

## Gold-Silver Ratio: Key Drivers of the Price Relationship



All examples in this report are hypothetical interpretations of situations and are used for explanation purposes only. The views in this report reflect solely those of the author and not necessarily those of CME Group or its affiliated institutions. This report and the information herein should not be considered investment advice or the results of actual market experience.

Gold and silver are ancient currencies, and like any two currencies they have their own rate of exchange. The exchange rate between the two metals is commonly set by the amount of silver that buys an ounce of gold -- and that ratio has fluctuated dramatically over time (Figure 1). In 1896, the gold-silver ratio became a major political issue when 'silver for coinage' Democratic Party presidential candidate William Jennings Bryan advocated a gold-to-silver ratio of 16:1 when the prevailing rate was 32:1. His opponents, including the ultimate victor, presidential candidate William McKinley, warned that Bryan's proposal would be highly inflationary.

Today, the gold-silver ratio is no longer the subject of political controversy. In recent decades, the ratio has largely favored gold although silver has experienced a rebound lately. We identified a number of key drivers of the gold-silver ratio on both the supply and demand sides. These factors include:

1. Mining profitability and mining-supply growth.
2. Interest rate sensitivity.
3. The evolution of industrial uses, particularly for silver.

**Figure 1: The Gold-Silver Ratio is Anything but Stable.**

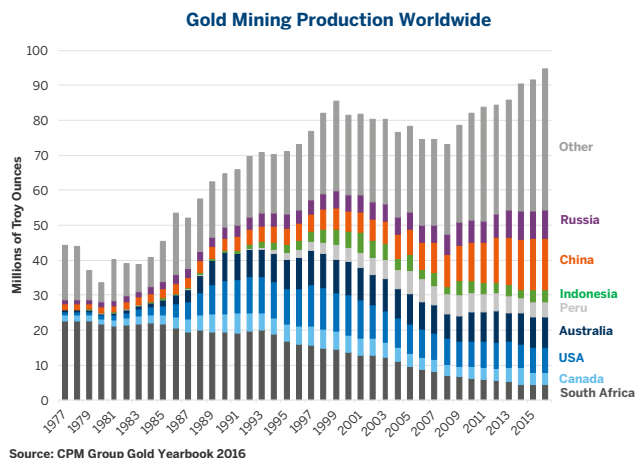


Source: Bloomberg Professional (GOLDS and XAG)

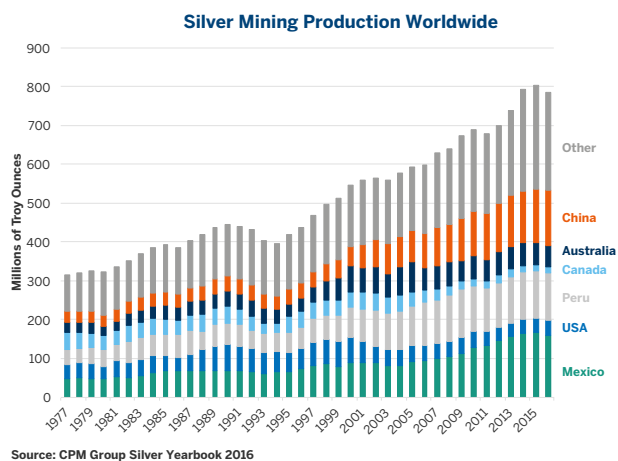
### Mining Profitability and Production

Gold and silver mining production have a few things in common. First, supplies of both metals have increased a great deal over the past several decades (Figures 2 and 3). Gold mining output has risen 183% since 1980, compared with silver's 138%. Unlike platinum and palladium, both gold and silver also have highly diversified supply bases.

**Figure 2: Gold Supplies Have Grown Strongly Since 1980.**



**Figure 3: Silver Supplies Have Also Grown Strongly.**

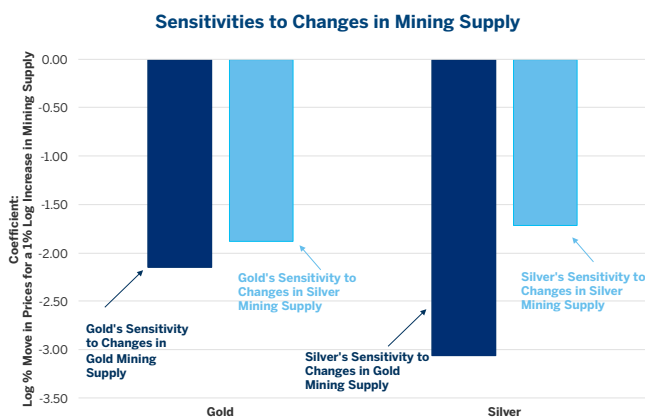


Changes in gold and silver mining production influence the price of both metals but not always in the way that one might expect. After all, why does gold buy more than twice as much silver today than it did in the late 1970s and early 1980s when gold mining supply has increased more than silver's? This counterintuitive development has a great deal to do with silver's extreme sensitivity to changes in gold mining output – even more than gold's own sensitivity to changes in its mining output (Figure 4).

