



WORLD GOLD COUNCIL

GOLD AS A STORE OF VALUE

By Stephen Harmston

Research Study No. 22

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The views expressed in this study are those of the author and not necessarily the views of the World Gold Council. While every care has been taken, the World Gold Council cannot guarantee the accuracy of any statement or representation made.

EXECUTIVE SUMMARY

- **Gold has maintained its value in terms of real purchasing power in the very long run in the US, Britain, France, Germany and Japan. Despite price fluctuations gold has consistently reverted to its historic purchasing power parity with other commodities and intermediate products.**
- In all five countries the purchasing power of gold substantially increased after the abolition of dollar convertibility in 1971 but has since reverted to an historic mean.
- **Gold has not necessarily held its value in terms of purchasing power in periods of social and economic instability. In times of war, for example, the prices of other commodities, more directly needed for the war effort, tend to rise faster. But over the period of Germany's massive inflation of 1918-24, when the value of bonds and stocks was severely diminished, gold maintained its purchasing power.**
- Gold's liquidity, acceptability and portability are particularly important in times of crisis and may well be more important than gold's rate of exchange with paper money at such times.
- **In the US since 1971 the purchasing power of gold has increased. In 1997, the average gold price was somewhat above the level indicated by the long-term average rate of exchange with other commodities and intermediate products, as represented by the wholesale price index. The 1997 gold price was, however, broadly in line with the historic rate of exchange against the basket of goods represented by the CPI.**
- In Britain, France, Germany and Japan, gold in recent years has been close to its historic purchasing power parity with other commodities and intermediate products.
- **A comparison of demand and supply fundamentals for gold, both before and after 1971, suggests the surge in gold's purchasing power in the 1970s was at least in part a reaction to the prolonged period during which gold had been held at a fixed price. Other factors – including inflation and spikes in the prices of most commodities – also played a role in the rise of gold's purchasing power. Post-1971, the increased worldwide demand for gold pushed up the rate of exchange between gold and other commodities and intermediate products. The more recent increase in the supply of gold has, however, pushed gold's purchasing power back towards its historic mean.**

- Among financial assets purchased in 1896 and sold in 1996, in terms of cumulative wealth, gold has under-performed stocks and government bonds in the US and Britain. However, in countries such as France, where inflation has been less controlled, gold has afforded a significantly higher increase in wealth than could be gained with government bonds. In Germany and Japan, bouts of hyperinflation wiped out the value of bonds and stocks but gold maintained its purchasing power and was thus a vital safe haven.
- **This study considers the period 1968-96 and finds that, as the real returns from holding gold were not positively correlated with those on other assets, gold would have had a useful place in a diversified portfolio. Compared to buying and selling out of a purely equity portfolio, buying and selling out of an equity portfolio that contained gold would have afforded, on average, a higher return with decreased risk.**

THE AUTHOR

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INTRODUCTION

"Gold is a wonderful thing! Whoever possesses it is lord of all he wants. By means of gold one can even get souls into Paradise."

Columbus, letter from Jamaica, 1503.¹

An object or product can be said to have subjective value – for example, the pleasure obtained from a piece of gold jewellery – or objective value, if it is widely accepted in exchange for other goods and services. Gold is unusual in that it has long possessed value in both these senses. This analysis concentrates on gold's objective store of value. If gold is to function successfully as a store of value it must either maintain its rate of exchange with other goods and services or, at least, be expected to return to an historical rate of exchange. It is said that an ounce of gold bought 350 loaves of bread in the time of Nebuchadnezzar, king of Babylon, who died in 562 BC. The same ounce of gold still buys approximately 350 loaves of bread today. Across 2,500 years gold has in other words retained its purchasing power, relative to bread at least, and has had a real rate of return of zero.²

The first chapter considers the very long-term purchasing power (rate of exchange with other commodities and intermediate products) of gold in the US (1796-1997), Britain (1596-1997), France (1820-1997), Germany (1873-1997) and Japan (1880-1997). In all five, over the very long term there has been a tendency for gold to return to an historic rate of exchange with other commodities and intermediate products. In each of these countries the purchasing power of gold dramatically increased after the abolition of dollar convertibility in 1971 but has since returned to its historic level. Gold is effective as a long-term hedge against rising prices.

