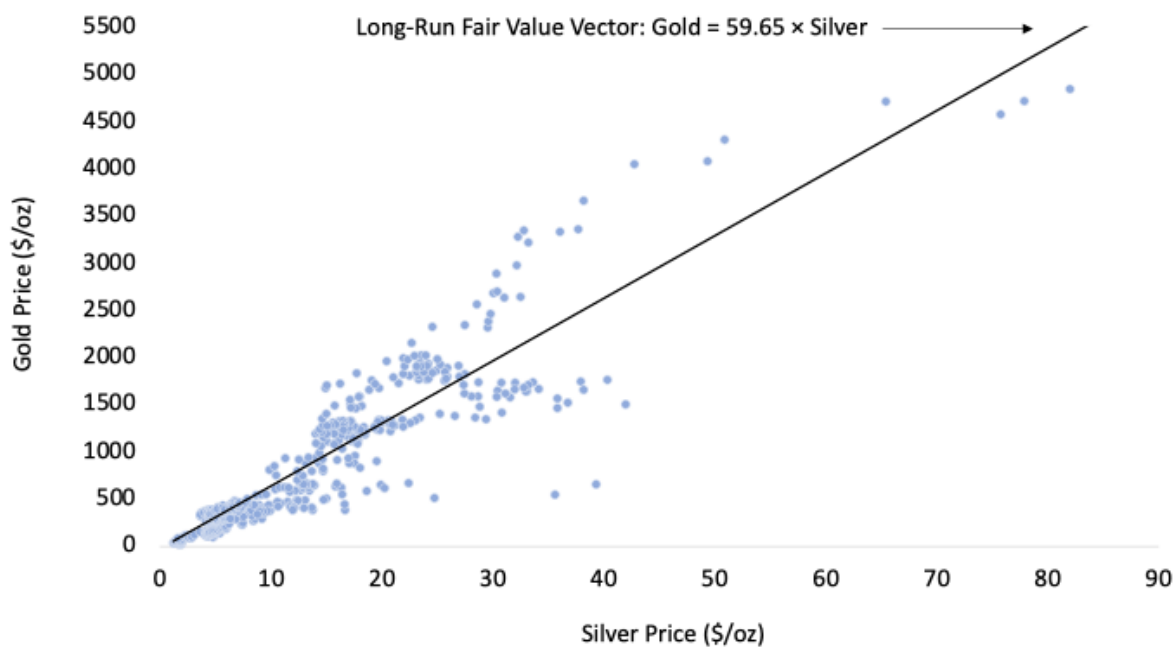
Monthly average gold and silver price data from January 1970 to May 2026 (spanning 677 months) were used in a Johansen Cointegration Test. The trace test result of 62.0482 was vastly higher than the critical value of 15.4943 and confirmed a very robust long-term cointegrating relationship. The cointegrating vector sets a baseline structural formula for the long-run equilibrium of 59.65. This is the equilibrium level from which the gold:silver ratio deviates to which it returns. The corrections from disequilibrium are actively driven by gold. Gold does far more than silver does to pull the pair back to equilibrium. In fact, silver barely adjusts its path to accommodate gold's mispricing. In terms of pace of adjustment, the test indicates that the bi-directional market structure corrects deviations down to half their size in the space of 17.3 months.

The above graph shows the percentage deviation of the gold:silver ratio from its long-run equilibrium over the January 1970 to May 2026 period. Of note are several extended periods more than 20% below or above equilibrium. Most noteworthy are, first, the undervaluation in the 1970s (with gold still shaking off the legacy of the fixed \$35 price and a time of relatively high silver prices, peaking in January 1980 due to the Hunt Brothers' squeeze) and, second, overvaluation during much of the 2018-2025 period (due to much stronger gold prices arising from higher investor and central bank demand).

The graph below shows the intersection of the average gold and silver price for each month against the long-run equilibrium for the period January 1970 to May 2026. This illustrates that despite massive shifts in price scales, the core relationship between gold and silver has remained bound to a central axis.

Long-run Equilibrium Corridor 1970-2026

Silver Price versus Gold Price with Johansen Fair-Value Vector Axis



*Johansen Vector Error Correction Framework (1970–2026), Trace Statistic: 62.05 vs 95% Critical Value: 15.49.
Source: Bloomberg; Precious Metals Insights

