

## CURRENT EVIDENCE ON THE RESOURCE COSTS OF IRREDEEMABLE PAPER MONEY

*Tyler Watts and Lukas Snyder*

I do not know of any attempt to measure the real resource costs of an irredeemable paper currency and to compare such costs with the real resource costs of a commodity currency. That is clearly a much needed research project.

—Milton Friedman

In 1986, Milton Friedman published a brief article in the *Journal of Political Economy* suggesting the possibility that real resource costs associated with the production and use of money could be greater under the current fiat money regime than under the commodity money regimes that preceded it. His article, and the broader implication about the resource costs of paper money, however, received scant attention. For by 1986, the Fed's disinflationary policies had come to full fruition, inaugurating the Great Moderation that ushered in two decades of low inflation, low unemployment, and strong real growth in the U.S. economy. Private accumulation of gold coins and bullion as an inflation hedge, safe-haven asset (hereafter "investment demand" for gold, following the terminology of the

---

*Cato Journal*, Vol. 35, No. 2 (Spring/Summer 2015). Copyright © Cato Institute. All rights reserved.

Tyler Watts is Director of the Institute for Economic Education at East Texas Baptist University. Lukas Snyder is a Data Analyst at Milliman in Indianapolis, Indiana. The authors thank an anonymous referee for helpful comments on an earlier draft of the article. The full data set used in this article is available upon request from Tyler Watts (tylerwatts53@gmail.com).

World Gold Council) had ballooned in the 1970s along with the price of gold, but the Volcker disinflation brought the gold price back down to earth, undermining much of the rationale for ongoing monetary gold accumulation.<sup>1</sup>

More recently, the world has experienced severe financial crises, recession, and massive central bank interventions aimed at preventing a recurrence of the Great Depression. Unconventional monetary policies—in the form of ultra-low interest rates, quantitative easing, and macro-prudential regulation—by the Federal Reserve and other major central banks have contributed to asset price booms in commodities. In particular, in 2012, gold—the traditional safe haven asset still widely perceived as a hedge against inflation and economic uncertainty—saw both its average annual nominal and real price soar to new heights, as shown in Figure 1.

The gold boom is not just a price boom, but a production boom. The high price of gold is largely a result of the extra safe-haven investment funds being diverted into gold holdings during times of

FIGURE 1  
GOLD PRICES, 1967–2013

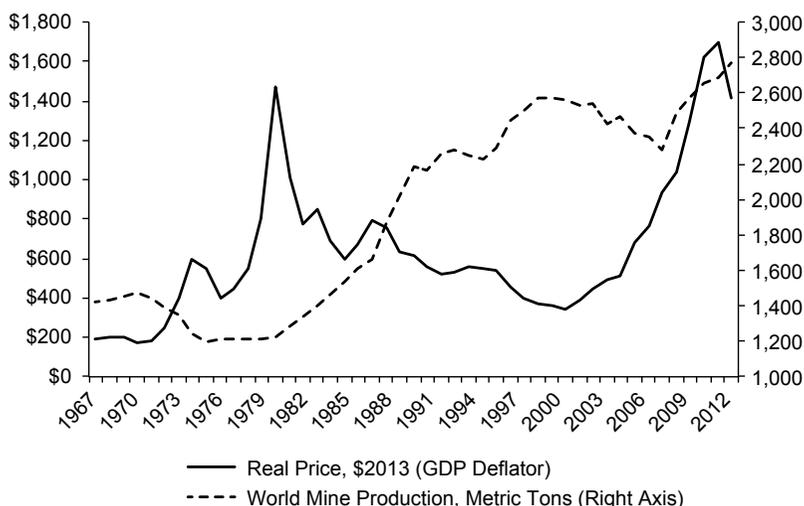


SOURCES: [www.kitco.com/charts/historicalgold.html](http://www.kitco.com/charts/historicalgold.html);  
[www.measuringworth.com/usgdp](http://www.measuringworth.com/usgdp).

