This January marked the 150th anniversary of a major event in American history: the discovery of gold at Sutter’s Mill, California. Fittingly, gold made news again this year by dropping past $300 an ounce to hit its lowest price in nearly two decades. While some of the subject’s interest undoubtedly springs from an almost voyeuristic fascination with the precious metal itself, gold prices are nonetheless legitimate news, since they are considered harbingers of stability or future inflation. Careful observers’ acquaintance with the gold market’s particular twists, turns, and idiosyncrasies gives them a more reasoned understanding of its uses as an economic indicator. This Economic Commentary takes the confluence of historical and current events as an excuse to refine our understanding of gold, gold prices, and inflation.

## Supply and Demand

Like any other good, gold’s price depends on supply and demand. But unlike wheat, say, where most of the current supply comes from this year’s crop, gold is storable and most of the supply comes from past production accumulated over centuries. In economists’ jargon, the current stock far exceeds this year’s flow. Of the total world supply of 125,000 metric tons of gold, annual production ranges around 2,400 tons. This means that in contrast to soybeans, corn, or pork bellies, this year’s gold production has little influence on prices.

In this sense, gold behaves less like a commodity than like long-lived assets such as stocks or bonds. That characteristic makes expectations particularly important because, like the stock market, gold prices are forward-looking, and today’s price depends heavily on future demand and supply.

Among other things, these expectations must take account of uncertainties in gold production, the most obvious being discoveries of new deposits. Production increased dramatically after discovery of the New World (which provided some exceptionally low-cost mines, such as Inca temples and palaces), and again in the 1850s when California and Australia became important producers. Equally essential, though less romanticized by Hollywood, have been technological changes. Development of the cyanide extraction process in 1890, for example, made it possible to recover gold from an inferior grade of ore. Further developments in chemistry and engineering continue to lower the price of extraction.

Still, unlike stocks, bonds, or Rembrandts, gold production does depend on prices. If the price of gold is very high, more mines will open up and existing ones will take out lower-grade ore. If the price is very low, some mines will shut down and others will curtail production, leaving low-grade ore in the ground. This adds a degree of “mean reversion” to the price of gold, which tends slowly to return to the cost of producing more gold.

In the very short term, however, there may be no such mean reversion. A price increase today could signal an even bigger rise in the near future, enticing mine operators to reduce output until prices move up. Alternatively, high prices may reduce output temporarily by encouraging some mine operators to move to low-grade ore, which is only profitable when prices are high. Since production capacity can be somewhat fixed, the shift to lower-grade ore could mean a lower supply—and thus a higher price—of gold.¹

Gold demand puts its own spin on matters. Unlike oil, for example, which literally goes up in smoke, gold is rarely destroyed while being used.² The largest demand is for jewelry and investments (which are often lumped together because it’s hard to categorize Krugerand cuff links or ingot necklaces). Combined jewelry and investment demand runs about 2,800 tons a year. Dental and industrial demand is smaller, at 120 tons annually. Gold, of all known metals the
most malleable (easily shaped) and duc-
tile (easily hammered flat or pulled into
a wire), has many industrial applica-
tions. Fine wires are used in electronics;
thin coatings are used to insulate glass.
Since most gold survives its use, the
total world stock continues to grow, and
this characteristic too makes its prices
resemble those of a long-lived asset. As
a result, they show much less mean
reversion than do prices of other storable
commodities, such as oil or copper.4

Gold’s extra, unique source of demand
and supply, which is receiving intense
scrutiny in 1998, relates to its role in the
world monetary system, namely, the
gold stocks of central banks. Of the total
supply of 125,000 tons, between 28,000
and 35,000 are held by central banks
around the world. The International
Monetary Fund’s current official figure
is 35,623 tons, though this may be an
underestimate because not all countries
report their holdings.

Central bank sales were often blamed for
pushing gold prices down in 1997. Early
that year, Argentina sold 125 tons, an
amount exceeding the average annual
industrial demand; in July, Australia sold
167 tons. The Argentine sale illustrates
how financial markets affect gold prices.
Argentina’s central bank did not sell
gold directly on the open market;
instead, it exercised put options, financial
contracts that entitled it to sell at a
previously specified price. In November,
Switzerland’s central bank merely pro-
posed selling 1,400 tons by the year
2000, and prices fell. This illustrates the
already-mentioned “asset” side of gold,
where expectations about future demand
and supply matter a great deal.

A related controversy brought the point
home even more powerfully. The Euro-
pean Union must decide how much gold
the European Central Bank will hold.
Fears were that it would hold a lower
proportion of gold than do existing
European central banks, and that this
could entail selling some of the 2,900
tons currently held by the European
Monetary Institute.

- Gold Prices and Inflation

Treating gold simply as a commodity
misses the point, fascinating as the par-
ticular details of its market may be. From
earliest times, gold has served as money,
and this association persists in many
people’s minds, despite the metal’s dis-
appearance from our coinage, the aban-
donment of the gold standard, and Mr.
Keynes’ wry comments about digging up
gold only to bury it in bank vaults.5

Much of the discussion about gold prices
centers on whether the dollar remains “as
good as gold”6 and what changes in the
price of gold mean for prices and infla-
tion in the rest of the economy.