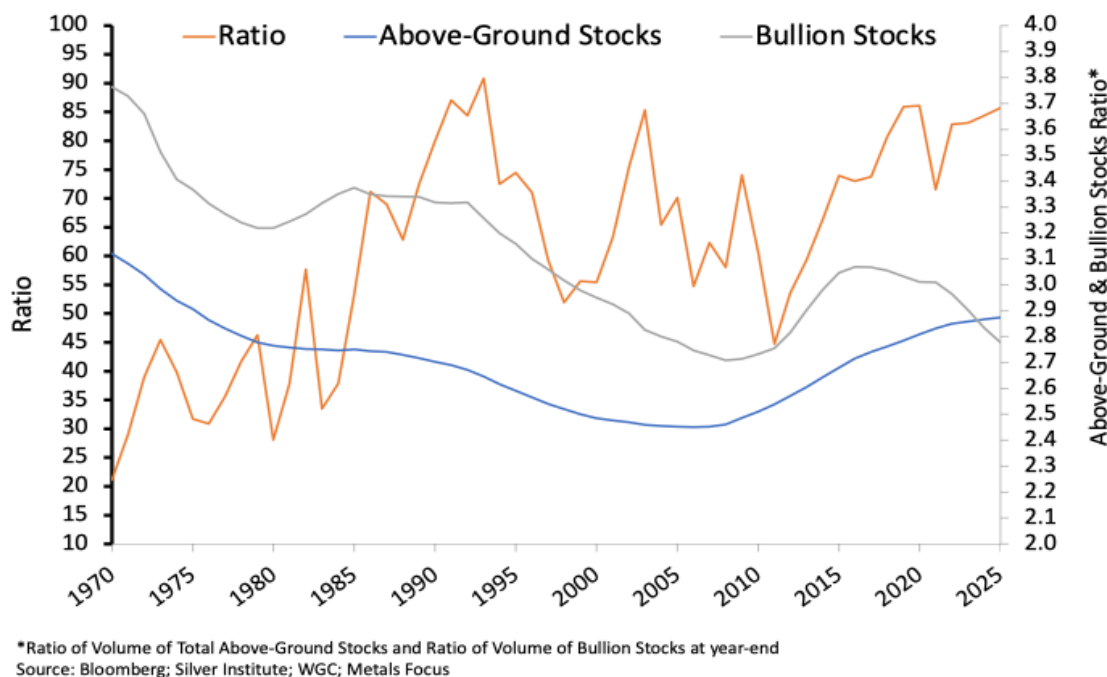
3.1.2. Drivers of Change in the Ratio

This section seeks to identify the principal drivers of changes in the gold:silver ratio. In 3.1.2.1, the analysis covers possible endogenous supply and demand drivers, while in 3.1.2.2, potential exogenous factors, such as the dollar exchange rate, inflation, and interest rates, are analyzed.

3.1.2.1. Supply / Demand

According to the US Geological Survey the potentially recoverable underground reserves of silver are 9 times greater than those of gold. The ratio of historical mine production of the two precious metals is a similar 8.3:1, basis, through to 2025, 58.6 billion ounces of silver and 7.1 billion ounces gold. Meanwhile, considering far greater, practically irrecoverable losses of silver than of gold, the ratio of above-ground stocks at end-2025 stood at 2.87:1. The first two of these three measures were of great importance in antiquity but, over time, have become irrelevant in the modern, globalized economy based on fiat money.

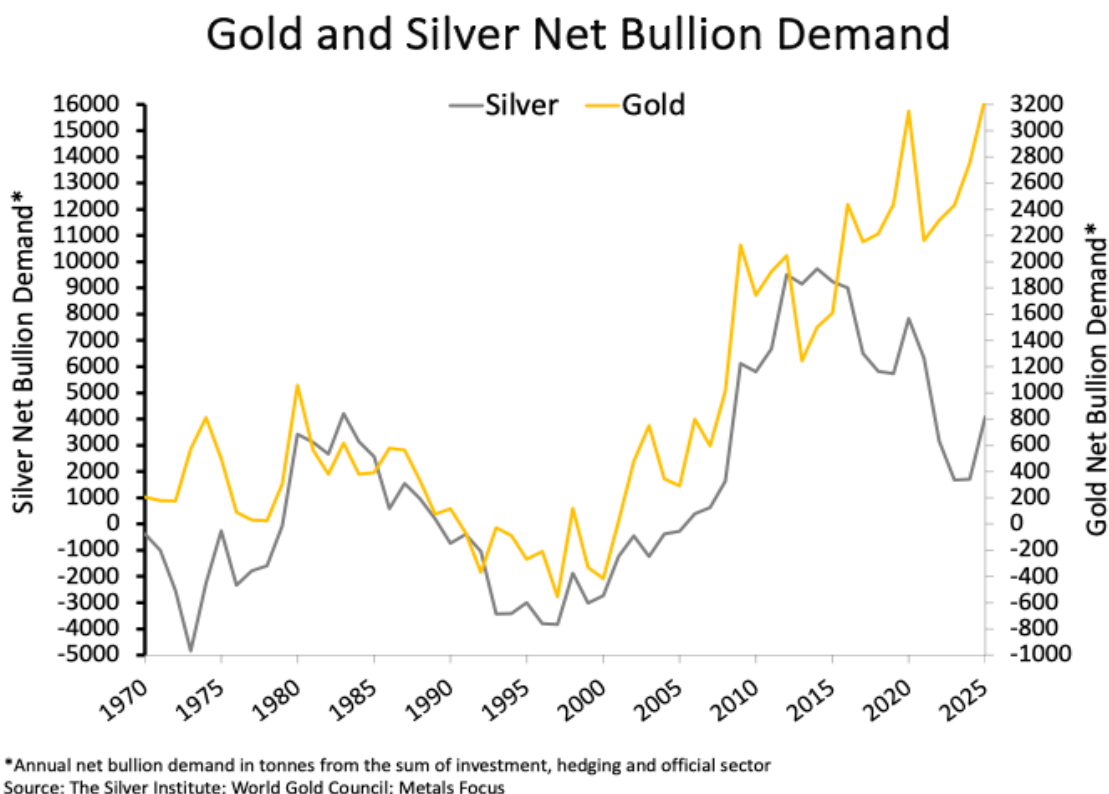
Gold:Silver Ratio & Silver:Gold Above-Ground Stocks Ratios