<sup>1</sup>Indeed, lower inflation rates, sustained economic growth, and higher real rates of return on capital investments not only diminished the demand for investment gold, but likely increased the supply as well, as people sought to liquidate gold in favor of higher-yield investment opportunities.

fiscal and monetary uncertainty, and this high price in turn induces mining entrepreneurs to direct additional resources into gold production. Although many researchers and commentators argue that the world is near “peak gold” production—that is, world gold output must at some point peak and then decline due to the finite amount of gold extant in the earth’s crust—it appears that gold output has indeed responded to real price changes over the past several decades, albeit with a significant lag. Gold, like all fixed mineral resources, exhibits rising marginal costs of production in the short run with fixed production technology. Hence, the lagged output response to higher real prices represents a clear increase in real resource use in the gold mining industry. As Butterman (1980: 377) explained in the U.S. Geological Survey annual *Minerals Yearbook* for 1978–79, “The increasingly strong gold price provided the incentive for extensive exploration for gold deposits and the development of new mines. Retreatment of old tailings dumps, and the heap leaching of low-grade ores, became economically feasible.” Figure 2 confirms that

FIGURE 2  
REAL GOLD PRICE AND WORLD GOLD PRODUCTION,  
1967–2013



SOURCES: Price Data: [www.kitco.com/charts/historicalgold.html](http://www.kitco.com/charts/historicalgold.html). World Production Data: USGS *Minerals Yearbook*, “Gold,” 1970–2011; USGS *Mineral Commodity Summaries*, “Gold,” 2012–2014 (<http://minerals.usgs.gov/minerals/pubs/commodity/gold>).

higher real prices of gold—driven largely by bouts of increased investment demand—do indeed elicit an increased supply effort, and hence a greater resource cost of gold production.

In light of these rising resource costs of investment gold production, Friedman's unanswered question acquires renewed relevance. By comparing the net annual real value of gold investment in the fiat money era against the classical gold standard era, we seek to begin the undertaking of Friedman's "much needed research project."

The remainder of this article proceeds as follows. First, we present some estimates of the resource costs of the classical gold standard. While standard estimates assume that the classical-style gold standard requires that 1.5–2.5 percent of annual real output be dedicated toward monetary gold production (Friedman 1953, 1960), recent revisions, based on a more realistic fractional reserve banking practice of the actual gold standard era, revise this number significantly downward, to about 0.05 percent of GDP (White 1999). The estimates of scholars using the historically and theoretically accurate fractional reserves practice serves as a baseline by which to compare resource costs of net monetary gold production in both the modern pure fiat money regime and the classical gold standard.

Next, we present new evidence on the resource costs of gold across both monetary regimes. We look at trends in gold investment both as a percentage of GDP and as a percentage of total gold demand. We find that in the last several years, not only has gold investment increased significantly as a fraction of total gold demand, from roughly a 10 percent average in the pre-2008 years, to nearly 40 percent in the post-2008 period, but gold coin and bullion holding has approached, in real per-capita terms, levels last observed during the classical gold standard era. These data give weight to Friedman's concern that the "direct resource cost of the gold and silver accumulated in private hoards may have been as great as or greater than it would have been under an effective gold standard" (Friedman 1986: 644).<sup>2</sup>

<sup>2</sup>Gold is not, of course, the only inflation hedge asset. Moreover, the accumulation of other assets, such as silver and other commodities, add to the resource opportunity costs of fiat money. This article, however, only examines the costs associated with gold investment due to the lack of readily accessible data on silver and other commodity investment. We acknowledge that our exclusion of nongold inflation hedges likely biases downward our estimates of the inflation-hedging resource costs of paper money.

In the final section, we conclude by reiterating the notion that a real resource opportunity cost is not unique to the gold standard. Fiat currencies are much more susceptible to devaluation and deflation, and rational economic actors anticipate those risks by continuing to accumulate quasi-monetary gold. If the costs associated with gold hoarding and other investment vehicles directed at protecting wealth against fiat money volatility are seen to approach the levels of monetary gold production under historical gold standards, then the case for fiat money cannot rest on reducing resource costs in practice. Our results indicate that, in two major fiat money volatility episodes in the last 40 years, fiat money regimes have drawn gold into quasi-monetary or investment uses at levels approaching monetary uses during the classical gold standard.