The second chapter investigates the recent gold price in relation to historic levels, and the fundamental supply and demand conditions for gold, to establish the extent to which the abolition of convertibility of the dollar in 1971 led to a sea-change in the determinants of the value of gold. The surge in gold's purchasing power during the 1970s was partly a reaction to the prolonged period during which the dollar gold price had been fixed. Post-1971, the increased worldwide demand for gold pushed up the rate of exchange between gold and other commodities and intermediate products. However, gold's

¹ Cited by Karl Marx, *Das Capital*, Volume I, 1867.

² Assuming that the quality of bread and the average weight of a loaf in 562 B.C. was comparable to that of today.

purchasing power has since decreased as a result of, *inter alia*, the increased supply of gold from newly mined output, increased central bank sales (real and anticipated), and forward selling. Yet while the demand and supply conditions have altered dramatically, the pattern of a return to an historic value persists.

Although gold has been an effective store of value, it could be argued that – as the real rate of return is zero when gold is at its historic purchasing power parity – other assets (if they afforded an appreciation of wealth over time) would have been a more effective store of value. The third chapter takes an historical perspective to examine the risk and rate of return of holding, and trading, in gold in relation to paper financial assets (i.e. stocks and bonds).

“The lesson is that, although the gold price may fluctuate...gold has consistently reverted to its historic purchasing power parity against other commodities and intermediate products. Over time, gold has proved to be an effective preserver of wealth. In periods of economic and social instability, when the value of other assets has been all but wiped out, gold has been a safe haven.”

During the 100 years between 1896 and 1996³, in terms of cumulative wealth, gold has under-performed stocks and government bonds in the US and Britain. In France, which has tended to experience greater inflation than Britain and the US, gold has performed comparatively better against other asset classes, whose returns have suffered through inflation. In Germany and Japan during this time-span severe economic and monetary crises wiped out much of the cumulative wealth from investments in stocks or government bonds. Holding gold was a more effective means of wealth preservation than holding other assets between 1940 and 1949, in France, Germany and Japan, countries that experienced massive economic upheaval and high inflation. During Germany’s economic turmoil of 1918-24, which virtually wiped out the values of bonds and stocks, gold maintained its purchasing power.

Gold has not necessarily held its value in terms of purchasing power in times of war. This is partly because at such times the prices of other commodities, more immediately useful for the war effort, have tended to rise faster. However, gold’s liquidity, acceptability and portability are

³ The first draft of this paper was prepared in 1997, with all the charts and calculations covering periods up to 1996. In this new version of the paper, as it was thought to be interesting to put the 1997 fall in gold price into its historical context, all the charts in the first chapter have been updated. These updates demonstrate that, in terms of the long-run picture, the change in gold’s purchasing power in 1997 appears as a mere blip.

qualities that have been particularly important in times of crises such as occupation by a foreign power or collapse in a monetary system. At such times, these qualities may well be more important than gold's rate of exchange with paper money. Given this, and gold's role as a wealth preserver in some of the darkest periods of the twentieth century, gold has proved to be a haven on numerous occasions and in different places.

The performance of stocks and bonds this century indicates that cumulative wealth indices rely on historical fortune in regard to the timing of the buying and selling of an asset. US-based investors faced with the choice of buying T-bills or gold in 1925 to sell in 1996 would have received a higher total cumulative return with gold. Yet faced with precisely the same choice in 1896, T-bills would have been the better option. The third chapter models the experience of US investors who bought and sold gold randomly between 1896-1996, and compares their fortune with those who traded bonds and stocks. Of the five countries studied, the US represents one of the worst case scenarios for gold. However, in less stable economies – which includes almost every large country except the US and Britain – when there have been periods of economic dislocation and high inflation the value of stocks and bonds have been severely diminished.

Our model shows that on average, in the US between 1896 and 1996, traders in gold would have made bigger annual gains than traders in both long and short-term government bonds. The chance of making the average with a randomly-selected combination of buying and selling years is, however, lower with gold than with bonds. Thus a trader in gold would have faced greater risk; trading in gold has been a potentially lucrative, but risky, activity. In comparison to those who bought and sold gold, traders in equities would have received, on average, a higher rate of return (with only a slightly greater chance of not making that return).

