INVESTMENT RESEARCH

MORGAN STANLEY

INVESTMENT STRATEGY

GOLD IN A GLOBAL MULTI-ASSET PORTFOLIO

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GOLD IN A GLOBAL MULTI-ASSET PORTFOLIO

Since gold is uncorrelated, rather than negatively correlated, with financial assets, it is not surprising that the addition of gold to a financial portfolio can have very different effects on the portfolio depending upon when the gold is added.

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SUMMARY AND INVESTMENT CONCLUSION

Much subjective input goes into the construction of a global, multi-asset portfolio, and while such influences are inevitable, emotion and impulsiveness may dominate analysis when objective standards are not applied across asset classes.

In fact, just as objective standards (such as price-to-book, price-to-earnings, price-to-value ratios) figure importantly in equity portfolio theory, so, too, can they be applied across asset categories that may at first seem incomparable. Let us consider an oversimplified case -- a fully invested portfolio restricted to two asset classes, U.S. equities and gold.

From the standpoint of a price-to-book evaluation, for example, one would start by ascertaining the replacement cost or true book value of the underlying real assets represented by a new common share unit of equity and the cost of producing a new weight unit (or ounce) of gold.

Comparing U.S. equities and gold on the basis of their respective market values, one can determine the divergence of the market price of each asset from its average and marginal (or replacement) cost of production. On March 4, 1988, the difference was approximately minus 12% for U.S. stocks based on replacement cost. It was minus 4% for U.S. gold, based on marginal costs, and close to plus 50% on an all-in average-cost basis. The degree of divergence of market price from cost over the long term can yield an estimate of the relative under/overvaluation of gold and equities. But divergences will also be influenced by radical movements in interest rates because equities exhibit special characteristics as financial claims, the present values of which are in part a function of the market rate of interest.

Also, gold has special characteristics that tend to influence its price movements. The immense scale of the market is shown by the value of the most recent year's mining output, which equaled approximately $24-billion -- greater than the stock market capitalization of Denmark. The current value of above-ground gold in the world is about $1.25-trillion -- more than one-quarter the market capitalization of

all the stocks in the Morgan Stanley Capital International 21-country index. The daily value of physical and futures gold trading is $3- to $5-billion. Surely, this is a liquid investment market too large to ignore.

Moreover, in the short run, gold production is not directly correlated with its price. Thus, one can observe that, while the price of gold does vary substantially under floating exchange rates, its unique and inelastic supply schedule tends to stabilize the total market value of gold in circulation -- just what one would expect of a natural monetary commodity. No matter the decade or century examined, total gold output in any one year has never averaged more than a small fraction of total gold stocks.

Indeed, the average increase in gold output over the long run has tended to gravitate to 2% -- directly proportional to the average rate of gain in economic productivity since the onset of the Industrial Revolution. Despite famous big discoveries and much-talked-about new mining techniques, statistics over centuries show that a relatively constant quantity of labor and capital must be applied to produce a relatively stable quantity of gold. Thus, the supply of gold in the market tends naturally to stay proportional over the long run to the supply of goods and services -- curiously similar to the stable money rule. This phenomenon helps to explain why gold became the natural measuring rod for trade and exchange and why it was selected as the monetary standard of early civilizations.

In the end, notwithstanding the many characteristics that influence the relative prices of equities and gold, we choose a relative cost-of-production analysis to help to allocate gold in a multi-asset portfolio for a fundamental reason. As in the case of all standard products and homogeneous commodities, it may also be said of gold that the actual costs of production, plus the expectation of profit, effectively regulate the value of new output offered on the market. Although in a free market the price of any product, service, or financial claim may actually fall below its cost of production, this disparity cannot continue indefinitely. Because when the free market price of any product falls below its costs of production, rational managers cut back production in order to avoid losses and bankruptcy.

Economic history and business analysis suggest that, in a completely free market, any price below the cost of production may be considered at equilibrium in the sense that it clears supply and demand in the short term. But the actual point-of-production price -- i.e., the long-term equilibrium price, which alone can ensure continuing production -- must cover the costs of production plus a profit; if it does not, ever-declining quantities will be produced (except by coercion, as in non-market economies). This relationship between the auction (or short-term) clearing price and the point-of-production price establishes not only an objective ground for evaluating the long-term relative values of equity and gold in a global portfolio but

also it identifies an unequivocal standard by which to compare the value of all assets in a multi-asset portfolio.

As noted earlier, on March 4, 1988, gold (with a market price of around $431.80 an ounce) was selling very close to U.S. replacement cost value on the basis of marginal U.S. mine output, while it was selling at almost a 50% premium to its all-in average U.S. costs of production of about $300 an ounce. The S&P 400, at 308.98, was trading at a 12% discount from its replacement cost value of $355. (A Dow Jones/gold comparison would be analogous.) Thus, gold is relatively overvalued and should be underweighted based on a long-term cost-of-production analysis.

As discussed in detail in the body of this report, applying these facts to the narrow case of a portfolio that must be fully invested and restricted to U.S. equities and gold bullion leads to a weighting of approximately 90% for U.S. equities and 10% for gold bullion. In a global multi-asset portfolio, gold today should have no more than a 5% weight.

But prospects for gold and equity prices change considerably with varying conditions. At current high real interest rate levels and given relatively stable exchange rates and a non-inflationary monetary policy, the most plausible forecast for gold and U.S equity prices is that they will be about the same or lower one year from now.

Many analysts, however, are more concerned with parallels between the 1920s and the 1980s. Several have recently asked me what the Dow might sell at if the gold price remained between $400 and $500 an ounce, interest rates declined to the level they averaged during periods of fixed exchange rates, and the equity/gold price ratio were the same as that in 1929.

It is worth noting that, at the peak in 1929, the Dow sold at 19 times the absolute value of gold ($20) and 13 times the wholesale price index-adjusted price of gold (approximately $30). On this basis, assuming long-term interest rates of about 4% (the average level under fixed exchange rates) and normalized growth for Dow earnings, the theoretical Dow Jones equivalent, my hand trembles to write, might approach 5,000 -- if it were to repeat the 1929 episode. It is insufficiently recognized that, at the peak in 1929, the Dow sold at approximately 1.8 times its estimated replacement cost, which in 1988 would be 1.8 times approximately 2,500, or 4,500.

One cannot emphasize enough that, among the many important differences between 1929 and 1988, long-term rates of interest in the United States were in 1929 about one-half the present level. This difference alone implies that the stock market may still be at a high valuation. Thus, no prudent forecaster should make the extraordinary argument that the Dow or S&P will rise once again to the extreme valuation levels of the past, based simply on the equity/gold price

ratios or the stock-price/replacement cost ratios of the past unless they are prepared to predict rising secular earnings combined with long-term interest rates at half their present level -- say, $250 per share on the Dow and 3%-4% long-term interest rates. Both conditions would require higher savings rates, general expectations of stable exchange rates and stable money, and also a world economy growing steadily at 2%-3%.

Indeed, if the bull market is to develop a major new lease on life, the U.S. must reduce substantially the level of long-term interest rates. This is the crucial economic issue of the next decade, which should be resolved by the next administration. One may hope for a solution after the presidential election, or, more likely, it will come after an economic crisis.

U.S. EQUITIES AND GOLD IN A GLOBAL MULTI-ASSET PORTFOLIO

The Morgan Stanley multi-asset global portfolio is divided into four classes (see Table 1):

Table 1

Morgan Stanley Asset Allocation Model

	Recommended Weighting	Wgt. Range	Risk Premium	Required Return	12 Mos. Forecast Return	Excess Return
Short-Term Investments	0	0-30%	0%	5%	5%	0%
U.S. Equities (S&P 500)	34	20-70	7	12	15	3
Emerging Growth	6	2-20	10	15	18	3
International Equities	7	5-20	9	14	16	2
Total Equities	47					
U.S. Bonds	28	10-60	4	9	13	4
International Bonds	13	0-20	7	12	14	2
High-Yield Bonds	5	0-05	7	12	16	4
Total Bonds	46					
Venture Capital	2	2-10	15	20	15	-5
Real Estate	2	2-25	6	11	5	-6
Farmland	3	0-10	6	11	13	2
Gold/Metals	0	0-15	6	11	6	-5
Special Investments	0	0-05	10	15	NA	NA

NA = Not Applicable

(1) short-term (liquid) securities; (2) equities (liquid and illiquid); (3) bonds (short and long; pure interest risk and credit risk); and (4) real assets (e.g., farmland, real estate, gold, and other special investments). These four classes are subdivided into 12 categories, each of which is weighted (column 1) on the basis of risk/return probabilities at any given moment in the world economic cycle. Furthermore, the portfolio is linked to estimated returns for the ensuing 12 months.

Weight ranges (column 2) take into consideration many factors, including currency and interest rates, the relative scale of the market for each asset, and the prudent risk limits of concentration in any particular asset. A risk premium (column 3) is assigned to each category and is derived from its relative volatility, liquidity, and riskiness, combined with the history and maturity of its investment characteristics. The required return (column 4) is equal to the yield on short-term U.S. Treasury bills (near zero risk) plus a risk premium. The estimated 12-month return (column 5) minus the required return yields the excess return (column 6), the relative size of which, among other considerations, tends to drive the relative weighting of each category.

Of course, much subjective input goes into the construction of a global, multi-asset portfolio, and while such influences are inevitable, emotion and impulsiveness may dominate analysis when objective standards are not applied across asset classes (e.g., equities and gold). A value-oriented, all-equity portfolio may be tested using common analytical standards or ratios such as beta determination, price-to-book value, price-to-replacement value, price-to-cash flow, price-to-dividends, among others. As a result, while portfolio managers may disagree about equity valuation, there are objective, quantifiable benchmarks (albeit with clear limitations) against which comparisons within the class can be made.