### Resource Costs of Money

A chief complaint against the gold standard is that there are opportunity costs associated with the real resources that must be dedicated to the mining and minting of coins. As Friedman (1962: 40) states,

The fundamental defect of a commodity standard from the point of view of society as a whole is that it requires the use of real resources to add to the stock of money. People must work hard to dig gold out of the ground in South Africa—in order to rebury it in Fort Knox or some similar place. The necessity of using real resources for the operation of a commodity standard establishes a strong incentive for people to find ways to achieve the same result without employing those resources.

Friedman has supplied widely cited estimates of this resource cost, in terms of the percentage of total national income required to be directed toward gold mining each year to add sufficient monetary gold stocks so as to maintain price level stability consistent with real economic growth. Assuming a 100 percent reserve gold standard monetary system (i.e., one in which all hand-to-hand currency consists of gold coin or fully backed gold certificates, and all bank deposits are 100 percent gold-backed), Friedman (1953: 210) estimated that “something like 1½ per cent of the national income would have had to be devoted to the production of the currency commodities in order for prices to have remained stable under a strict

commodity standard.” In 1960, he argued that “under a pure commodity standard, the United States would at present be devoting about 2½ per cent of its national product or about \$8 billion a year to produce directly or indirectly through foreign trade additional amounts of the monetary commodity to add to the amounts already in circulation or in warehouses” (Friedman 1960: 5).

Friedman’s 1.5 percent of GDP figure amounted to half of the average GDP growth for the U.S. economy during the historical period in question. Updating Friedman’s estimate with the then-lower ratio of money to income, Alan Meltzer (1983: 105) arrived at a gold cost figure of roughly 0.5 percent of GDP. The Friedman-Meltzer estimates thus range from a low of \$35.4 billion to a high of \$177 billion per year in terms of 2012 dollars.

These resource costs would constitute a high burden by anyone’s standards, and Friedman recognized that fractional reserve banking developed to economize on the resource costs of a strict 100 percent reserve gold standard. Historical gold standard monetary regimes have, since the beginnings of banking, featured substantially less than 100 percent reserves. Yet Friedman and Meltzer report estimates only for the resource costs of an imagined 100 percent reserve system, rather than also considering a more realistic fractional reserve system.

According to Lawrence H. White, in a financially developed economy with a mature banking system under a gold standard, the historically observed ratio of gold reserves to banks’ demand liabilities was as low as 2 percent, or 1/50th of Friedman’s assumed 100 percent reserves scenario. Thus, White (1999: 47) estimates, the amount of new gold production required each year to maintain monetary equilibrium in the economy would therefore be around 0.05 percent of GDP, 1/50th of Friedman’s 1960 estimate and 1/10th of Meltzer’s 1983 update of that estimate. If we assume a far more conservative 10 percent gold-to-bank demand liabilities ratio, our estimate of the annual resource cost of monetary gold amounts to only 0.25 percent of GDP, a figure very close to the measured gold flow resource cost we derive for the classical gold standard period in the United States. The upshot of these historically more realistic estimates of the resource cost of gold is that they are an order of magnitude or more below the traditional view of resource costs that Friedman’s initial estimates had established.

Even granting that Friedman and Meltzer’s estimates of the resource costs of the gold standard were far too high, the argument

that fiat money can avoid such resource costs altogether still must be taken into account. With a negligible marginal cost of production, paper money obviously has the *potential* to reduce the net resource costs of the monetary regime.<sup>3</sup> Here we investigate the extent to which this potential has been realized. That is, to what extent has the switch to fiat money in the United States obviated the demand for monetary gold? Where Friedman, Meltzer, and White have offered armchair estimates of resource costs based on different assumptions, we examine the actual data on gold production for monetary use under the classical gold standard and for investment uses under the fiat dollar standard.

A great irony with fiat money is that its negligible marginal cost of production, which has the potential to spare resource costs of money, can potentially resuscitate these very resource costs if abused. Inflation through excessive fiat money issuance can be, and has historically been, far more severe and prolonged than the mild inflations associated with new gold discoveries in the historical gold standard regimes. This kind of fiat money inflation, or even the very threat of it, can inaugurate a flight back into gold as a safe-haven asset.