Gold and silver are partially substitutable. While silver has more industrial uses than gold, both are used in jewelry. When prices of gold and silver rise, consumption of gold jewelry often plunges while demand for silver jewelry remains relatively unaffected. This is because as gold jewelry moves out of reach, some consumers will turn to less expensive silver. As such, increases in gold mining production tend to depress gold prices, which in turn leads to an increase in gold jewelry consumption at the expense of silver. The opposite happens when gold mining production declines: the price of gold tends to rise, leading people to consume less gold and perhaps a bit more silver jewelry, putting even more upside pressure on silver prices.

Changes in silver mining supply also exert a strong influence on gold and silver prices. So what is the outlook for gold and silver mining supplies? That has a great deal to do with mining profitability.

**Figure 4: Silver Prices More Sensitive to Changes in Gold Mining Supply Than Gold Itself.**

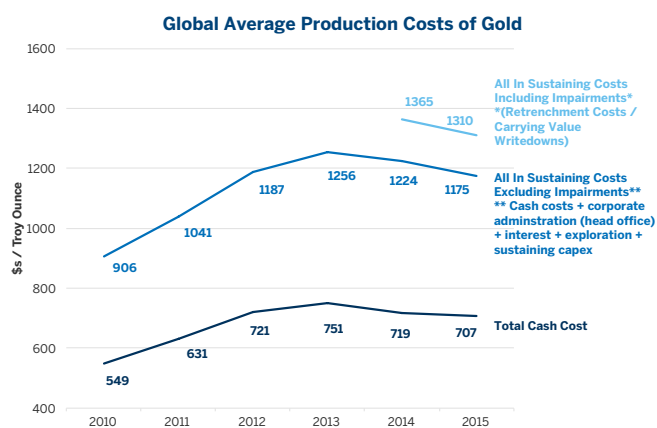


Source: CPM 2016 Gold and Silver Yearbooks with Calculations from CME Group Economic Research

The good news for silver is that gold is currently trading near its cost of production. This means that mining gold isn't especially profitable on an all-in cost basis, although it is still highly cash flow positive when one does not factor in overhead costs (Figure 5). If gold production stagnates, that could support the prices of both gold and silver but, if historical correlations hold, it could be even more bullish for silver than for gold, and thus tend to move the gold-silver ratio lower.

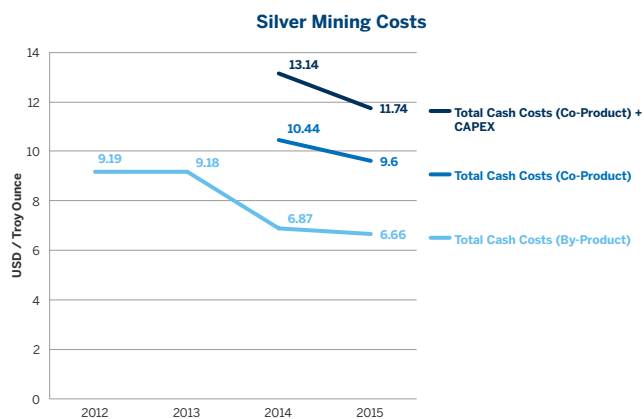
By contrast, mining silver is still highly profitable and therefore output appears more likely to increase in coming years than gold (Figure 6). Silver trades near \$19 per ounce but the cost of producing an ounce of the metal is less than \$12 on an all-in basis, and cash costs are roughly half of that. If silver mining production booms, however, it may depress the price of both metals relatively evenly, having only a modest impact on the gold-silver ratio.

**Figure 5: Gold Mining Yields Strongly Positive Cash Flows but Barely Meets All-In Costs.**



Source: GFMS Gold Survey 2016, Metals Focus: Gold Focus 2015, Metals Focus Gold Mine Cost Service

**Figure 6: Silver Remains Highly Profitable for Most Mining Operations.**



Source: Thomson Reuters/The World Silver Institute: World Silver Survey 2016, page 35

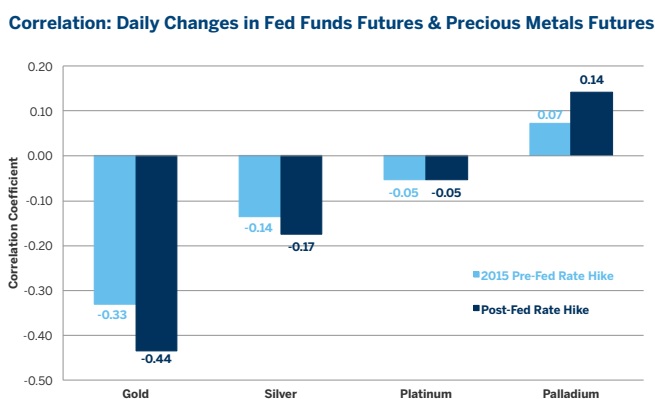
However, the supply side is only one factor influencing the gold-silver ratio. On the demand side, interest rates and industrial usage matter as well.