Gold’s most natural relationship to the
general price level is what one might
expect for any good or asset: A higher
general price level should be associated
with higher gold prices.7 To put it differ-
ently, cars cost more in 1998 than they
did in 1958; so do haircutts and movie
tickets. If it takes more dollars to buy
cars, haircuts, and movie tickets, it seems
likely that more dollars would also be
needed to buy an ounce of gold. Over the
long term, this generally holds true: An
ounce sells for more now than it did in
1970 ($285 versus $35). On shorter time
horizons, however, the Consumer Price
Index (CPI) and the price of gold often
go their separate ways. In recent U.S.
experience, the relationship between the
two is tenuous at best (see figure 1). Gold
prices today are less than half what they
were in January 1980, while the CPI has
more than doubled. This is not due solely
to the gold price spike of the early 1980s;
gold prices now are lower than they were
in 1985, even though the CPI has risen
more than 50 percent since then. Such a
relative price change is not unique. Con-
sider the price of computing power,
which has dropped so precipitously that a
1998 laptop is more powerful than a
1960s commercial mainframe.

A closer relationship exists between gold
prices and inflation, that is, the rate of
change in the general price level.8 Figure
2 plots both these series, lagging gold by
a year. Figure 3 further clarifies the rela-
tionship by plotting the CPI inflation rate
in each period against the gold price in
the previous period. Two periods particu-
larly stand out: The high inflation of the
early 1980s is matched by high gold
prices, which definitely appear to “lead”
the CPI inflation rate by about a year, a
relationship that doesn’t break down until
1988. The most recent decrease in the
inflation rate also corresponds to a drop
in gold prices, though that relationship is
much more synchronous, without a clear
lead or lag time.
The scatterplot diagram of figure 3 highlights the relationship more fully, though it obscures the leads and lags on view in figure 2. The slope of the line suggests that a $100 rise in the price of gold is associated, on average, with higher inflation in the following year of 2.4 percentage points. This pedantic terminology is supposed to convey the idea that figures 2 and 3 do not say anything about causality. While gold prices do tell us something about the inflation rate, it need not be either that inflation raises gold prices or that higher gold prices cause inflation. Some third factor, such as the money supply, may influence both.

Pedantry aside, the statistical relationships do look fairly strong: Gold prices can account for more than 70 percent of variation in the inflation rate. Significantly, however, a lot of the relationship comes from high-inflation environments; without those data points, it is decidedly weaker.

There are several possible reasons for this. The relationship may only become apparent when there are big swings in the inflation rate; without them, the noise may overwhelm the signal. If this is so, we should be warned not to read too much into the current numbers, just as it’s unwise to anoint any basketball player who sinks a few shots as the next Michael Jordan. In both cases, though, it pays to keep watching.

Another feature that weakens the relationship between gold and inflation is that it may change over time. This is especially likely if some third factor, such as monetary policy, is causing the relationship. Conceivably, a monetary policy designed to bring down inflation, as in the early 1980s, might have a different impact than one promoting a stable, low-inflation environment, like that of the 1990s.

The other factor to notice is the quantitative side of the relationship. Does the rebound in gold prices since January indicate a resurgence of inflation? Apart from the statistical caveats already given, it is wise to look at the actual relationship in figure 3. The rebound, lifting prices from $280 to $300 an ounce, predicts that inflation will increase 0.48 percent. Similarly, the newsmaking drop in the price of gold from its local high in February 1996 (when it topped $400) to its nadir in January 1998 (just below $280) suggests an inflation rate decrease of 2.9 percent, a more significant shift.

**Conclusion**

In a memorable essay, Milton Friedman wrote that “millions of people all over the world regard gold as ‘money,’ if not the only ‘true’ money.” As a consequence, the price of gold commands attention, and rightly so, because it serves to indicate general price stability or inflation. But gold is also a commodity, used in jewelry and by industry. This means that the details of its demand and supply affect its pricing, and need to be considered when gold is used to assay monetary policy.
Footnotes
1. This is a simplification, as the full argument relies on other factors such as mines’ inventory policy. The evidence seems to support the idea that higher gold prices mean lower output in the short run (see James Barney Marsh, “Keynes on the Supply of Gold: A Statistical Test,” Eastern Economic Journal, vol. 9, no. 1 [January–March, 1983], pp. 7–12).

2. Of course, it is not always recycled after its industrial uses, and in certain other cases it is destroyed or irrecoverable. For example, gold leaf of 20 carats and above is edible (see Martha Stewart, Martha Stewart’s Christmas, New York: C.N. Potter, 1989).

3. One ounce of gold, about the size of a human teardrop, can be beaten into 187 square feet of gold leaf or drawn into a mile of fine wire.


6. The phrase, oddly enough, is from Charles Dickens, A Christmas Carol (1848), stave III.

7. The meaning of “inflation” has changed over the years and is not completely standard even today (Michael F. Bryan, “On the Origin and Evolution of the Word Inflation,” Federal Reserve Bank of Cleveland, Economic Commentary, October 15, 1997).


9. Whether further reductions in the inflation rate are desired is a separate, and often disputed, matter.


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The views stated herein are those of the author and not necessarily those of the Federal Reserve Bank of Cleveland or the Board of Governors of the Federal Reserve System.

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