White (1999: 49) takes standard estimates of the deadweight burden of the inflation tax on currency-holding at various rates of inflation, compares them to his own estimate of a 0.05 percent of GDP annual resource cost of monetary gold production, and derives a break-even point: "A country where fiat money is managed so as to keep inflation below 4 percent can do without a gold standard; but a high-inflation country would be better off with gold." But his approach understates the costs of fiat money inflation by counting only the deadweight loss of money-holding benefits arising from a suboptimal quantity of real balances, completely neglecting the resource costs of producing quasi-monetary gold to meet inflation-hedging demand.

<sup>3</sup>Moreover, due to the fact that a reserve monopolist central bank is needed to install a fiat money regime in an economy, fiat money can—at least in theory—be supplied with perfect elasticity through activist monetary policy. Thus, fiat money offers the potential twin benefits, as compared with the gold standard, of zero resource costs and an elastic supply that could obviate both liquidity crises and deflationary adjustments in the face of adverse nominal spending shocks in the economy. It is not our task here to address whether central banks have in practice actually achieved a greater degree of monetary stability than the gold standards they superseded.

## U.S. Monetary Gold Production: Gold Standard vs. Fiat Currency

This brings us to our present task, which is to provide data comparing monetary or investment gold production for two distinct periods of U.S. monetary experience: the classical gold standard era of 1879–1914, and the post-Bretton Woods, pure fiat money era of 1972–present. The former period represents the zenith of the international gold standard in the decades leading up to World War I. The latter period is instructive because it provides two distinct sub-periods of increased gold investment, interspersed by a sub-period of declining gold prices and slack gold investment demand—namely, the gold boom of the 1970s brought on by inflationary volatility in fiat money, the Great Moderation in U.S. inflation and interest rates from 1984 to 2007, and the 2008 financial crisis and ensuing recession accompanied by massive monetary interventions by the Federal Reserve and other central banks. Although the latter actions have not yet generated much measured inflation, they nevertheless encouraged the long-term bull market in gold, leading the yellow metal to new nominal and real price records in 2012.

### *Procedure*

We set about to estimate the net annual change in the monetary gold stock (i.e., coins and bullion held by the public and in bank reserves) for the classical gold standard era, and the net annual gold *investment* demand (as opposed to industrial or jewelry demand<sup>4</sup>)

<sup>4</sup>We recognize that purchases of gold jewelry, especially the high-karat variety, can and do at times constitute investment demand, as people may choose to hold investment gold in this more attractive and wearable form. Indeed, it is common practice in many societies, particularly India and China, for people to hold much of their wealth in such a manner. For present purposes we are unable to include any jewelry purchases as gold investment for the United States. Although there are indications that at least some U.S. gold jewelry buyers view their purchases as a quasi-investment, we lack data, such as high-karat items as a percentage of total U.S. gold jewelry sales, upon which to build an estimate of the investment nature of gold jewelry purchases. Suffice to say that, by overlooking any jewelry component of investment gold purchases, we are simply establishing a more conservative estimate of investment gold flow costs for the fiat money era.

for the modern fiat money era.<sup>5</sup> Using the GDP deflator index, we converted the yearly gold flow values into constant 2009 dollars, then divided these real monetary/investment gold flow figures into real GDP for each year, to provide estimates in terms of the above-referenced literature of the resource cost of gold in terms of the fraction of total output devoted to *net* annual production of monetary or investment gold.

### *The Data*

Precise yearly data for the value of the monetary gold stock in the United States for the classical gold standard era are taken from the annual summary *Report of the Director of the Mint* published by the Government Printing Office. The yearly net flow of monetary gold is estimated for each year simply by subtracting the previous year's gold stock. We view this as a reliable estimate on the grounds that the vast majority of monetary gold in the United States in the classical gold standard period was either manufactured or processed by the U.S. mint, and that which was not of U.S. mint provenance—for example imports of foreign-made bullion—was most likely stored in the vaults of national banks that reported to the U.S. Treasury. Hence, the mint directors were well positioned to keep careful tabs on monetary gold stocks and flows in the United States.