In this analysis, I suggest that, just as objective valuation standards can be used in constructing an equity portfolio -- standards that portfolio managers ignored at their peril in August-September 1987 -- so, too, can they be used across asset categories that may at first seem incomparable. From this standpoint, then, let us study first an oversimplified example -- a fully invested portfolio restricted to U.S. equities and gold, using "price-to-book" as our common objective standard. To that end, let us examine what would be the cost to produce the approximate book value (that is, replacement cost) of the underlying real assets represented by a new common share unit of equity. Similarly, what would be the cost of producing a new weight unit (ounce) of gold (that is, its replacement cost) to be held in the same portfolio? In turn, what is the market price of each unit relative to its replacement cost?

The cost of producing a new share (or unit) of the S&P 400 index is approximately equal to the value of its underlying replacement cost. But market price and replacement cost can and often do diverge substantially, as shown in Table 2 and Figure 1.

Table 2

Replacement Book Value of the S&P 400

Year	Replacement Book Value (a)	Price-to-Replacement Book	Adjusted ROE (b)	Year	Replacement Book Value (a)	Price-to-Replacement Book	Adjusted ROE (b)
1960	$ 40.5	1.52	8.3%	1974	$112.3	0.68	3.6%
1961	42.3	1.79	8.2	1975	125.3	0.81	5.1
1962	44.0	1.50	10.0	1976	147.6	0.81	5.1
1963	46.5	1.71	10.5	1977	162.2	0.65	5.3
1964	49.7	1.81	10.9	1978	178.4	0.60	5.0
1965	53.0	1.86	11.5	1979	199.5	0.61	4.5
1966	57.1	1.49	11.2	1980	221.9	0.70	3.6
1967	62.1	1.69	10.1	1981	247.4	0.55	4.6
1968	67.3	1.68	9.5	1982	275.1	0.57	3.8
1969	73.1	1.39	8.4	1983	300.0	0.62	5.2
1970	79.3	1.27	6.5	1984	307.7	0.61	6.8
1971	85.9	1.31	6.9	1985	316.0	0.74	6.5
1972	94.8	1.39	7.0	1986	328.0	0.82	6.6
1973	104.1	1.05	6.3	1987E	340.0	0.84	6.5
				1988E	355.0	0.79(c)	--

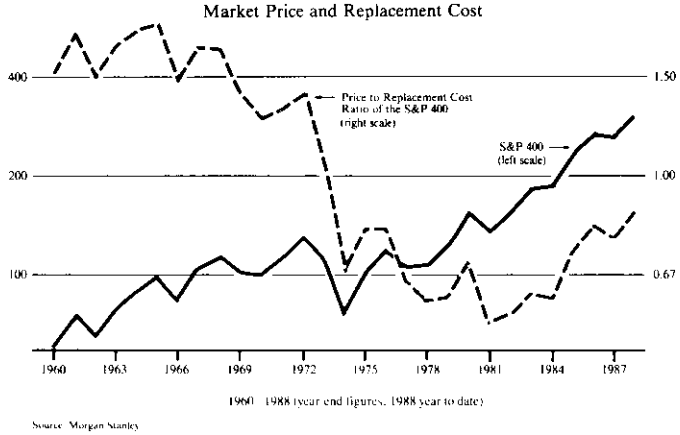
(a) Replacement book value of the S&P 400.
(b) Based on quality-adjusted earnings (adjusted for inventory profits and replacement cost depreciation) divided by replacement book value.
(c) As of January 21, 1988.

Source: Goldman Sachs

In 1982, for example, the year-end price of the S&P 400 was approximately 157; replacement cost, however, was 1.75 times that.

Figure 1

Market Price and Replacement Cost



1960–1988 (year end figures, 1988 year to date)

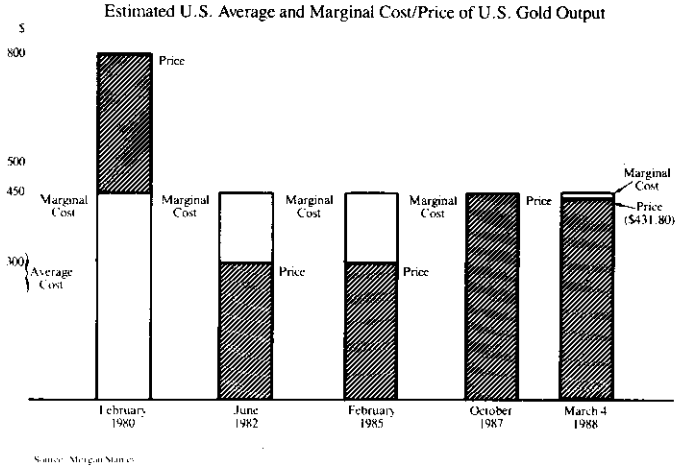
Source: Morgan Stanley

Meanwhile, using techniques developed by the U.S. Bureau of Mines, we estimate the all-in marginal (or replacement) cost of producing a new unit or ounce of gold from a major source in the United States -- such as the Homestake mine -- at approximately $450[1], whereas all-in average costs are approximately $300 an ounce. (Incidentally, $450 was also the approximate marginal cost of available production at the Homestake Mine when gold was at $300 an ounce in 1985.[2]) Market price and replacement costs, then, often diverge in commodity production also. Naturally, when the disparities between market prices and replacement costs are greatest, a long-term arbitrage opportunity opens up.

Figure 2 shows the fluctuations in the market price of gold relative to its underlying cost of production for the most recent period of floating exchange rates. Under fixed rates, however, the price of gold does not vary, and thus the market-value-to-underlying-cost ratio is determined by calculating the value of gold as a function of the variation in the general price level (including wages). Therefore, the value (or purchasing power) of gold, the price of which is fixed, would tend to rise above its marginal cost of production when the general level of prices and wages declined; conversely, the market value (purchasing power) of gold would tend to fall as the general level of prices and wages rose.

Figure 2

Estimated U.S. Average and Marginal Cost/Price of U.S. Gold Output



Source: Morgan Stanley

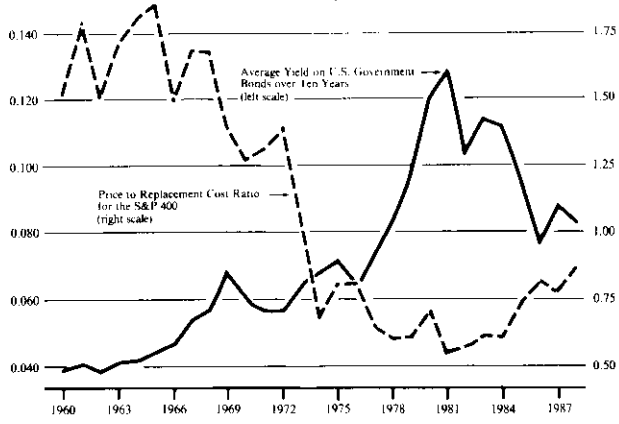
Now, a long-term value-based comparison of equities and gold could determine the divergence of the market price of each asset from its marginal (or replacement) cost of production. On March 4, 1988, for instance, the divergence was approximately minus 12% for U.S. stocks (Figure 1). It was minus 4% for U.S. gold based on marginal costs and almost plus 50% based on average all-in costs.

On the basis of the degree of divergence between market price and replacement costs, one can roughly estimate, from the long-term view, the relative under/overvaluation of gold and equities. But such divergences will also be influenced by radical movements in interest

rates because equities are not commodities but instead are financial claims with special characteristics. The present values of equities are in part a function of market rates of interest (Figure 3).

Figure 3

Interest Rates and Price/Replacement Cost Ratio



1960 - 1988 (year-end figures. 1988 year to date)

When interest rates and inflation rates are volatile and diverge substantially from long-term trends, the market prices of other financial claims, such as equities, will diverge often and substantially from their replacement cost values.

Also, the monetary system itself can in subtle ways influence the results of a gold/equities portfolio. In periods of gold-based fixed exchange rates, gold returns are at least equal to the par value of gold, plus or minus the variation in the price level from unity. That is, the purchasing power of gold under fixed exchange rates varies inversely with the price level -- e.g., 6.4% from 1929-1932[3]. Thus, under fixed exchange rates, not only was there little short-term risk in gold investments, but also the yield on gold held was often positive -- equal to the fall in the price level during deflationary periods. Moreover, an additional low-risk return could be obtained in the very liquid short-term gold lending-market.

SPECIAL CHARACTERISTICS OF GOLD

Gold is a commodity with its own special characteristics, some of which may not be generally understood. Approximately 2.5- to 3.0-billion ounces of gold are held in public and private world stocks, which may be as much as 90% of all gold mined throughout history. (Gold has been highly valued and thus conserved and held securely since the dawn of civilization.) At present prices, world gold stocks are worth approximately $1.25-trillion. The value of daily physical and futures gold trading is between $3- and $5-billion. (See Table 3 for official holdings; private holdings are the residual.)