The above-ground stocks of gold and silver and the additions to these from ongoing mine production could, on the other hand, be relevant for the gold:silver ratio as they can indicate relative scarcity or abundance of either metal. The data show that the ratio of silver:gold above-ground stocks fell from about 3.1:1 in 1970 to a low point of 2.4:1 in the mid-2000s before rising over the last 16 years to just under 2.9:1 in 2025. Counterintuitively, over 1970-1993, the reduction in this stocks ratio coincided with a generally rising gold:silver ratio. From 1994-2011 the gold:silver ratio was volatile but tended to fall

while the above-ground stocks ratio dropped slightly. Since 2011, the gold:silver ratio has risen, as has the above-ground stocks ratio. Regression analysis of the data shows a weak relationship for the overall 1970-2025 period. The relationship is much stronger for the separate periods 1970-1993 and 1994-2025, with a negative coefficient in the first period flipping to a positive one in the second. In particular, the earlier period, the conclusion is that the fall in the stocks ratio was completely overwhelmed by other factors. Likewise, the rise in the above-ground stocks ratio from 2.62 in 1994 to 2.87 in 2025 is unlikely to have had a major influence on the gold:silver ratio over the period.

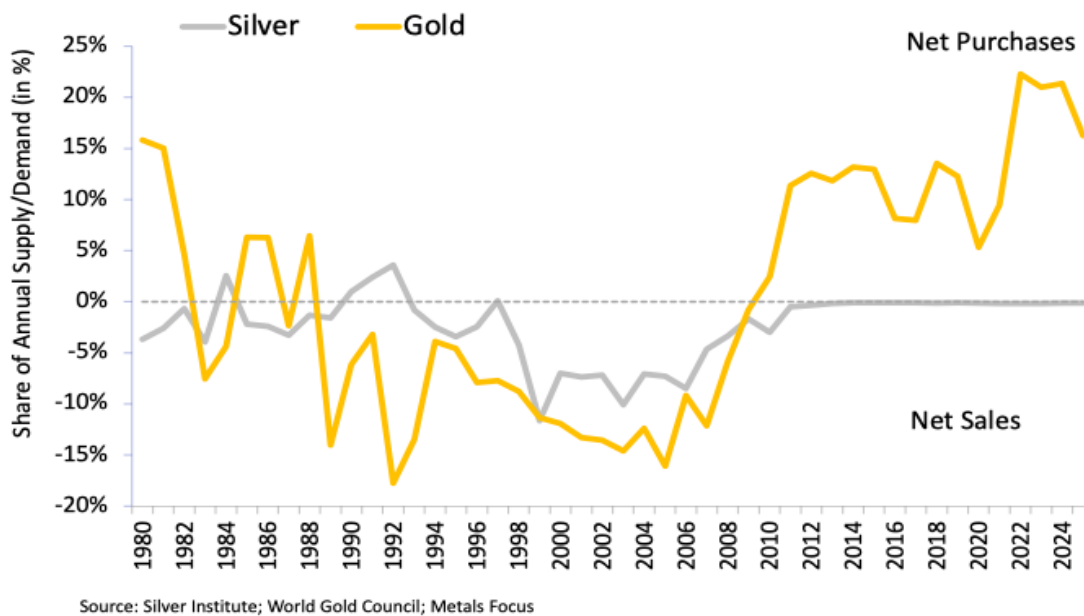
Looking at the bullion subset of above-ground stocks, the ratio of silver:gold dropped from 3.76 in 1970 to 2.78 in 2025. Silver bullion became relatively scarcer to gold. However, over the same period the gold:silver ratio tended to rise. This defies the simple logic that the abundance or scarcity of commodities drives their relative prices. Yet it makes sense in the context of bullion, which is more of a monetary asset and, especially, considering the years of net dishoarding of silver bullion stocks, mainly by investors but also by governments, from 1970-1978 and 1990-2000. By contrast, gold bullion stocks rose in the 1970s and their decline from 1991 to 2000, driven entirely by central banks, was proportionally lower than for silver. (From 1990-2000 silver bullion stocks dropped by 14.9% compared to gold's 4.1%.)



Curiously, from 2000 to 2025, while silver bullion stocks have increased proportionally less than gold's (70% versus 80%), the difference is not, in itself, sufficient to explain the rise in the gold:silver ratio over that 25-year period. Yet reviewing that period in detail reveals that while gold and silver bullion stocks rose in tandem from 2001-2015, over the past decade the trend has weakened for silver but grown

stronger for gold. It is probable that this reflects an increasing amount of gold bullion demand from institutional rather than retail buyers. Certainly, this supposition is true considering central bank activity in precious metals, which is almost exclusively in gold.