**Interest Rates: Mirror, Mirror on the Wall, Which is the Most Precious of Them all?**

A decline in expectations for an interest rate hike by the Federal Reserve has been more of a boon for the price of gold than any other metal because gold, which has few industrial uses, is considered the purest of all precious metals. Among the various metals, gold has, by far, the strongest negative sensitivity to changes in interest rate expectations (Figure 7). As such, if the Fed hikes rates by less than what the current Fed Funds futures curve is pricing (essentially two rate hikes for the rest of the decade), that would tend to support gold more than silver and could move the gold-silver ratio higher. On the other hand, if the Fed hikes more than twice between now and the end of 2019, that would most likely tend to depress gold prices more than silver prices and lower the gold-silver ratio.

Another reason why gold outperformed silver as an investment during the past three-and-a-half decades probably has to do with the secular trend towards lower interest rates, which have tended to benefit gold more than silver. This trend may be reaching its limit, however, unless bond yields can find a way to go even lower. If rates reverse course and begin to rise, silver might outperform gold.

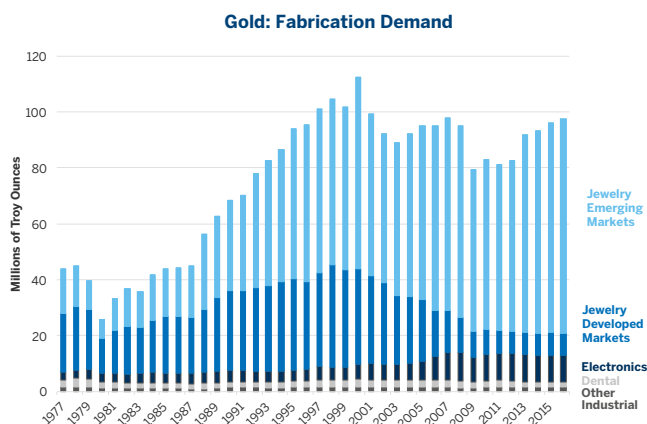
**Figure 7: Gold Reacts More Negatively Than Other Precious Metals to Gains in Fed Funds Rates.**



Source: Bloomberg (FFZ7, GCL, S11, PL1 and PA1), CME Group Economics Research Calculations

Interest rates represent only a part of the demand picture: they influence demand for gold and, to a lesser extent, silver as investments. Another big part of the equation is industrial demand, and since gold has few industrial uses (Figure 8), this is mainly silver's domain.

**Figure 8: Gold is Overwhelming Used for Jewelry and Investments.**



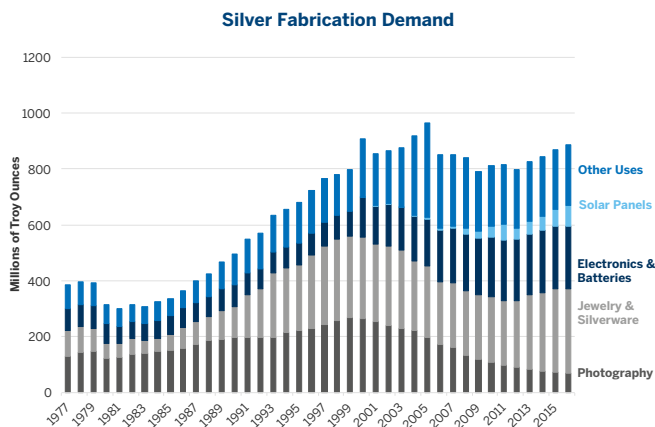
Source: CPM Group Gold Yearbook 2016

**Industrial Uses and Impacts**

A final reason why silver underperformed gold for much of the past fifteen years probably has to do with the death of what used to be its primary use: photography. The advent of digital cameras wiped out the traditional photography industry and destroyed a great deal of demand for silver. That's the bad news. On the flip side, silver-plate photography can only die once and it's now mostly dead.

The other piece of good news is that demand for solar panels is soaring, and that silver is used in some solar panels opens up a possible source of future demand growth (Figure 9).

**Figure 9: Silver Demand Growth Might Rely More on Solar Panels.**



Source: CPM Group Gold Yearbook 2015

**To read more economic research reports like this one or subscribe to the mailing list, visit [cmegroup.com/research](http://cmegroup.com/research).**