If the Morgan Stanley Capital International 21-country world equity index is valued at $4.44-trillion, the value of world gold stocks is

Table 3

Central Bank Gold Reserves By Country and Region
(Million Troy Ounces)

	1950	1960	1970	1980	1981	1982	1983	1984	1985	1986	1987**
Industrial											
United States	652.0	508.7	316.3	264.3	264.1	264.0	263.4	262.8	262.7	262.0	262.2
Canada	16.6	25.3	22.6	21.0	20.5	20.3	20.2	20.1	20.1	19.7	18.9
Australia	2.6	4.2	6.8	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9
Japan	0.2	7.1	15.2	24.2	24.2	24.2	24.2	24.2	24.2	24.2	24.2
Austria	0.2	8.4	20.4	21.1	21.1	21.1	21.1	21.1	21.1	21.1	21.1
Belgium*	16.8	33.4	42.0	34.2	34.2	34.2	34.2	34.2	34.2	34.2	33.9
Denmark*	0.9	3.1	1.8	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
France*	18.9	46.9	100.9	81.9	81.9	81.9	81.9	81.9	81.9	81.9	81.9
Germany*	-	84.9	113.7	95.2	95.2	95.2	95.2	95.2	95.2	95.2	95.2
Italy*	7.3	63.0	82.5	66.7	66.7	66.7	66.7	66.7	66.7	66.7	66.7
Netherlands*	9.0	41.5	51.1	43.9	43.9	43.9	43.9	43.9	43.9	43.9	43.9
Norway	1.4	0.9	0.7	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
Spain	3.2	5.1	14.2	14.6	14.6	14.6	14.6	14.6	14.6	14.8	14.8
Sweden	2.6	4.9	5.7	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1
Switzerland	42.0	62.4	78.0	83.3	83.3	83.3	83.3	83.3	83.3	83.3	83.3
United Kingdom*	81.8	80.0	38.5	18.8	19.0	19.0	19.0	19.0	19.0	19.0	19.0
Other	1.6	2.7	1.9	1.9	2.1	2.1	2.1	2.2	2.8	2.8	2.8
European Monetary Cooperation Fund	-	-	-	85.6	85.7	85.7	85.7	85.7	85.7	86.5	86.5
Subtotal	857.1	982.5	912.3	873.5	873.3	873.0	872.3	871.7	872.2	872.1	871.2
Developing-Oil	20.8	20.3	33.5	40.6	43.4	43.6	43.8	43.9	43.8	43.8	43.8
Developing-Non-Oil											
Africa	7.8	7.1	22.8	14.9	12.2	10.5	10.9	10.5	7.8	7.6	8.6
Asia	12.5	13.4	17.5	32.2	32.2	32.4	30.8	31.5	32.9	34.7	35.1
Europe	10.1	21.6	34.9	38.3	37.8	36.7	36.0	36.8	37.1	36.2	35.0
Middle East	3.5	8.9	13.7	14.9	14.9	14.9	14.8	14.8	14.7	14.7	14.7
Western Hemisphere	34.8	28.3	20.8	20.8	21.9	19.6	20.3	18.4	21.0	20.9	19.6
Subtotal	68.7	79.3	109.7	121.4	119.0	114.1	112.9	112.0	113.5	114.1	113.0
International Monetary Fund	42.7	69.6	124.0	103.4	103.4	103.4	103.4	103.4	103.4	103.4	103.4
Bank for International Settlements	1.5	(0.5)	(8.1)	7.5	7.6	7.3	6.6	6.6	6.7	6.4	6.1
World Total	999.8	1,154.0	1,175.1	1,149.6	1,150.0	1,145.1	1,143.1	1,141.9	1,144.7	1,145.6	1,143.6

Notes: Totals do not equal sum of categories because of rounding. Developing-oil nations include oil-exporting countries; Developing non-oil nations consists of other developing countries. *Data for 1980 and subsequent years exclude amounts transferred to the European Monetary Cooperation Fund accounts. **Data for 1987 through May or June.

Sources: International Monetary Fund; CPM Group, LTD.

equal to more than one-quarter of the MSCI index; it exceeds the market capitalization of most of the individual national equity markets. These comparative market capitalizations attest to the vast economic and monetary potential built into the scale of existing world gold stocks, the unique liquidity of which derives from gold's near perfect homogeneity, divisibility, and portability, and the huge volume of worldwide gold transactions. If portfolio weightings should in any way be linked to the total value and liquidity of the asset markets that make them up, then a zero weighting for gold might dismiss too quickly a large and liquid investment. Indeed, the scale of the gold market is shown in the value of the most recent year's output, which equaled approximately $24-billion -- greater than the total stock market value of Denmark.

In addition, four centuries of history show that, over the long run, the purchasing power of gold is as constant as is available in the world of things. This is the primary conclusion of Professor Roy F. Jastram in his classic econometric study, The Golden Constant, 1977. While the cause of this constancy has escaped the monetary historians and portfolio theorists, my research suggests it is linked to the long-term supply schedule of global gold output. It can be clearly seen in Table 4 that, while the rate of change in gold output in any one country may vary widely from year to year, the global variation over the long run is narrow and steady.

Moreover, a careful study of gold production figures over two centuries shows that the systematic accumulation of gold grows directly in proportion to that of productive capital. Both grow around 2% a year over the long run. (See Table 5; also, compare inflationary periods with periods of stable prices.)

It seems that the stability of the purchasing power of gold over the long run, statistically demonstrated but not explained by Professor Jastram's monograph, is linked to the steady long-run rate of increase of world gold production, which, since the onset of the Industrial Revolution, has averaged approximately 2% a year -- closely proportional to the long-run average rate of gain of economic output. (See Figure 4 and Tables 4 and 5.)

Though not widely recognized, these statistics suggest why gold has emerged, throughout history, as a natural monetary commodity. That is to say, over the long run, the supply of gold tends to grow directly in proportion to the available supply of goods and services. A balanced relationship between money and goods is a necessary condition for currency stability.

Historical data also show that rising gold prices have never prompted in the short run a substantial increase in the mining of new gold relative to total stocks. Indeed, the data support the conclusion that the majority of existing gold mining activities are not susceptible to radical short-term cost reductions nor to very significant short-run expansion by innovative techniques.

Table 4

Major Non-Communist Gold Producers
(Thousand Troy Ounces)

	1979	1980	1981	1982	1983	1984	1985	1986E	1987P
South Africa	22,617	21,631	21,122	21,355	21,847	21,905	21,598	20,518	19,600
Canada	1,644	1,563	1,673	2,081	2,223	2,491	2,758	3,355	3,500
United States	964	970	1,378	1,466	1,956	2,059	2,475	2,951	3,300
Brazil	804	1,127	1,177	1,447	1,640	1,726	2,025	2,375	2,500
Australia	597	548	591	867	1,035	1,257	1,833	2,508	2,900
Philippines	574	666	753	830	812	773	810	900	950
Papua New Guinea	634	457	553	564	584	835	1,067	1,157	1,500
Chile	111	216	400	546	571	541	554	588	590
Colombia	304	510	534	460	439	800	1,150	1,250	1,250
Zimbabwe	388	367	372	426	453	478	472	475	475
Dominican Republic	354	371	413	379	361	338	337	290	280
Ghana	362	392	387	330	304	287	299	325	375
Peru	134	153	176	165	166	137	135	145	150
Mexico	195	196	203	196	223	229	190	225	225
Others	1,010	1,026	1,160	1,230	1,449	1,436	1,493	1,559	1,579
Total	30,692	30,193	30,892	32,342	34,063	35,292	37,196	38,621	39,174

E = CPM Group estimates. P = CPM Group estimates.
Notes: Totals may not equal the sums of the columns because of rounding.

Sources: Chambers of Mines of South Africa; U.S. Bureau of Mines; American Bureau of Metal Statistics; Gold Institute; Statistics Canada; industry sources; CPM Group Ltd.

Table 5

Global Gold Production Since 1800
(Thousand Troy Ounces)

Year	Ounces	Cumulative Production	Year	Ounces	Cumulative Production	Year	Ounces	Cumulative Production	Year	Ounces	Cumulative Production
1800-09*	608	6,080	1895	9,717	322,266	1926	19,343	884,187	1957	32,354	1,766,767
1810-19*	391	9,990	1896	11,397	333,663	1927	19,388	903,575	1958	33,416	1,800,183
1820-29*	486	14,850	1897	13,921	347,584	1928	19,433	923,008	1959	35,832	1,836,015
1830-39*	652	21,370	1898	15,073	362,657	1929	19,589	942,597	1960	37,549	1,873,564
1840-49*	1,760	38,970	1899	12,421	375,078	1930	20,873	963,470	1961	38,984	1,912,548
1850-59*	6,445	103,420	1900	12,692	387,770	1931	22,341	985,811	1962	41,860	1,954,408
1860-69*	6,107	164,490	1901	12,692	400,462	1932	24,255	1,010,066	1963	43,272	1,997,680
1870	5,030	169,520	1902	14,494	414,956	1933	25,511	1,035,577	1964	44,841	2,042,521
1871	6,381	175,901	1903	15,934	430,890	1934	27,028	1,062,605	1965	46,225	2,088,746
1872	5,798	181,699	1904	16,920	447,810	1935	29,460	1,092,065	1966	46,580	2,135,326
1873	5,504	187,203	1905	18,488	466,298	1936	33,101	1,125,166	1967	45,759	2,181,085
1874	5,360	192,563	1906	19,534	485,832	1937	35,263	1,160,429	1968	46,135	2,227,220
1875	5,341	197,904	1907	20,040	505,872	1938	37,598	1,198,027	1969	46,730	2,273,950
1876	5,430	203,334	1908	21,484	527,356	1939	39,635	1,237,662	1970	48,090	2,322,040
1877	6,001	209,335	1909	22,094	549,450	1940	42,176	1,279,838	1971	47,095	2,369,135
1878	5,987	215,322	1910	22,147	571,597	1941	39,030	1,318,868	1972	45,395	2,414,530
1879	5,416	220,738	1911	22,475	594,072	1942	35,325	1,354,193	1973	43,577	2,458,107
1880	5,349	226,087	1912	22,637	616,709	1943	27,989	1,382,182	1974	40,829	2,498,936
1881	5,064	231,151	1913	22,352	639,061	1944	25,346	1,407,528	1975	39,156	2,538,092
1882	4,886	236,037	1914	21,218	660,279	1945	24,483	1,432,011	1976	40,604	2,578,696
1883	4,746	240,783	1915	22,649	682,928	1946	24,946	1,456,957	1977	40,601	2,619,297
1884	5,015	245,798	1916	22,047	704,975	1947	25,347	1,482,304	1978	40,760	2,660,057
1885	4,945	250,743	1917	20,216	725,191	1948	26,559	1,508,863	1979	40,537	2,700,594
1886	5,256	255,999	1918	18,523	743,714	1949	27,580	1,536,443	1980	40,278	2,740,872
1887	5,509	261,508	1919	17,543	761,257	1950	27,237	1,563,680	1981	41,347	2,782,219
1888	6,048	267,556	1920	16,304	777,561	1951	26,583	1,590,263	1982	42,937	2,825,156
1889	5,814	273,370	1921	15,987	793,548	1952	27,335	1,617,598	1983	44,748	2,869,904
1890	6,400	279,770	1922	15,471	809,019	1953	27,287	1,644,885	1984	46,187	2,916,091
1891	7,060	286,830	1923	17,781	826,800	1954	28,653	1,673,538	1985	48,371	2,964,462
1892	7,544	294,374	1924	19,031	845,831	1955	29,901	1,703,439	1986	50,918	3,015,380
1893	8,657	303,031	1925	19,013	864,844	1956	30,974	1,734,413	1987E	52,600	3,067,980
1894	9,518	312,549							1988E	56,000	3,123,980