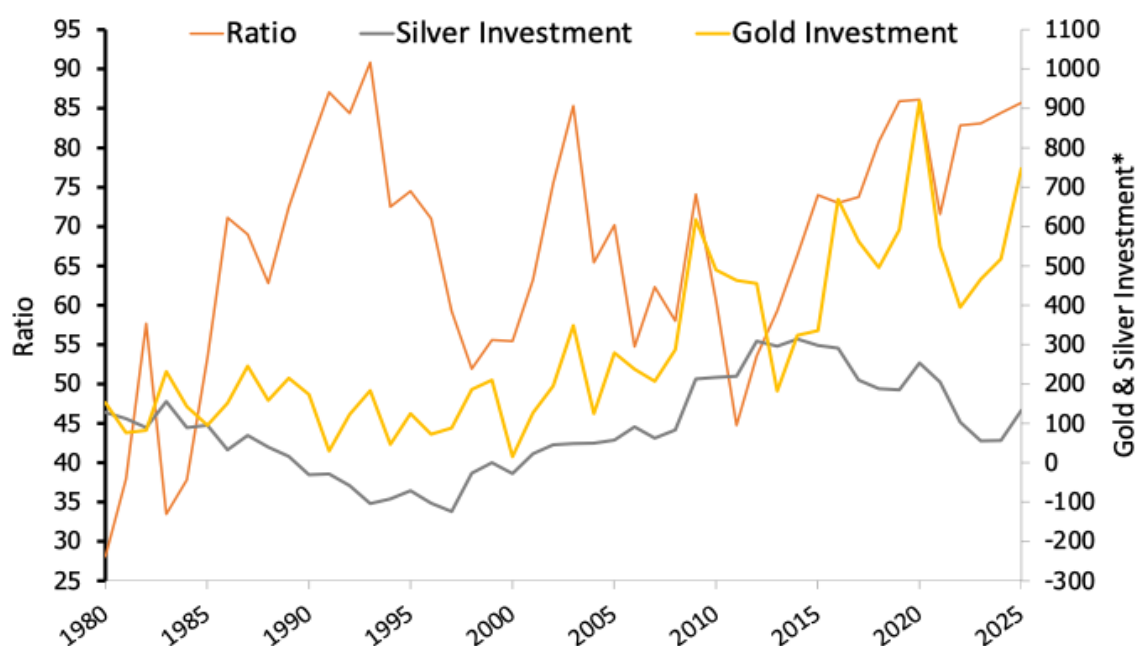
Official Sales/Purchases Share of Annual Supply/Demand



Arguably, the swing from net central bank gold sales to purchases since 2010, and especially the lift in their buying since 2022, has had a particularly strong impact on the gold price and, hence, on the gold:silver ratio. This has occurred not only through the direct impact of these purchases on the gold supply/demand balance but also indirectly through the signal they have sent to investors, whose own demand has undoubtedly risen further as a result. Notably, this positive price dynamic is wholly absent from the silver market, where official sector activity in the last 15 years has consisted of trivial levels of annual sales.

As indicated above in the analysis of the change in gold and silver bullion stocks, trends in gold and silver investment demand have at times differed. Although it dropped to a very low level in 1991-2000, gold investment demand never turned net negative, unlike silver, which saw several years of massive net sales by legacy investors. And after recovering in the 2000s through to the middle of the last decade, net silver investment demand has since waned, while it has tended to increase in gold's case.