Data for the post-Bretton Woods period come from two major sources. For the years 1997 to 2013, the World Gold Council provides “total bar and coin investment” data for gold in the United States and other major gold-using countries in nominal dollar value and/or quantity terms. Details on the sources and estimation methods for these data are provided in the endnotes of the

<sup>5</sup>The 1914–1933 period is excluded on the basis that, although the United States remained on a domestic gold standard, most of the erstwhile gold-standard countries did not, which led to large inflows of gold into the United States for much of this period. These inflows would distort our method of estimating yearly net monetary gold accumulation on the basis of the net change in the monetary gold stock. The 1934–1974 period is excluded from analysis on the grounds that holdings of monetary gold had been made illegal for U.S. residents during this period. While many Americans surely continued to hold monetary gold during this period, the illegality of such holdings undoubtedly clouds the already scanty official data on private gold-holding for that era.

yearly Gold Demand Trends publications issued by the World Gold Council.<sup>6</sup>

The period 1975 to 1996 presents the biggest challenge for this project in terms of estimating the yearly flow of investment gold into the U.S. economy because no official data are available.<sup>7</sup> Thus, we construct a weighted estimate based on annual production figures for, and journalists' accounts of American investors' purchases of, the most popular gold investment products available during this period. For this entire period, the South African Krugerrand gold coin was the most widely used vehicle for gold holding by American investors.<sup>8</sup> Various journalists' accounts indicate that Americans' share of total Krugerrand output ranged from 32.8 percent to 50 percent for 1977, 50 percent to 61.4 percent for 1978, and 50.6 percent for 1979 (Africa Fund 1977; Ross 1978, 1979; *Globe and Mail* 1979; Welsh 1980). Taking the mode of these estimates, we posit that U.S. purchases amounted to 50 percent of total Krugerrand output for the entire period.<sup>9</sup> Late in 1979, in reaction both to the widespread success of the Krugerrand and the gold investment boom then occurring, the Canadian government introduced the Maple Leaf bullion coin. Based on reports from Canada's *Globe and Mail* newspaper, we posit that U.S. purchases amounted to 40 percent of Maple Leaf output for the period in question (Welsh 1980, 1983). The U.S. government got into gold bullion production with the introduction of the American Eagle coin in 1986. We posit that 100 percent of American

<sup>6</sup>See [www.gold.org/supply-and-demand/gold-demand-trends/back-issues](http://www.gold.org/supply-and-demand/gold-demand-trends/back-issues).

<sup>7</sup>Private possession of unlimited amounts of gold coin and bullion, which had been outlawed by President Franklin D. Roosevelt's well-known gold confiscation and devaluation policies of 1933–1934, was re-legalized as of December 31, 1974 by Public Law 93–373.

<sup>8</sup>Indeed, for 1975–1978, the Krugerrand was the predominant government-issued gold bullion product available for individual American investors, representing an estimated 75 percent of all U.S. bullion purchases (Jarvis 1978). Canadian Maple Leaf gold coins became available late in 1979, and the U.S. Mint-issued Gold American Eagle became available in 1986.

<sup>9</sup>It is likely that U.S. purchases accounted for well less than 50 percent of Krugerrand production after North American coins became available. However, Krugerrand production tapered off substantially into the 1980s, especially after the introduction of the American Eagle in 1986, thus the effect of overweighting U.S. Krugerrand purchases for later years is diminished by the decreasing relevance of new Krugerrand production in the United States and world gold bullion markets.

Eagles were purchased in the domestic market.<sup>10</sup> Thus, although the gold investment flow data for 1975–1996 are not as complete or precise as for the classical gold standard era or the post-1996 period, we feel confident that, by tracking estimated U.S. purchases of the three best-selling gold bullion products, we have established a conservative working estimate of net U.S. gold investment flows for this period. The compiled data are presented in Table 1.

As Table 1 indicates, the net flow of monetary or investment gold into the U.S. economy since the time of the classical gold standard has varied within a large range, from 0.007 percent of real GDP during the Great Moderation to 0.306 percent during the later years of the classical gold standard. The overall average monetary gold flow resource cost during the classical gold standard in the United States stands at 0.249 percent, which we note is one-sixth the level of Friedman's 100 percent reserves-based estimate and one-half of Meltzer's updated Friedman-style estimate, but five times larger than White's estimate. The fact that the observed flow resource cost lies roughly midway between Friedman's and White's estimates makes perfect sense, given that Friedman (wrongly) assumes 100 percent reserves, while White assumes a free banking regime capable of achieving reserve economies much greater than those achieved in U.S. gold standard experience.<sup>11</sup>