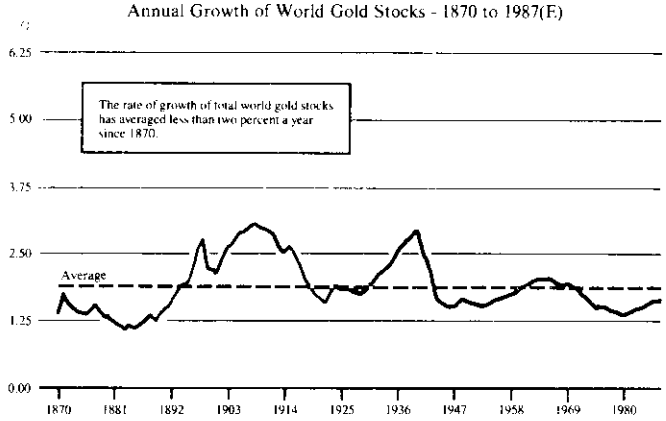
E = CPM Group estimates.
Notes: *Annual averages for the ten-year period.
Sources: American Metal Market Metal Statistics 1974, attributed to Dr. Adolph Soetbeer; U.S. Bureau of Mines; Statistics Canada; Chamber of Mines of South Africa; Central Intelligence Agency; Gold Institute; CPM Group Ltd.

Even estimates of gold output in 1988, expected to be one of the best production years of the century, suggest only a 5%-6% year-over-year increase. Relative to total gold stocks, this increase is less than 2%. Past innovations and great discoveries -- like today's heap-leach mining and carbon-in-pulp retrieval techniques -- did and will continue to make a difference in annual production figures. But in relation to total annual world gold output of about 50-million ounces and total stocks of about 3-billion ounces, the increased production of the "gold boom" years of 1986 and 1987 is very modest indeed.

In short, the historical data show that both the scale of existing stocks and the annual production of gold are unlike that of industrial or agricultural commodities -- such as porkbellies, oil, lumber, or copper. Gold output cannot be increased substantially relative to total stocks in a short time-frame by either intensified exploration or scale-production techniques. Thus, it should not be surprising to discover that the stock of gold for a generation, a century, has increased on average about 2% a year (Figure 4).

Figure 4

Annual Growth of World Gold Stocks - 1870 to 1987(E)

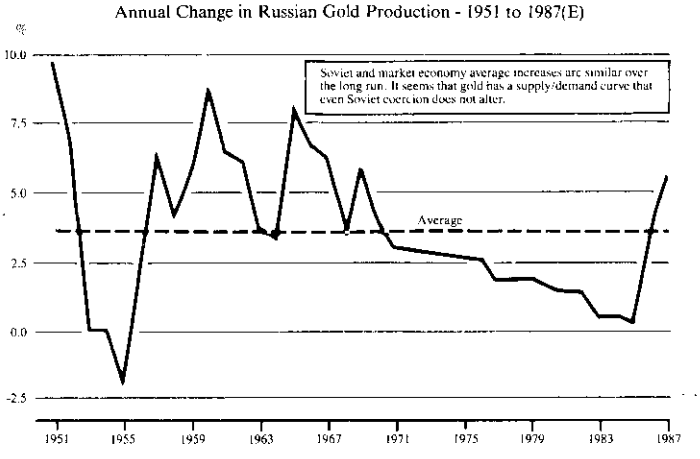


Source: Morgan Stanley

Gold output even in a command economy, such as the Soviet Union, shows similar growth characteristics, as shown in Figure 5.

Figure 5

Annual Change in Russian Gold Production - 1951 to 1987(E)

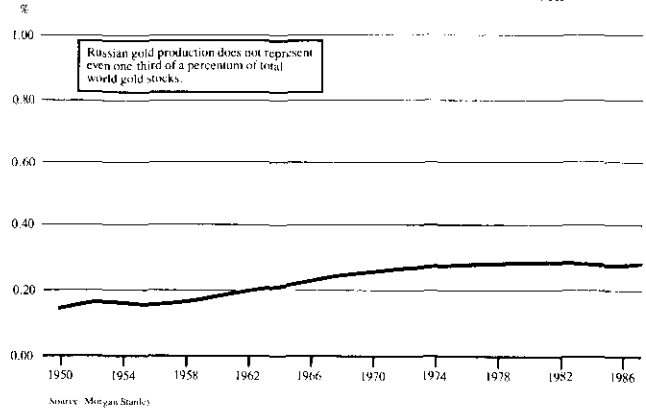


Source: Morgan Stanley

Indeed, contrary to conventional fears of policymakers and economists that the Soviet Union might be able to control the gold market, history shows that total annual Soviet output has accounted for only about one-third of 1% of total world stocks (Figure 6).

Figure 6

Russian Gold Production Relative to World Gold Stocks



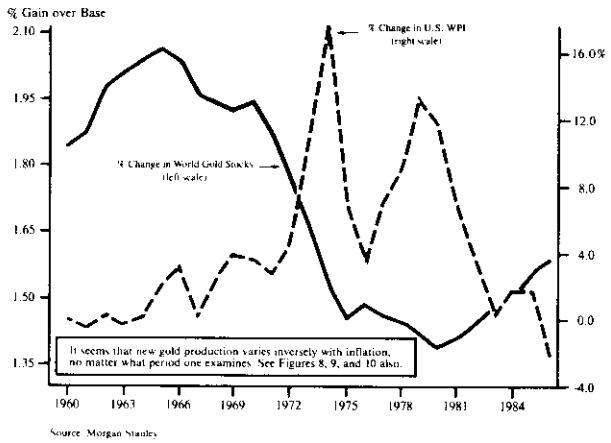
Even annual South African output is only two-thirds of 1% of total world stocks (Table 5). Thus neither country could successfully control the world gold market under either floating or fixed exchange rates.

The inelasticity of gold output relative to price variations can be measured under different monetary systems and inflation conditions. Under both fixed and floating rates, there seems to be little correlation between production and inflation. On the other hand, gold output tends, counterintuitively, to rise when the price level stabilizes or falls (see Figures 7, 8, 9, and 10).

While the price of gold does vary substantially under floating rates, gold's unique and inelastic supply schedule tends to stabilize the market value of gold in circulation -- just what one would expect of a natural monetary commodity. In addition, gold output in any one year never comes to more than a small fraction of total stocks -- about 1.5%-2.0%. Indeed, the 2% increase in gold output over the long run has been directly proportional to the average rate of gain of general economic productivity since the onset of the Industrial Revolution. Despite famous big discoveries and much-talked-about new mining techniques, statistics over centuries show, in general, that a relatively constant quantity of labor and capital is required to produce a relatively constant quantity of gold. This phenomenon helps to explain why gold became the natural measuring rod for the wages of labor, trade, and exchange and, thus, also, the monetary standard of early civilizations. The steady ratio of new gold supply to total gold stocks describes a necessary, if insufficient, condition for currency stability.

Figure 7

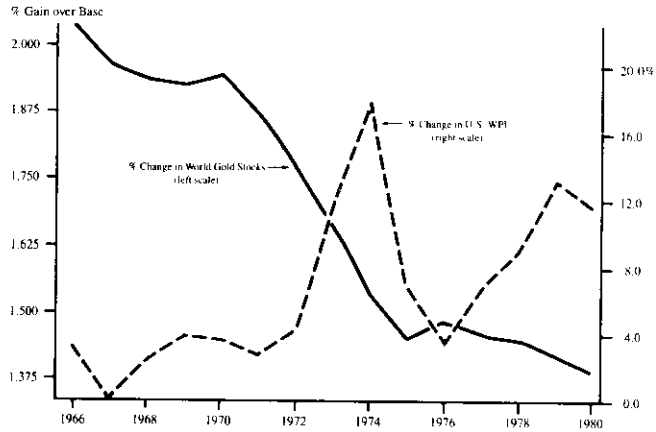
Inflation and Change in World Gold Stocks - 1960 to 1987(E)



Source: Morgan Stanley

Figure 8

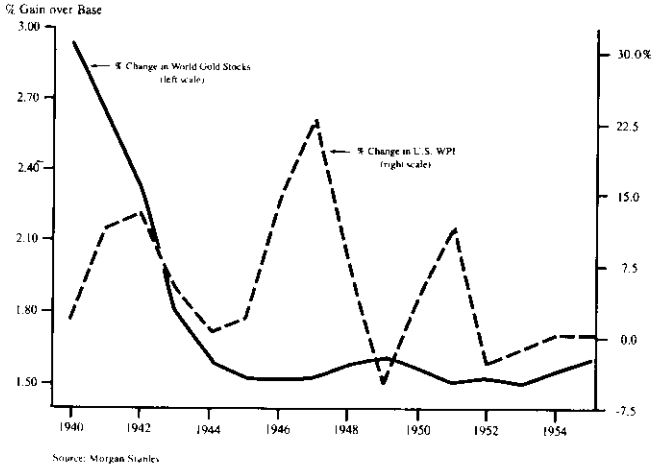
Inflation and Change in World Gold Stocks - 1966 to 1980