Gold:Silver Ratio and Gold & Silver Investment

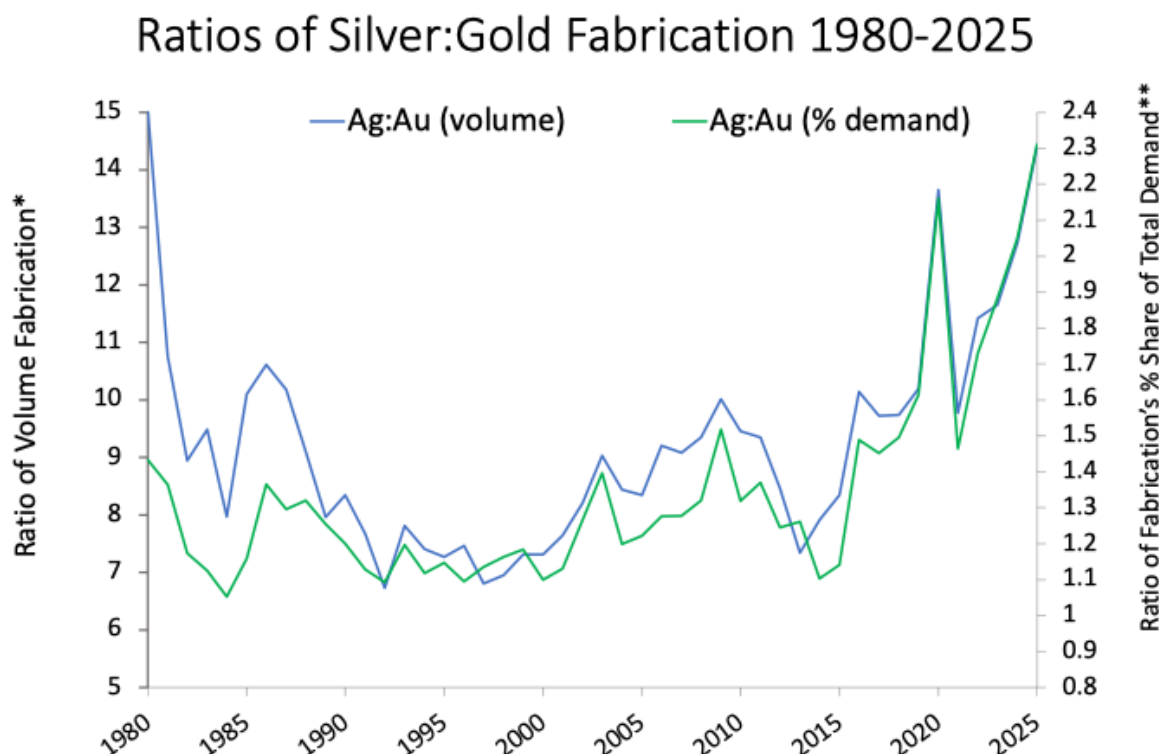


*Annual Net Investment plus Net Producer Hedging; Silver in Moz; Gold in 100,000oz
Source: Silver Institute; Bloomberg

Multiple linear regression analysis of annual net investment demand for gold and silver against the gold:silver ratio for the 1980-2025 period shows a meaningful statistical correlation, with an adjusted R-Squared of 0.366. As expected, the gold-to-silver ratio is positively correlated with gold investment demand and negatively correlated with silver investment demand. (For an example of the latter: By early 1998, Berkshire Hathaway's massive silver purchases at a time of weak gold investment demand had resulted in a precipitous fall in the gold:silver ratio.) The analysis shows that gold's relationship is statistically stronger but that both metals investment is highly definitive for the pair's price ratio for the period. However, introducing a break in the series at 2000/2001, when a structural change happened in gold and silver investment demand, is illuminating. This shows that while for the overall 1980-2025 period gold investment was of somewhat greater statistical significance, for the 1980-2000 period it is silver investment or disinvestment that explains nearly all the movement in the gold:silver ratio. It is in the 2001-2025 period that gold investment is the far more powerful influence on the metals' price ratio. This is in line with the major upward shift in gold investment demand over the last 25 years.

Fabrication demand is generally more of a reactive than a proactive component of supply/demand, particularly for silver, where its large industrial component makes it less price-elastic in the short term than jewelry-dominated gold. Over the longer run, however, structural shifts in demand will have an impact on the price and vice versa. This is expected to impact the gold-to-silver ratio. To test this hypothesis, regression analysis was made using two different comparative measures of annual gold and silver fabrication demand. The first is to derive a silver:gold ratio from the annual volume of metal used in fabrication, excluding all coins and bars. The second is to calculate the percentage share of annual total demand represented by fabrication, excluding all coins and bars, and to derive an annual silver:gold

ratio from this data. The results are shown in the graph “Ratios of Silver:Gold Fabrication 1980-2025”. Except for the 1980s, when the volume measure drops from a far higher starting point, the two data sets are quite closely aligned. The increase in both measures over the last ten years is noteworthy and coincides with a general increase in the gold:silver ratio. This is not surprising, given the corresponding fall in the investment-to-bullion demand ratio over the same period discussed earlier in this Report.



*Ratio of annual volume silver:gold fabrication (excluding bars & coins) **Annual ratio of fabrication's % share of total demand
Source: Silver Institute; World Gold Council; Metals Focus; LBMA; Precious Metals Insights

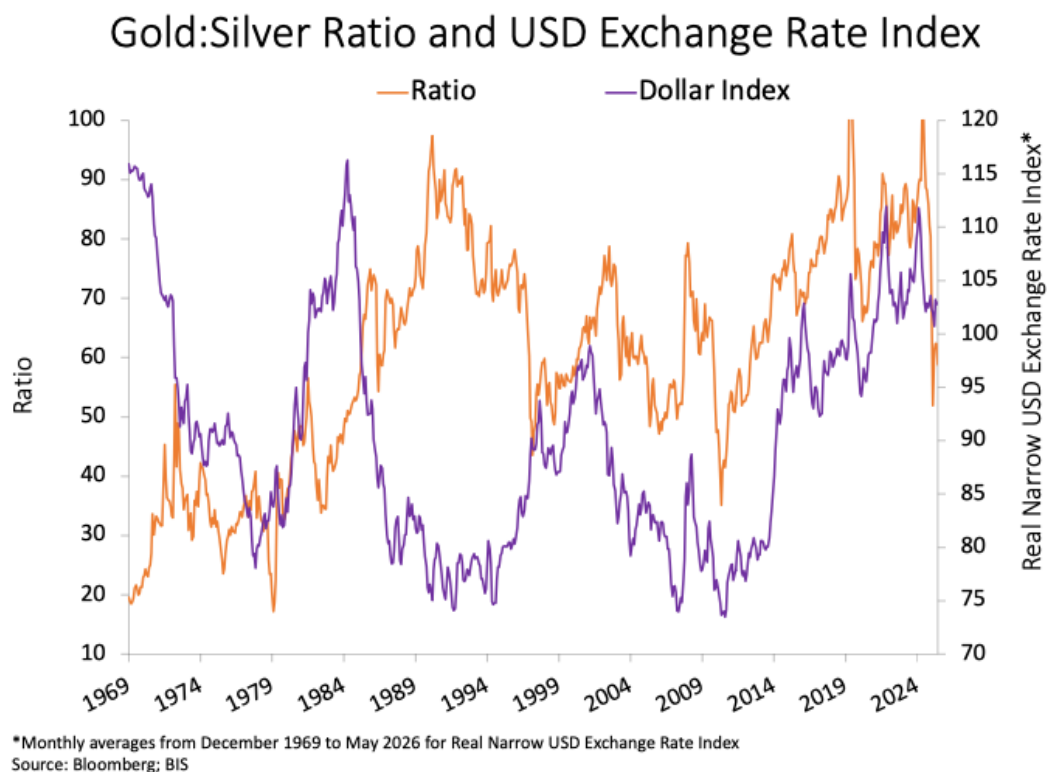
Statistical analysis of the relationship between the gold:silver ratio and these fabrication ratio measures supports the above conclusions. Specifically, it shows that both for the full period and for 2001-2025, using the ratio of the percentage share of demand is statistically far more significant than the volume ratio. In particular, during the modern era the gold:silver ratio is quite highly correlated to the ratio of fabrication's share of demand (an adjusted R-Squared of 0.422 and a very low P statistic). The corollary of silver fabrication taking an increasing share of total demand compared to gold is a relative (to gold) fall in the share of investment demand in total silver demand.