On the surface, it appears that the post-Bretton Woods fiat money period performs substantially better for the United States than did the classical gold standard in terms of economizing on the resource costs of monetary gold. The percentage of real GDP devoted to monetary

<sup>10</sup>Production of both Canadian Maple Leafs and American Eagles represented *net* gold demand, as in Canada's case the coins were required by law to be produced with newly mined Canadian gold and in the case of the American Eagle the U.S. Treasury was required to replace any gold it withdrew from reserves for the purpose of minting Eagles (McAllister 1987). While American Eagles were marketed entirely within the United States, certainly some amount of them have been purchased for foreign accounts, and thus net American holding of Eagles likely represents less than 100 percent of production. We are confident, however, that foreign accumulation of American Eagles is offset by American accumulation of other minor bullion products, such as Chinese Pandas and Mexican Pesos.

<sup>11</sup>The National Banking System imposed stringent reserve requirements on banks' notes and demand liabilities ranging from 15 percent to 25 percent, depending on the classification of the bank, although these were in effect lower due to the pyramiding of reserves, as explained by Edward Meade (1898).

TABLE 1  
MONETARY AND INVESTMENT GOLD FIGURES

Time Period	Net Monetary/ Investment Gold Flow (\$2009)	Annual Averages for: Gold Flow as % of Real GDP	Gold Flow per capita (\$2009)
Antebellum (1822–1860)	\$109,740,350	0.242%	\$5.43
Early Classical Gold Standard (1879–1896)	\$429,438,431	0.196%	\$8.45
Late Classical Gold Standard (1897–1913)	\$1,488,766,455	0.306%	\$18.44
Classical Gold Standard Average	\$943,969,185	0.249%	\$13.30
1970s Gold Boom (1975–1983)	\$1,645,624,704	0.026%	\$7.26
Great Moderation (1984–2007)	\$656,026,889	0.007%	\$2.55
Financial Crisis/ Recession (2008–2009)	\$2,888,100,756	0.020%	\$9.43
Post Great (Moderation (2008–2013)	\$3,289,354,167	0.022%	\$10.58
Post-Bretton Woods Average	\$1,289,522,889	0.014%	\$4.87

SOURCES: Friedman and Schwartz (1970); U.S. Bureau of the Mint (1907, 1913); Warwick-Ching (1993); and World Gold Council, *Gold Demand Trends*: [www.gold.org/supply-and-demand/gold-demand-trends/back-issues](http://www.gold.org/supply-and-demand/gold-demand-trends/back-issues).

or investment gold was on average at least a full order of magnitude larger in the classical gold standard period than in the fiat money era.

We need to dig deeper, however, to get an accurate picture of the relative significance of investment gold in the modern era as compared to monetary gold in the classical gold standard era. The U.S.

economy has experienced substantial economic growth in the past 100 years, representing a 24-fold expansion in real GDP. This growth has been driven largely by a host of products and industries that either did not exist or were in their infancy in 1913: automobiles, aircraft, television, computers, cell phones, etc., to name just a few. Real GDP growth has averaged over 3 percent, while the gold stock has grown at about 1.5 percent per year during that time (Lehrman 2012: 27). With real goods and services *other than gold* growing at more than double the rate of the gold stock, gold is bound to become of less and less economic significance relative to total economic output. Note for instance that nonmonetary uses of gold—largely jewelry and art applications—averaged 0.11 percent of real GDP in the classical gold standard era, a figure which diminishes to 0.03 percent of GDP through the entire post-Bretton Woods era.<sup>12</sup> Is the diminution of the total value of nonmonetary, noninvestment gold relative to total output a factor of diminishing consumer tastes for gold? Perhaps, but a more plausible explanation is that this represents not an absolute drop in consumers' interest in gold, but simply a *relative* diminishment of gold due to tremendous growth across all other sectors of the economy.<sup>13</sup>

To compensate for the tendency of large overall economic growth to cloud relative gold cost comparisons over a more than 100-year timespan, it is useful to consider monetary vs. investment gold accumulation on a real per capita basis. As the final column of Table 1 shows, real per capita monetary gold flows peaked at an average level of \$18.44 (2009 dollars) in the late classical gold standard years, and bottomed out at an average of \$2.55 during the Great Moderation. However, during two distinct episodes of monetary volatility in the fiat money era—namely, the high inflation of the late 1970s and early 1980s, and the 2008 financial crisis and ensuing Great Recession—real per capita gold investment approached the level of the classical

<sup>12</sup>Calculation based on data from *Annual Report of the Director of the Mint* and *USGS Gold End Use Statistics*. Data available on request by email: tylerwatts53@gmail.com.