Source: Morgan Stanley

Figure 9

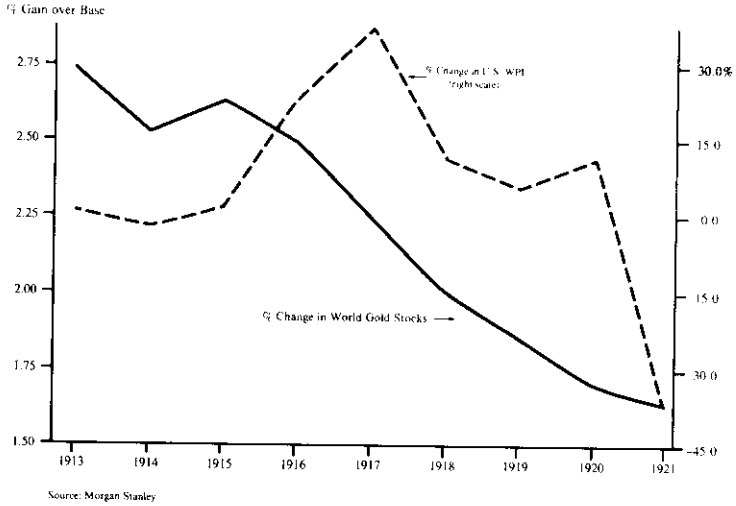
Inflation and Change in World Gold Stocks - 1940 to 1955



Source: Morgan Stanley

Figure 10

Inflation and Change in World Gold Stocks - 1913 to 1921



Source: Morgan Stanley

Newspapers and magazines recently have carried major stories on what they call the remarkable growth of gold production of late. Current statistics indicate, however, that, after two decades of high gold prices, global gold production has grown at approximately the same modest rate of the past hundred years -- about 2.2%. In fact, the 1986 increase was only 2.8%. Estimates for 1987 gold production call for not more than a 4% increase over 1986 -- this in what the publicists call the great gold "boom" of the 1980s. In addition, there has been much press recently on the effect of big gold loans on the supply side of the gold market. Yet, far and away the largest of these gold loans, the one-million-ounce Newmont loan, is less than 2% of annual output and a miniscule fraction of total stocks.

From the standpoint of portfolio timing, it is worth noting that the periodicity of gold price changes under floating rates seems to vary not only with the general price level but also with the level of income growth.

Table 6

Annual Gold Usage
(Thousand Troy Ounces)

	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986E	1987P
Electronics											
United States	1,060	1,229	1,340	1,293	1,205	1,043	1,070	1,120	900	830	920
Japan	703	883	1,081	976	1,109	1,113	1,382	1,565	1,500	1,450	1,525
Europe	762	826	999	800	723	723	778	884	923	910	890
Other	61	94	90	84	84	84	93	96	116	170	160
Subtotal	2,586	3,032	3,510	3,153	3,121	2,963	3,323	3,665	3,439	3,360	3,495
% of Total	6.1%	7.0%	9.3%	13.0%	9.8%	8.4%	9.9%	9.4%	8.3%	8.6%	9.1%
% Change Year to Year	-	17.2	15.8	-10.2	-1.0	-5.1	12.2	10.3	-6.2	-2.3	4.0
Dental											
United States	797	811	716	466	415	428	420	435	444	525	420
Japan	402	472	429	206	374	363	265	370	380	380	380
Europe	1,344	1,463	1,458	1,251	1,263	1,039	961	952	936	862	845
Other	202	200	235	112	129	138	96	87	80	77	75
Subtotal	2,745	2,946	2,838	2,035	2,181	1,968	1,742	1,844	1,840	1,844	1,720
% of Total	6.5%	6.8%	7.5%	8.4%	6.9%	5.6%	5.2%	4.7%	4.5%	4.7%	4.5%
% Change Year to Year	-	7.3	-3.7	-28.3	7.2	-9.8	-11.5	5.8	-0.2	0.2	-6.7
Other Industrial											
United States	527	632	611	452	470	449	425	440	410	400	410
Japan	134	138	128	164	132	86	482	150	175	170	180
Europe	720	788	765	601	534	505	482	476	492	463	455
Other	225	257	244	145	151	135	122	135	151	196	180
Subtotal	1,606	1,815	1,748	1,362	1,287	1,175	1,511	1,201	1,228	1,229	1,225
% of Total	3.8%	4.2%	4.6%	5.6%	4.0%	3.4%	4.5%	3.1%	3.0%	3.1%	3.2%
% Change Year to Year	-	13.0	-3.7	-22.1	-5.5	-8.7	28.6	-20.5	2.3	0.1	-0.3
Jewelry											
United States	3,187	3,383	3,281	2,484	2,725	2,917	3,250	3,295	3,328	3,000	3,000
Japan	1,817	2,304	2,117	1,156	1,492	1,559	1,607	1,860	1,920	2,000	2,210
Europe	13,359	14,327	13,172	6,836	9,122	10,298	8,941	10,462	11,745	11,542	11,000
Other Developed	749	852	713	471	478	545	486	460	447	505	450
Developing	16,032	14,610	10,460	6,818	11,424	13,648	12,565	16,169	17,281	15,786	15,400
Subtotal	35,144	35,476	29,743	17,765	25,241	28,967	26,849	32,246	34,721	32,833	32,060
% of Total	83.5%	82.0%	78.6%	73.1%	79.3%	82.6%	80.3%	82.8%	84.2%	83.6%	83.3%
% Change Year to Year	-	0.9	-16.2	-40.3	42.1	14.8	-7.3	20.1	7.7	-5.4	-2.4
Total	42,081	43,269	37,839	24,315	31,830	35,073	33,426	38,955	41,227	39,266	38,500
% Change Year to Year	-	2.8%	-12.5%	-35.7%	30.9%	10.2%	-4.7%	16.5%	5.8%	-4.8%	-1.9%

E = CPM Group estimates. P = CPM Group projections.

Notes: These statistics represent total fabrication demand, including metal recovered from old scrap but excluding gold used in investment-related medals, medallions, and coins. Gold use in the centrally planned economies also is excluded.
Source: CPM Group, Ltd.

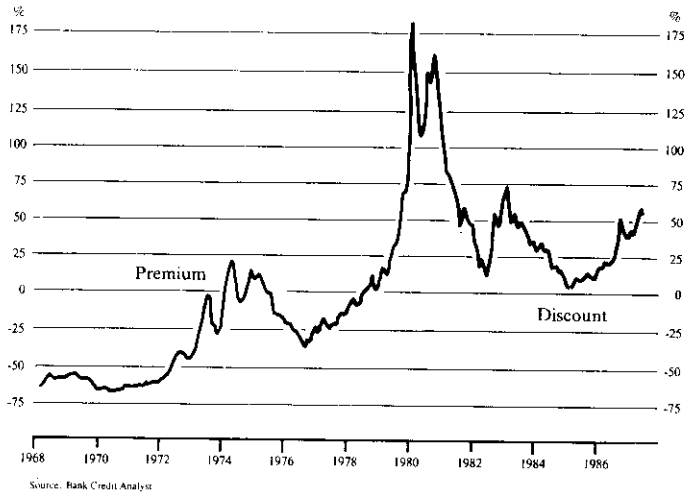
The industrial uses of gold, while growing, seem insufficient to be considered the major factor determining gold price variations (Table 6).

ON THE VALUE OF GOLD AND THE THEORY OF VALUE

Finally, let us consider a few other analytical techniques to try to determine the relative value of gold before we try to derive our portfolio weightings. Some analysts have suggested that gold is overvalued -- by as much as 50%-75% -- relative to the historical WPI (Figure 11).

Figure 11

Premium/Discount of Gold to WPI

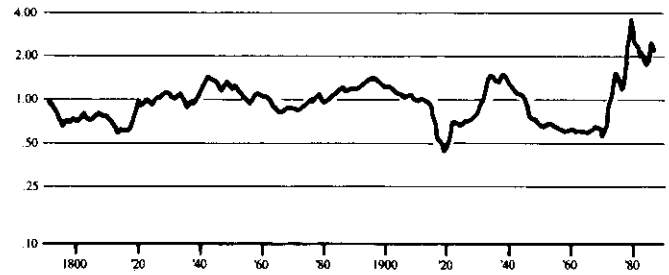


Source: Bank Credit Analyst

Others would portray what they consider an overvaluation of gold by examining its purchasing power over the past two centuries (Figure 12).

Figure 12

Purchasing Power of Gold



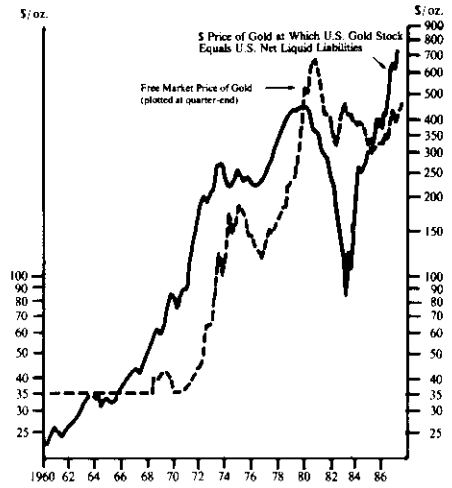
Note: Purchasing power was calculated from annual averages of the "All Commodities" component of the Producer Price Index (U.S. Department of Labor) or its predecessor, the Wholesale Price Index, and the annual averages of the dollar price of gold. Updated through Dec. 31, 1987.

Source: Barron's and the Institute for Economic Research

Still other analysts argue that, according to historical ratios, gold is undervalued by as much as 40%-50% relative to U.S. net liquid liabilities held abroad (See Figure 13).

Figure 13

The Price of Gold Required to Cover U.S. Net Liquid Liabilities



Source: Bank Credit Analyst

These gold valuation techniques are based on relative price and current account balance sheet analysis. But it may be argued that the history of relative prices and current account analysis do not provide as objective a basis for long-run forecasting as does an actual cost-of-production analysis. While the quantitative nature of relative price analyses affects an air of legitimacy, it is the real world production costs that actually underlie the true book value of new gold output. Relative price analyses depend entirely upon historical comparisons that are often unreliable because similar circumstances may or may not recur -- and certainly not with the predictability needed for investment timing.