3.1.2.2. Exogenous Factors

Exogenous factors that may affect the gold:silver ratio include the dollar exchange rate, interest rates, inflation and global manufacturing output. Each of these is addressed in turn in this section of the Report.

The dollar exchange rate is likely to be relevant to the gold:silver ratio because commodities are usually priced in dollars and because gold, especially, is a proven alternative to the US dollar. To test this hypothesis a regression analysis using log returns for the gold:silver ratio against the Narrow Real US Dollar Index was performed for the January 1970 to May 2026 period and various other shorter time periods.

This analysis showed that over the full 1970-2026 period, fluctuations in the US Dollar index do not systematically dictate or explain changes in the gold:silver ratio. While both gold and silver prices individually have strong negative correlations with the US dollar, they generally moved in the same direction, meaning the gold:silver ratio remained largely independent of dollar movements for most of the time. The exception to this has been the period from January 2006 to May 2026, during which the regression analysis yields a statistically significant result and a valid but still weak correlation between the ratio and the dollar index, with an Adjusted R-Squared of 0.118. It is notable that 2006 marked the first year of the silver ETF, and the last 20 years have seen a growing financialization of the gold and silver markets.

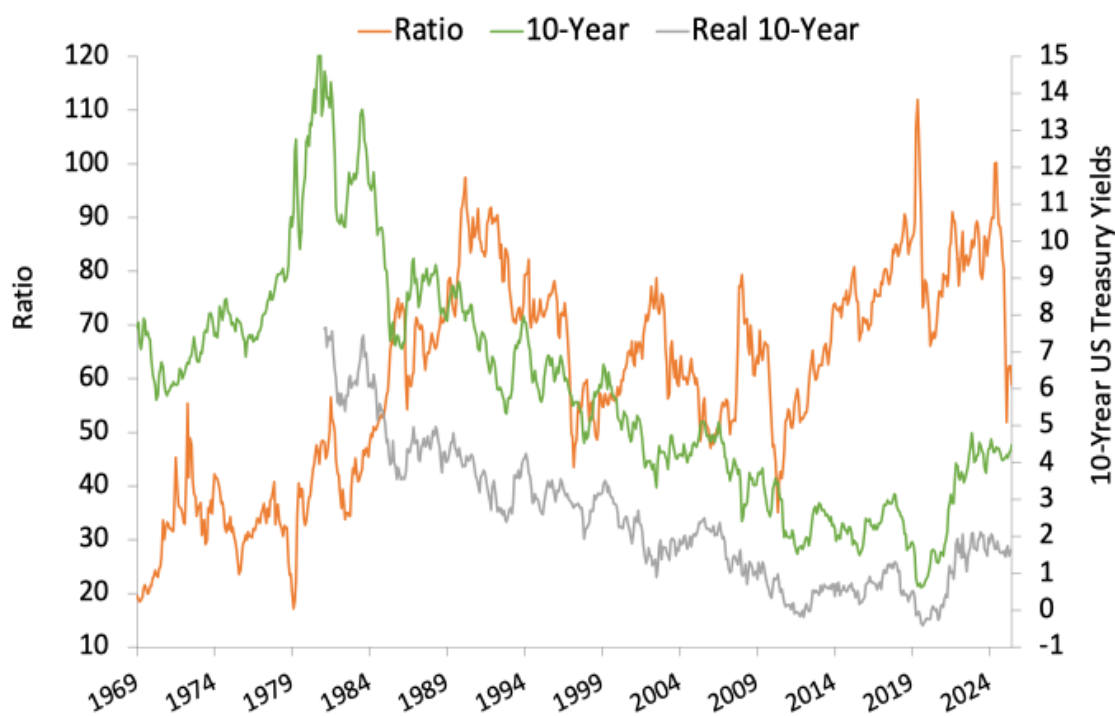


The explanation for why the gold:silver ratio may rise under conditions of a stronger dollar, and vice versa, is most likely explained by silver's higher price volatility, less liquid market, and its relative lack of

safe-haven demand compared to gold. It would seem that as the more volatile and speculative of the pair, silver has stronger reactions both to the upside and downside under conditions of a weaker or stronger dollar, respectively. That said, while the relationship between the gold:silver ratio and the dollar index has become statistically significant, the strength of the relationship remains low, with only 12% of the ratio's monthly variance explained by changes in the dollar index.