<sup>13</sup>For comparison, consider that U.S. sugar consumption rose from about 85 pounds per person in 1913 to about 100 pounds per person in 2013, even though the total value of sugar consumed in the United States fell from over 1 percent to 0.03 percent of real GDP (USDA Economic Research Service, [www.ers.usda.gov/topics/crops/sugar-sweeteners.aspx](http://www.ers.usda.gov/topics/crops/sugar-sweeteners.aspx); Austin 1913).

gold standard, and even exceeded the level observed during the early years of the classical gold standard era.<sup>14</sup>

The figures on the composition of gold use presented in Table 2 reinforce our interpretation of the trends observed in Table 1. While monetary uses of gold dominate nonmonetary uses by a two-to-one ratio during the classical gold standard, no sub-period of the fiat money era sees the investment share of gold rise above the non-monetary share.

Thus, on first glance the U.S. experience with fiat money comes out ahead in terms of minimizing the proportion of gold flowing into monetary uses, thus freeing more gold for nonmonetary uses. Note, however, that the shifting patterns of gold use in monetary versus nonmonetary uses reflect the episodic volatility of the fiat money era.

---

TABLE 2  
MONETARY VS. NONMONETARY COMPOSITION OF  
YEARLY GOLD DEMAND

---

Period	Annual Average Value of Percentage of Calculated Net Yearly Production Used in:	
	Jewelry/ Industrial	Monetary/ Investment
1880–1913 <sup>15</sup> (CGS)	33%	67%
1975–1980 (1970s Gold Boom)	60%	40%
1982–2003 ("Early" Great Moderation)	53%	46%
1997–2007 ("Late" Great Moderation)	91.6%	8.4%
2008–2011 (Great Recession)	60%	40%

---

SOURCES: Friedman and Schwartz (1970); U.S. Bureau of the Mint (1907, 1913); Warwick-Ching (1993); and World Gold Council, *Gold Demand Trends*: [www.gold.org/supply-and-demand/gold-demand-trends/back-issues](http://www.gold.org/supply-and-demand/gold-demand-trends/back-issues).

<sup>14</sup>The larger monetary gold flows seen during the later classical gold standard period arose largely from substantial new worldwide gold discoveries and application of new gold processing technology (Friedman 1992: 104 ff.).

<sup>15</sup>These values were estimated by dividing the average of total value of gold used in the "Manufactures and the Arts" category of the 1914 *Report of the Director of the Mint* (p. 201) into the average of the previously estimated nominal gold flow for each year in the period.

For instance, while the stability and low inflation expectations of the Great Moderation drove monetary or investment use of gold to less than 10 percent of the total, this figure rose to 40 percent on the heels of the 2008 financial crisis and Great Recession.

## Conclusion

Our goal in this article has been to provide data covering a range of monetary regimes and financial episodes from U.S. history in order to shed light on the question of the resource costs of monetary gold. The data indicate that in times of consistently low inflation and smooth financial seas, such as the Great Moderation, gold investment demand is light, and the value of net yearly real gold investment, both total and in per-capita terms, falls well below that of the historical gold standard era. However, in times of financial crisis and potential fiat money volatility, gold investment demand grows to levels that can rival monetary gold production of the classical gold standard era.