Also, there is something irreducible and objective about real world labor costs, which account for the bulk of the costs of production; for, surely, the cost of production regulates all business decision-making and influences the formation of all prices. As in the case of all standard products and homogeneous commodities, it may also be said of gold that the actual costs of production, plus the expectation of profit, effectively regulate the value of new output offered on the market. This economic principle explains why the value of gold and standard products must, in the long run, be proportional to the quantity and quality of labor bestowed upon them, i.e., to their underlying costs of production. Although in a free market the price of any product, service, or financial claim may fall below its cost of production, this disparity cannot continue indefinitely. Indeed, when the free market price of any product falls below its costs of production, rational producers cut back supply in order to avoid losses and bankruptcy. They also must cut back on their use of the factors of production (labor, capital, natural resources). This process leads to reduced output until supply once again balances with demand.

A simple example best demonstrates the argument. Suppose that, today, using two man-weeks of total costs, one can produce from two neighboring mines either an ounce of gold or a ton of coal to sell for $500 at a 10% profit. But one year from now, because of changed circumstances, one can produce at the same costs only one-half ton of coal but still one ounce of gold to sell at the same price of $500 per ounce and $500 per ton. It is clear that the cost of producing one ton of coal would substantially exceed the market price. As a result, every miner who was able to do so would reduce his coal output and redeploy the factors of production into gold mining until new supply and demand conditions changed prices and costs, thereby altering once again the allocation of the factors of production. We emphasize the obvious with this example because the prevailing theory of economic value today is based upon the neo-classical doctrine that all economic value is subjective and, therefore, relative prices have no objective ground. This doctrine is proved false by experience, which shows that, in order to sustain production in a free market, prices of standard goods and commodities will tend over the long run to rise or to fall so as at least to cover all objective costs of production plus normalized profit. (Recent examples of this process can be found in the U.S. paper, chemical, copper, aluminum and steel industries from 1982 to 1987.)

Economic history and business analysis suggest that, in a completely free market, any price below the cost of production may be considered an equilibrium price only in the sense that it clears supply and demand in the short term. But, in fact, the long-term, or true equilibrium price, must be the actual point-of-production price; for it alone can ensure continued output. Such a price must at least cover the costs of production plus profit; if it does not, ever-declining quantities will be produced (except by coercion, as in non-market economies). This relationship between the auction, or short-term, market-clearing price, on the one hand, and the point-of-production price, on the other, establishes not only the objective ground for evaluating the long-term relative values of equity and gold in a global portfolio but also a clear standard by which theoretically to compare the value of all assets in a global portfolio.

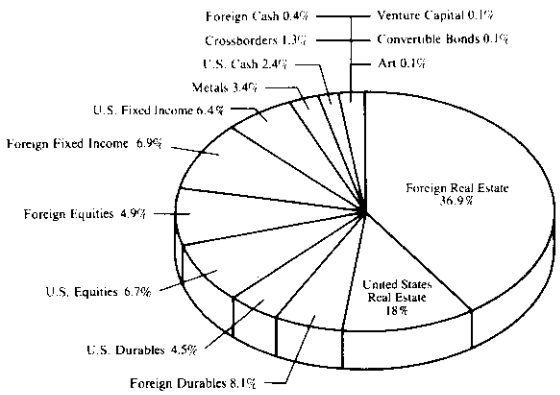
STANDARD DEVIATIONS, RATES OF RETURN, AND THE QUESTION OF INVESTMENT POLICY AND TIMING

The investment characteristics of gold are often defined by its standard deviation, which is high (29.87); its recent compound rate of return, which is very high (9.08%); its liquidity, which is linked to its extraordinary divisibility and portability, to the immense volume of gold transactions worldwide, and to its large share of total Free World physical and financial capital (about 5% of investable assets in 1984); its preeminence as a diversification asset because of its lack of correlation with the performance of other global asset classes -- thereby reducing general portfolio risk; and its function as insurance

because of its indestructibility and statistically proven constancy of purchasing power over very long periods. It is clear from the data that adding gold to a portfolio increases average returns and reduces the standard deviation. Perhaps the best summary of investment characteristics of portfolio assets in general can be found in Investment Markets, written by Roger Ibbotson and Gary P. Brinson and published in 1987. There we shall find in particular that gold, relative to a global multi-asset portfolio ("world wealth"), has a high alpha and a modest beta. (See Figures 14 and 15 and Tables 7, 8, and 9 from articles by Ibbotson in the Journal of Portfolio Management.)

Figure 14

Physical and Financial Capital of the Developed Free World
1984 = $27,680.5-Billion

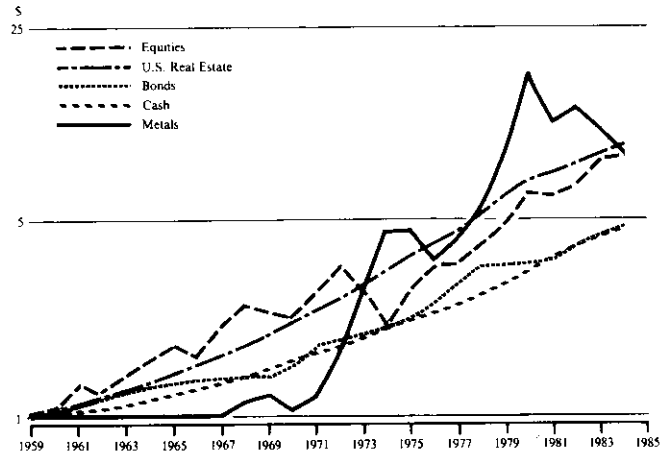


Physical and financial capital of the developed free world. Estimates are as of year-end 1984.

Source: Roger G. Ibbotson, Laurence B. Siegel, and Kathryn S. Love, "World Wealth: Market Values and Returns," The Journal of Portfolio Management, Fall 1985

Figure 15

Cumulative Wealth Indexes of World Asset Classes
Year-End 1959 = $1



Source: Roger G. Ibbotson, Laurence B. Siegel, and Kathryn S. Love, "World Wealth: Market Values and Returns," The Journal of Portfolio Management, Fall 1985

When all the quantitative data -- comparing gold with all other global investable assets -- are taken into account, one is still left with a fundamental investment policy question. And it is this: even if gold does give superb relative returns, as Ibbotson and Brinson show, how does one know that this will be so in the next quarter-century, especially if it is doubtful that performances correlate from one period to the next? Moreover, how does one determine when to raise or lower the weighting of gold in a portfolio in order to achieve the important but lower-order purposes of diversification, stabilization, insurance, and liquidity? This question is crucial because standard deviations, recent returns, and other comparative data are slim reeds upon which to base asset selection, portfolio weighting, and investment timing -- especially as the business cycle ebbs and flows.

It is at this juncture that an objective analysis of the ratio of the price and costs of gold production may lead to greater confidence in choosing when and how to invest in gold.

Table 7

Total Annual Returns on World Asset Classes and Portfolios, 1960-1984

	Compound Return	Arithmetic Mean	Standard Deviation
Equities			
United States			
NYSE	8.71%	9.99%	16.30%
AMEX	7.28	9.95	23.49
OTC	11.47	13.88	22.42
United States Total	8.81	10.20	16.89
Foreign			
Europe	7.83	8.94	15.58
Asia	15.14	18.42	30.74
Other	8.14	10.21	20.88
Foreign Total	9.84	11.02	16.07
Equities Total	9.08	10.21	15.28
Bonds			
United States			
Corporate			
Intermediate-term	6.37	6.80	7.15
Long-term	5.03	5.58	11.26
Corporate Total*	5.35	5.75	9.63
Government			
Treasury Notes	6.32	6.44	5.27
Treasury Bonds	4.70	5.11	9.70
U.S. Agencies	6.88	7.04	6.15
Government Total	5.91	6.10	6.43
United States Total	5.70	5.93	7.16
Foreign			
Corporate Domestic	8.35	8.58	7.26
Government Domestic	5.79	6.04	7.41
Crossborder	7.51	7.66	5.76
Foreign Total	6.80	7.01	6.88
Bonds Total	6.36	6.50	5.56

	Compound Return	Arithmetic Mean	Standard Deviation
Cash Equivalents			
United States			
U.S. Treasury Bills	6.25%	6.29%	3.10%
Commercial Paper	7.03	7.08	3.20
U.S. Cash Total	6.49	6.54	3.22
Foreign	6.00	6.23	7.10
Cash Total	6.38	6.42	2.92
Real Estate**			
Business	8.49	8.57	4.16
Residential	8.86	8.93	3.77
Farms	10.77	11.09	8.55
Real Estate Total	9.26	9.49	3.45
Metals			
Gold	9.08	12.62	29.87
Silver	9.14	20.51	75.34
Metals Total	9.11	12.63	29.69
U.S. Market Wealth Portfolio	8.53	8.65	5.08
Foreign Market Wealth Portfolio	7.76	8.09	8.48
World Market Wealth Portfolio			
Excluding Metals	8.27	8.40	5.27
Including Metals	8.32	8.48	5.84
U.S. Inflation Rate	5.24	5.30	3.60

* Including preferred stock.
** United States only.

Source: Roger G. Ibbotson, Laurence B. Siegel, and Kathryn S. Love, "World Wealth: Market Values and Returns," Journal of Portfolio Management, Fall 1985.