The graph of the gold:silver ratio against the 10-Year US Treasury Yield and the Real 10-Year Treasury Yield suggests a superficial, very long-run relationship from the 1980s, with a general rise in the former and a downward trend in the latter. However, the regression analysis conducted for these series shows only a very weak correlation between the ratio and interest rates for both longer and shorter run time series. The conclusion is that the visual picture simply describes a structural coincidence, not a true transactional relationship between the gold:silver ratio and interest rates.

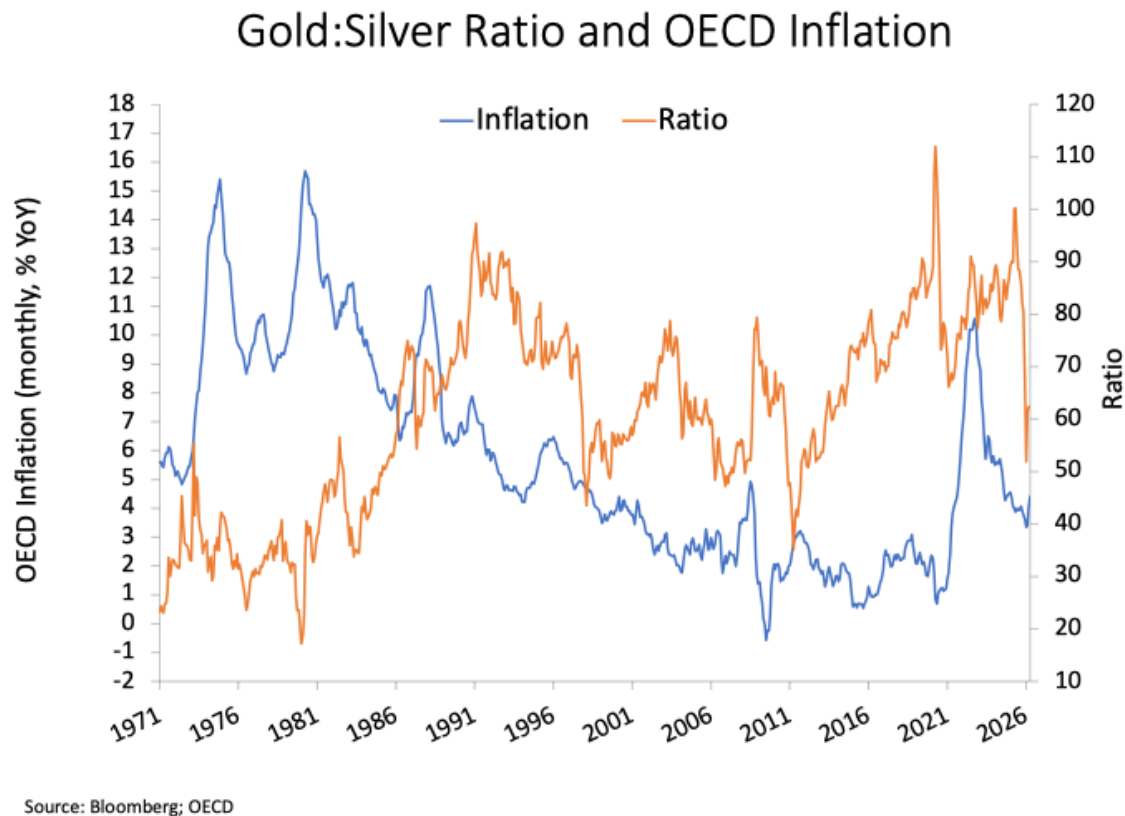
Gold:Silver Ratio and 10-Year Treasury Yields