These facts support the claim of Lawrence H. White (1999) that fiat money regimes ultimately only save on resource costs associated with monetary gold accumulation if they are able to credibly commit to a low inflation regime and thereby obviate monetary demand for gold. Even when relatively low-inflation fiat regimes, such as the post-Bretton Woods Federal Reserve, engage in inflationary or expected inflationary policies, they can instigate renewed flows of investment gold at significant levels. On a final note, this article has addressed only the monetary or investment uses of gold in terms of accumulation of physical gold either by financial institutions or individual investors. Of course, there are other means available for hedging against volatility in the value of fiat money. Investors may accumulate other hard assets, such as silver, land, and art, in addition to gold, or may engage in various asset allocation strategies, such as increased holdings of foreign-currency-denominated assets. All investment strategies that aim at securing one's capital against losses due to fiat money volatility incur some form of opportunity costs. In other words, while gold remains the most popular safe-haven asset, there is more to the opportunity costs of fiat money than strictly gold investment. A further examination of whether the total opportunity costs of fiat money, including all hedging assets and strategies, exceeds the monetary gold resource costs of the classical gold standard is a ripe subject for further research.

## References

- Africa Fund (1977) "The Krugerrand: Facts about South Africa's Gold Coin." Available at <http://kora.matrix.msu.edu/files/50/304/32-130-E81-84-al.sff.document.af000017.pdf>.
- Austin, O. P. (1913) *Statistical Record of the Progress of the United States, 1800–1913, and Monetary, Commercial, and Financial Statistics of Principal Countries*. Washington: Government Printing Office.
- Butterman, W. C. (1980) "Gold." In *Minerals Yearbook*. U.S. Department of Interior, Bureau of Mines. Washington: Government Printing Office.
- Friedman, M. (1953) *Essays in Positive Economics*. Chicago: University of Chicago Press.
- \_\_\_\_\_ (1960) *A Program for Monetary Stability*. New York: Fordham University Press.
- \_\_\_\_\_ (1962) *Capitalism and Freedom*. Chicago: University of Chicago Press.
- \_\_\_\_\_ (1986) "The Resource Cost of Irredeemable Paper Money." *Journal of Political Economy* 94 (3): 642–47.
- \_\_\_\_\_ (1992) *Money Mischief*. New York: Harcourt Brace.
- Friedman, M., Schwartz, A. J. (1970). *Monetary Statistics of the United States: Estimates, Sources, Methods*. New York: Columbia University Press.
- Globe and Mail* (1979) "Traders Feel Auctions Spur Gold Hoarding" (6 March).
- Jarvis, C. B. (1978) "About Coins Book Has the Answers to Coin Questions." *Globe and Mail* (6 May).
- Lehrman, L. E. (2012) *The True Gold Standard*. The Lehrman Institute.
- McAllister, B. (1987) "Eagle Gold Coins: Not All American; Mint's Popular Series Contains Foreign Metal, Lawmaker Says." *Washington Post* (17 February).
- Meade, E. S. (1898) "The Deposit-Reserve System of the National-Bank Law." *Journal of Political Economy* 6 (2): 209–24.
- Meltzer, A. H. (1983) "Monetary Reform in an Uncertain Environment." *Cato Journal* 3 (1): 93–112.
- Ross, N. L. (1978) "2 Legislators Urge U.S. to Mint Gold Coin." *Washington Post* (7 May).

- \_\_\_\_\_ (1979) "Canadian Coin Competition for Krugerrand."  
*Washington Post* (27 August).
- U.S. Bureau of the Mint (1907) *Annual Report of the Director of the Mint for the Fiscal Year Ended June 30, 1907*. Department of the Treasury, Bureau of the Mint. Washington: Government Printing Office.
- \_\_\_\_\_ (1913) *Annual Report of the Director of the Mint for the Fiscal Year Ended June 30, 1913*. Department of the Treasury, Bureau of the Mint. Washington: Government Printing Office.
- \_\_\_\_\_ (1914) *Annual Report of the Director of the Mint for the Fiscal Year Ended June 30, 1914*. Department of the Treasury, Bureau of the Mint. Washington: Government Printing Office.
- Warwick-Ching, T. (1993) *The International Gold Trade*. Cambridge: Woodhead.
- Welsh, L. (1980) "Demand Eases for Maple Leaf after Initial Surge."  
*Globe and Mail* (14 January).
- \_\_\_\_\_ (1983) "Maple Leaf Coin Shines in Some Markets."  
*Globe and Mail* (22 October).
- White, L. H. (1999) *The Theory of Monetary Institutions*. Malden, Mass.: Blackwell.