Table 8

Regression Results for Asset Class Returns in Excess of U.S. Treasury Bill Rates, 1960-1984

Dependent Variable	Independent Variable	Alpha %	Alpha T Statistic	Beta	Standard Error of Beta	Adjusted R^2	Standard Deviation of Residuals	1st Order Autocorr. of Residuals
U.S. Equities-NYSE	U.S. Equities	-0.06	-0.22	0.96	0.02	0.99	1.32%	0.04
AMEX	U.S. Equities	-1.10	-0.47	1.22	0.13	0.78	11.54	0.13
OTC	U.S. Equities	2.73	1.56	1.24	0.10	0.87	8.51	-0.05
U.S. Total Equities	World Equities	-0.22	-0.23	1.05	0.06	0.93	4.72	-0.05
Europe Equities	Foreign Equities	-1.57	-1.10	0.89	0.08	0.83	6.85	-0.48
Asia Equities	Foreign Equities	5.85	1.22	1.32	0.27	0.48	23.00	-0.15
Other Equities	Foreign Equities	-0.76	-0.26	0.99	0.17	0.59	14.02	-0.06
Foreign Equities	World Equities	1.19	0.64	0.90	0.11	0.72	9.10	-0.00
World Equities	World Wealth Excl. Metals	-1.14	-0.74	2.32	0.23	0.80	7.19	0.26
U.S. Corporate Bonds	U.S. Total Bonds	-0.05	-0.10	1.33	0.07	0.93	2.56	-0.28
U.S. Government Bonds	U.S. Total Bonds	0.12	0.36	0.84	0.05	0.94	1.60	-0.28
U.S. Total Bonds	World Total Bonds	-0.52	-0.47	0.72	0.17	0.43	5.46	0.20
Foreign Corporate Bonds	Foreign Total Bonds	1.56	3.31	1.02	0.06	0.93	2.35	-0.08
Foreign Gov't Bonds	Foreign Total Bonds	-1.00	-3.66	1.04	0.03	0.98	1.36	0.08
Crossborder Bonds	Foreign Total Bonds	0.91	1.04	0.64	0.11	0.60	4.33	0.12
Foreign Total Bonds	World Total Bonds	0.47	0.77	1.16	0.09	0.87	3.08	0.10
World Total Bonds	World Wealth Excl. Metals	-1.24	-1.08	0.67	0.18	0.36	5.39	0.17
U.S. Cash	World Cash	0.25	6.22	0.02	0.03	-0.02	0.20	0.26
Foreign Cash	World Cash	-0.73	-2.94	5.20	0.17	0.98	1.23	-0.26
World Cash	World Wealth Excl. Metals	0.05	0.16	0.04	0.06	-0.02	1.52	0.03
U.S. Business Real Estate	U.S. Real Estate	1.30	1.65	0.31	0.16	0.10	2.95	0.20
U.S. Residential Real Estate	U.S. Real Estate	-0.36	-0.87	0.94	0.09	0.83	1.55	0.11
U.S. Farm Real Estate	U.S. Real Estate	0.44	0.26	1.68	0.35	0.48	6.33	0.18
U.S. Real Estate	World Wealth Excl. Metals	2.52	3.71	0.31	0.10	0.25	3.20	0.57
U.S. Equities	U.S. Market Wealth	-3.17	-2.10	2.88	0.25	0.85	6.91	0.35
U.S. Bonds	U.S. Market Wealth	-1.34	-0.88	0.40	0.25	0.06	7.00	0.12
U.S. Cash	U.S. Market Wealth	0.28	6.58	-0.01	0.01	0.05	0.19	0.00
U.S. Real Estate	U.S. Market Wealth	2.42	3.35	0.32	0.12	0.20	3.31	0.62
U.S. Market Wealth	World Wealth Excl. Metals	0.60	1.51	0.85	0.06	0.89	1.86	-0.06
Foreign Equities	Foreign Market Wealth	2.05	1.14	1.50	0.18	0.74	8.80	0.06
Foreign Total Bonds	Foreign Market Wealth	-0.48	-0.46	0.67	0.11	0.61	5.21	0.09
Foreign Cash	Foreign Market Wealth	-0.62	-0.41	0.31	0.15	0.12	7.45	0.05
Foreign Market Wealth	World Wealth Excl. Metals	-1.22	-1.19	1.38	0.16	0.76	4.83	-0.08
World Wealth Excl. Metals	World Wealth Incl. Metals	0.19	0.43	0.88	0.07	0.88	2.16	0.14
Gold	Metals	-0.04	-0.14	1.00	0.01	0.10	1.43	-0.42
Silver	Metals	6.61	0.47	1.20	0.47	0.19	69.07	-0.37
Metals	World Wealth Incl. Metals	2.89	0.48	1.53	0.86	0.08	28.66	0.39

Source: Roger G.Ibbotson, Laurence B. Siegel, and Kathryn S. Love, "World Wealth: Market Values and Returns," Journal of Portfolio Management, Fall 1985.

Table 9

Effects of Characteristics on Expected Returns on Assets

	Risks					Marketability			
Asset	Stock Market Beta	Inflation	Real Interest Rate	Residual Risk Cost*	Taxability*	Information Costs*	Search Transactions Costs	Divisibility Costs	Miscellaneous Factors
Large Company Stocks	Near one	Low positive	Positive?	Near zero	Low	Low	Low	Very low	Probably efficiently priced
Small Company Stocks	Varies	Low positive	Positive?	Low	Low	High	Medium*	Very low	
Treasury Bonds	Near Zero	Positive	Low	Near zero	High	Low	Low	Medium*	Efficiently priced
Corporate Bonds	Low	Positive	Low	Near zero	High	Low	Low	Medium*	
Municipal Bonds	Near zero	Positive	Low	Low	Zero	Low	Low	Medium*	
Treasury Bills	Zero	Zero	High	Near zero	High	Low	Low	High*	
Houses, Condos	Low	?	?	High	Negative	High	High*	Very high*	High management costs
Gold	Zero or negative	Negative?	?	Low	Low	Low	Low	Very low	No income; portable
Art	Low	Negative?	?	High	Low	Very high	Very high	Very high	Nonpecuniary benefits; no income
Foreign Securities	Varies	Varies	?	Varies	Low	High	Low		
Human Capital	High	?	?	Very high	Very high	High	High*	Very high*	Cannot sell, only rent or borrow against

Note: Low, medium high, etc., refer to positive coefficients unless indicated to be negative.

Effects of Characteristics on Expected Returns on Assets:
High or Positive = raises expected return, lowering price
Low or Negative = decreases expected return, raising price
* Financial intermediaries are likely to be important in reducing these costs.
Source: Reprinted from the article by Roger G. Ibbotson, Jeffrey J. Diermeier, and Laurence B. Siegel, "The Demand for Capital Market Returns: A New Equilibrium Theory," Financial Analyst Journal, January/February 1984.

AN EQUITY-GOLD-PORTFOLIO

At present, gold is selling very close to its replacement-cost value on the basis of marginal mine output in the U.S (around $450 an ounce), while it is selling at almost a 50% premium to its all-in average cost of production (around $300) and a 100% premium to its average cash cost of production (around $200). On March 4, the S&P 400 was trading at a 12% discount from the replacement-cost value of its components.[4] (A Dow Jones/gold comparison would be analogous.)

Now, in February 1980, the market price of gold at $850 was way overvalued relative to the marginal cost of mining gold at the Homestake Mine. But, in June of 1982, gold, priced at $300, was undervalued relative to marginal gold mining costs at Homestake. On March 4, 1988, on the basis of long-run cost-of-production analysis, gold, at $431.80 an ounce, seemed fairly valued, while equities, at 2,057.8 on the Dow and 308.98 on the S&P 400, may be undervalued relative to gold. Even more important, however, both may be overvalued by other standards. In a three-asset portfolio, for example, high real rates of interest would perhaps suggest that U.S. equities and gold are overvalued relative to bonds.

On this mode of analysis, gold might have been underweighted in a gold-equity portfolio in 1980 and overweighted in 1982 and 1985 (when the price was around $300). Given the current ratio of gold and equity prices to their underlying costs of production, gold should be underweighted and U.S. equities overweighted in a pure gold-U.S. equity portfolio fully invested for the long run.

Moreover, the weighting of the two assets in a global multi-asset portfolio, given present levels of interest rates, must also be influenced by such factors as forecasts of profits (earnings momentum), divided discount models, inflation (discounts of future prices), and economic, monetary, and political considerations. If the price of gold were to rise substantially above $500 in the near future and the U.S. equity market were to stabilize or fall, it should then be prudent further to reduce gold investment levels -- on the grounds of objective replacement-cost analysis (i.e., price-to-true-book ratios). But if gold prices were to fall again, say to $300, and U.S. equities stabilize or rise, the percentage allocation of gold in the portfolio might then be gradually raised for the same reasons. This is not meant to imply that other compelling factors, especially the level of interest rates, might not determine a different weighting.

All things considered, gold, according to our analysis, should today be underweighted, but not eliminated.

In the narrow case of a portfolio required to be fully invested and restricted to only two categories of assets -- U.S. equities and gold bullion -- the portfolio might now contain 90% U.S. equities and 10% gold bullion.

In a global, multi-asset portfolio, we believe gold under present conditions should have no more than a 5% weight. (Remember that gold is close to 5% of global investable assets.)

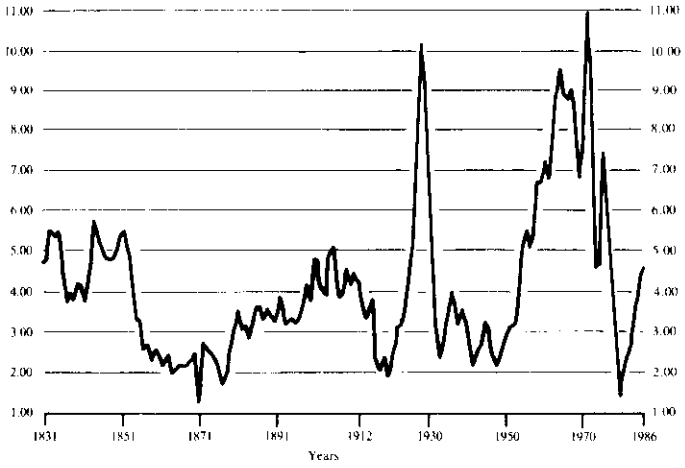
WHITHER GOLD AND THE STOCK MARKET?