Source: Bloomberg; FRB St. Louis

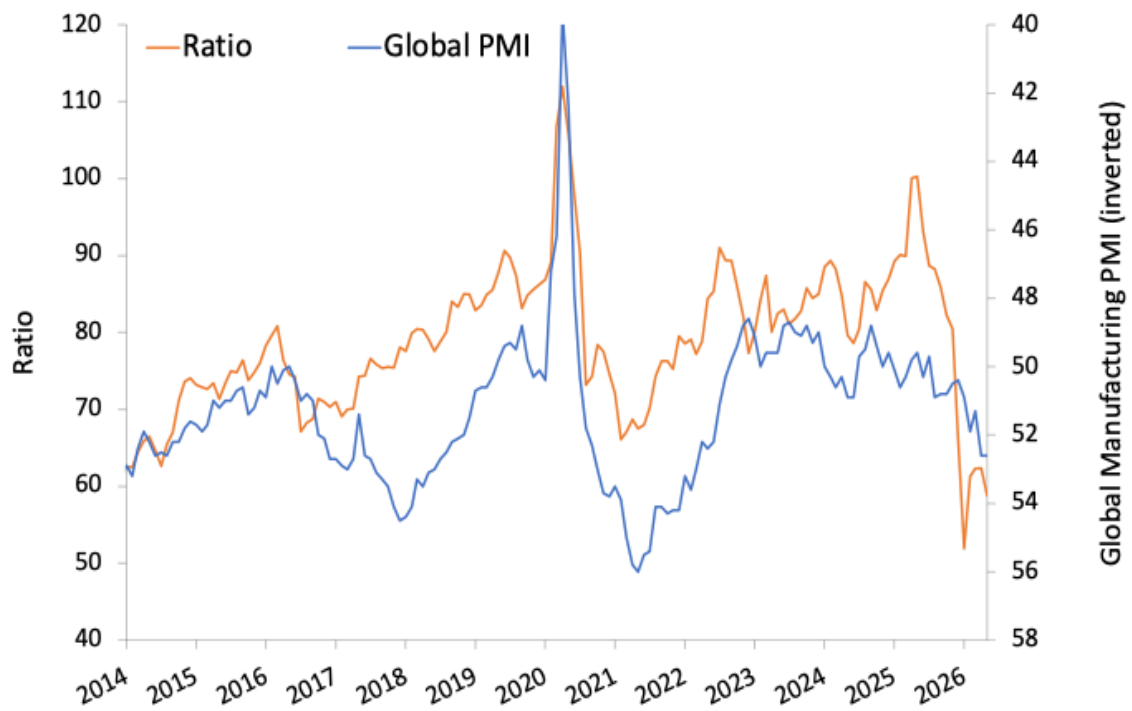
Regression analysis of the gold:silver ratio against OECD inflation for the period January 1971 to May 2026 shows no statistically significant relationship. The results were the same when making the regression analysis over two shorter time periods, namely January 1971 to December 1996 and January 1997 to May 2026. To the extent that changes in inflation affect investment demand for precious metals,

it is likely that the lack of correlation with the gold:silver ratio stems from gold and silver rising or falling in tandem during these episodes, so the ratio between them changes little.



Industrial demand for silver is far more important than it is for gold. And, in silver's case, it has been growing as a share of fabrication demand for the metal. For instance, industrial uses accounted for 41% of fabrication (excluding coins) in 1990, but at least 63% in 2025. This suggests the health of global manufacturing should have some bearing on silver and, by extension, on the gold:silver ratio. To investigate this a regression analysis was performed for the monthly gold:silver ratio against the monthly JP Morgan Global Manufacturing PMI for the period September 2013 to May 2026. The results of this analysis were statistically significant and prove that a positive change in the global manufacturing PMI is associated with a decrease in the gold:silver ratio (negative correlation). Conversely, a falling PMI (indicating a contraction in manufacturing) drives the ratio up. Nevertheless, with an adjusted R-Squared of just 0.058, the JP Morgan Manufacturing PMI only partly explains movements in the gold:silver ratio.

Gold:Silver Ratio and Global Manufacturing PMI



Source: Bloomberg; JP Morgan Global Manufacturing PMI

4. Outlook for the Gold:Silver Ratio

The gold:silver ratio ended May 2026 at 60:1, rising during the following month to end June at 70:1. With the ratio over the space of just one month capable of moving so much, it is a challenge to forecast it in the short term, let alone predict a longer-term outlook. That said, past trends in the gold:silver ratio that are analyzed in some detail in this Report offer some guidance.

Firstly, while the ratio is volatile over the short term, it tends to move in longer-term up or down cycles, which, in the modern era, typically last several years. It is probable that January 2026's low for the ratio marked the bottom of one, admittedly rather short, downward cycle.

Secondly, the cointegration analysis is described in section 3.1.1. of this report supports the mean reversion hypothesis. The equilibrium level for the gold:silver ratio according to the Johansen Cointegration Test on the monthly data from January 1970 to May 2026 is 59.65:1. In the past, episodes of fundamental disequilibrium (defined as > 20% above or below equilibrium) have from 1980 through to 2020 always been followed not only by mean reversion but also by the ratio falling through or rising above the 20% threshold at the other end of the spectrum. That this did not happen in January 2026 may be significant.

Thirdly, it is possible that there has been a regime shift since 2022 that will produce something akin to the mirror image of the regime in place from 1970-1979, although in this case it could be longer-lasting. In the 1970s, according to the above-cited model, more time was spent in disequilibrium than in equilibrium. This was due to the systematic overvaluation of silver relative to gold, itself a legacy of the time the yellow metal took to adjust to decades of a controlled official price. It is conceivable that since 2022, a similar role is being played for gold via the large-scale central bank purchases since that date. This demand is mostly price-insensitive and guarantees gold a higher floor. If this theory is correct, it would be logical to expect extended periods of disequilibrium caused by gold overvaluation.

Finally, notwithstanding the strong probability of a regime shift having taken place, the tendency for the gold:silver ratio cyclically to rise above and fall below its long-run equilibrium has not changed. Therefore, even if in future the outcomes will be skewed higher by the structural change supported by heavy official sector gold demand, dips well below equilibrium will also occur.