About all financial markets, one final observation is unavoidable. In a world of unhinged currencies, floating exchange rates, and central bank monetary manipulation, free-market pricing of real and financial assets will tend to go to extremes of overvaluation and undervaluation (or so-called overshooting and undershooting). Observe in Figures 16 and 17 that, after the U.S. central bank, the Federal Reserve System, was established in 1913, equity-gold price ratios -- as measured by the Dow Jones industrial average and proxies for the Dow before 1912 -- peaked at levels almost double the highest levels before 1913.

Thus arises the tantalizing question: How are U.S. equities valued in the market today, relative to gold, by the test of long-term historical DJI/gold price ratios? In the twentieth century it seems that the value of the Dow Jones has varied between approximately one and almost 30 times the absolute value of the gold price. By adjusting the gold price under fixed exchange rates by the wholesale price index (WPI), the extremes of annual averages become less dramatic -- about two to 11 (Figures 16 and 17).

Figure 16

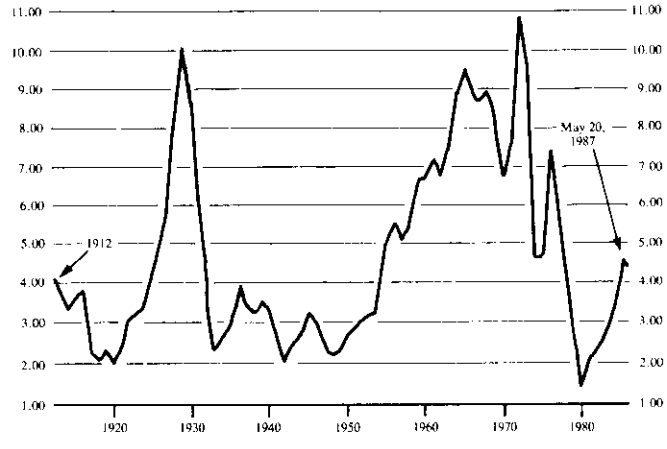
Dow Jones Industrial Average/Gold Ratio
1831 - 1986



Note: Gold price adjusted for WPI under fixed rates.
Source: Trevor, Roberts (Stephen Stoller)

Figure 17

Dow Jones Industrial Average/Gold Ratio*
1912-1987



*Dow's Average Level for Year; Gold's Average Price for Year.
Source: Trevor, Roberts (Stephen Stoller)

At present, the Dow is selling at about 4.8 times the price of gold. In order to achieve the past extreme equity-gold price ratios of 11 to 1 or 2 to 1, the gold price might fall to $200 as the Dow remained steady at approximately 2,000. While this is always possible, and some well-known analysts have made such a forecast, I consider it

unlikely in the short run, partly because worldwide all-in production costs of available gold average higher than $200. Another extreme might be a 2 to 1 ratio achieved by a $400 gold price and a Dow Jones average of 800. In general, the long-run average ratio would put the Dow at approximately 1,400-1,800 on the basis of a $300 to $400 gold price.

One might have much greater confidence in a strict gold/equity value analysis if the present level of interest rates were comparable to those posted when the equity/gold price ratio reached extremes in the past. But, in fact, average interest rate levels of the past decade are the highest they have been in American history -- even higher than those that prevailed in the decade of the Civil War when the national government almost collapsed.

At present high real interest rate levels, and given reasonably stable exchange rates and a non-inflationary monetary policy, the most plausible forecast for gold and equity prices is that they will be about the same or lower one year from now.

Several strategists have recently asked if the price of gold remained steady between $400 and $500 and interest rates declined to the average level during periods of fixed exchange rates, what might be the equity-gold price ratio relative to that of 1929? It is worth noting that, in 1929, the Dow at its peak sold at 19 times the absolute value of gold ($20) and 13 times the WPI-adjusted price of gold (approximately $30). On this basis, assuming long-term interest rates of about 4% (the average level under fixed exchange rates) and assuming normalized growth for Dow company earnings, the theoretical Dow Jones equivalent, my hand trembles to write, might approach 5,000 if it were to repeat the 1929 episode. It is insufficiently recognized that, at the peak in 1929, the Dow sold at approximately 1.8 times its estimated replacement cost[5], which in 1987 would have been 1.8 times approximately 2,500 or 4,500.

One cannot emphasize enough that, among the many important differences between 1929 and 1988, long-term rates of interest in the United States were in 1929 about one-half the present level. This difference alone implies that the stock market may still be at a high valuation. Thus no prudent forecaster should make the extraordinary argument that the Dow or S&P will rise once again to the extreme valuation levels of the past on the basis of the equity/gold price ratios or the stock-price/replacement cost ratios of the past unless they are prepared to project secular rising earnings combined with long-term interest rates at half their present level -- say $250 per share on the Dow and 3%-4% long-term interest rates. Both conditions would require higher savings rates, general expectations for stable exchange rates and stable money, and also a world economy growing steadily at 3%.

Indeed, if the bull market is to develop a major new lease on life, the U.S. must reduce substantially the level of long-term interest rates. This crucial economic policy issue of the next decade should be resolved in the next administration.

If it is not dealt with after the Presidential election, it may be resolved after an economic crisis.

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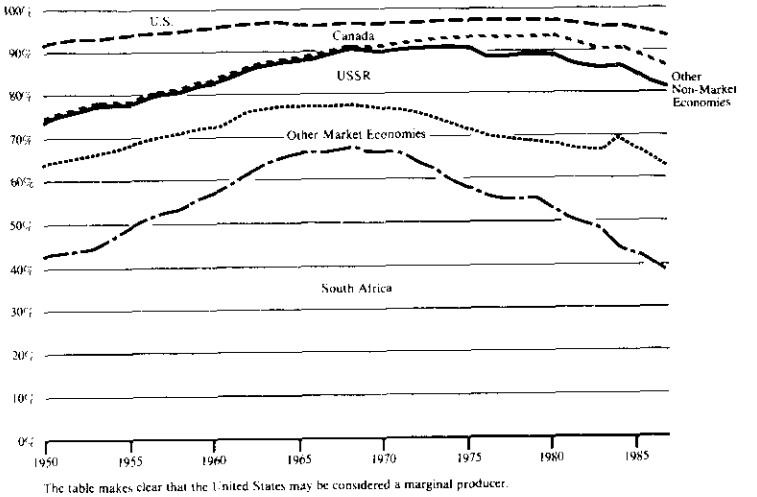
FOOTNOTES

(1) Methodologies for determining the marginal and average cost of producing gold, as well as the pure cash cost per ounce, may vary substantially. I use, among others, the U.S. Bureau of Mines techniques, as set forth in its exhaustive 1984 publication on gold, Gold Availability - World. Though marginal cost analyses in dollars would have changed considerably in South Africa during the past seven years, because of the collapse of the rand, results would not vary much in the United States. Cost statistics may be obtained from Consolidated Goldfields; U.S. Bureau of Mines; CPM Ltd; annual reports; and company sources.

To define the world-wide marginal gold producer, consider that U.S. mine output equals about 7% of annual world output; and the U.S. is among the highest-cost producers. Thus it may be considered a marginal producer (Figure 18).

Figure 18

Breakdown of World Gold Production
1950 to 1987(E)



The table makes clear that the United States may be considered a marginal producer.

Source: Morgan Stanley

Homestake Mines, a major U.S. producer, accounts for about 10% of U.S. output, and it is also a high-cost producer; thus it may be considered a marginal U.S. producer, and its costs a proxy for the marginal cost of production of U.S. gold. It is useful, in determining allocations in a U.S. equity-gold portfolio, to use the U.S. as the gold-source because it is the counterpart to the U.S. equity source. Moreover, many analysts fail to note that gold extraction costs are generally reported on a cash/cost per ounce basis (excluding capital costs); but a sounder methodology, especially for our portfolio replacement-cost analyses, requires an all-in cost per ounce -- including depreciation. Estimated all-in average production costs per ounce (considering all capital costs) tend to be 30%-50% above average cash costs per

ounce. Homestake all-in costs per ounce at the margin are estimated at $450 and have been close to this figure for a decade (even though, by rigorous cost control, average costs have recently fallen).

(2) The question arises as to why the marginal cost of available gold at the Homestake Mine remains relatively stable from 1980 to 1987? First, mining wage costs stabilized during the disinflationary period. Second, great efforts to cut average costs were brought to bear on mining techniques as the market price fell from $850 in 1980 to $300 in 1982 and 1985. Third, and more generally, it is a first principle of gold mining -- in some cases required by law or contract as in South Africa, in others enforced by customary practice -- that when the market value of gold rises, lower grade, higher cost ores are mined; and when the market value of gold falls, higher grade, lower cost ores are mined. Thus, as the market value of gold fluctuates under fixed or floating exchange rates, the average and marginal costs of gold production tend naturally to be stabilized by the variation in the grade of ore mined, so as to stabilize, under all economic conditions, the long-term viability of a stable stream of net income from the mine. This general principle is no more than the rational application of the law of conservation of energy to the economics of production of a very scarce and very valuable natural resource, discovered and processed at great and time-consuming cost.

(3) Derived from Morgan Stanley research, published from time-to-time as "U.S. Asset Categories, Annual Rates of Return Under Various Economic Conditions." The Wholesale Price Index would probably be a better measure of price-level return for portfolio investors.

(4) If only average U.S. gold mining costs, or cash costs per ounce, were used in the ratio, instead of marginal mining costs of available gold, then it is clear that theoretical gold replacement costs would be substantially lower and, thus, gold, relative to equities, would be even more overvalued than I have argued. (See exhaustive U.S. Bureau of Mines gold study, 1984, for different cost estimates and methodologies.)

(5) Early 20th Century replacement cost figures are developed from Department of Commerce and Federal Reserve Board figures.