However, even when gold does not perform favourably, the fourth chapter suggests there are still good reasons to hold it, beyond its being a store of value. The real returns from holding gold from 1968 to 1996 were negatively correlated with the real total returns from holding stocks and bonds; gold could, therefore, perform a hedging role in a multi-asset portfolio. This concept of gold as a hedge against risk is developed in our model. Between 1968-96, compared to buying and selling out of a purely equity portfolio, buying and selling out of an equity portfolio that contained gold would have afforded, on average, a *higher* return with *decreased* risk.

Ultimately, the historical lesson from the study of the US, Britain, France, Germany and Japan is that, although the gold price may fluc-

tuates, over the very long run gold has consistently reverted to its historic purchasing power parity against other commodities and intermediate products. Over time, gold has proved to be an effective preserver of wealth. In periods of economic and social instability, when the value of other assets has been all but wiped out, gold has also proved to be a safe haven.

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1 FIVE COUNTRIES, ONE TALE

In 1977 Roy Jastram in his seminal text *The Golden Constant* constructed indices of commodity prices, gold prices, and gold purchasing power from 1560 to 1976 for Britain and from 1800 to 1976 for the US.⁴ He found that gold tended to return to an historic rate of exchange (purchasing power parity) with other commodities. Jastram concluded this demonstrated what he termed the “retrieval phenomenon,” where “gold prices do not chase after commodities; commodity prices return to the index level of gold over and over.”⁵ This study updates Jastram’s work to take account of the price fluctuations of the last 21 years, and extends the analysis to three countries that have had less stable prices than the US or Britain in the twentieth century: France, Germany and Japan.⁶

Following Jastram, wholesale prices are used here as a measure of inflation, the main reason being that, historically, wholesale prices are more readily available for early times than consumer price figures. The wholesale price indices available for past periods cover either commodities only or commodities and intermediate goods but do not include services.⁷ In the past, when services were a less important part of the economy, such indices were reasonable indicators of the level of inflation.⁸

The first graph under each of the following five country headings compares the gold price index, the wholesale price index, and the purchasing power of gold index (constructed by dividing the first index by the second).

The graphs are constructed using a logarithmic scale, which affords direct comparison of the behaviour of the series at different points in time and a better view of the fluctuations within each series. Specifically, the same vertical distance, irrespective of where it is measured on the graph, represents the same percentage change in the index. The second graph in these sections depicts, for comparison, the purchasing power of gold on a linear scale.

⁴ *The Golden Constant – The English and American Experience 1560-1976*, Roy W. Jastram, University of California, Berkeley, 1977.

⁵ *op. cit.*, pp 179.

⁶ This analysis of gold concerns gold bullion, rather than gold stocks, futures or other derivatives.

⁷ With respect to the wholesale price indices used in this study, for the years before World War II the goods within the index are commodities, while for the recent time period they are commodities and intermediate products.

⁸ In a modern economy it can be useful to consider a consumer price index (CPI) which includes services. In light of this, Appendix 1 contains a comparison of the purchasing power of gold as calculated using the wholesale price index (WPI) and the purchasing power of gold using the consumer price index (CPI) for the US and Britain. This comparison demonstrates that the choice of price index numbers does not affect our conclusion that gold has held its value in terms of purchasing power in the very long run.

1.1 United States: 1796-1997

Figure 1.1 shows that, with the exception of the period of the American Civil War (1861-1865), the gold price was virtually stable with only slight variations between 1796 and 1933. Over this period there was a clear tendency for wholesale prices to revert to an historic level.⁹ Given this, as figure 1.2 clearly shows, gold maintained its value against other commodities over the period as a whole.¹⁰

With the increase in the gold price in 1933 there was an increase in gold's purchasing power, which was eroded by the subsequent increases in wholesale prices. As a result of the near-rigidity of the price of gold, changes in the purchasing power of gold were inversely related to changes in wholesale prices until 1968. From 1968 this relationship broke down as the gold price began to move away from its official level, as a result of growing pressure on the Bretton Woods fixed exchange rate system. Although key currencies were not floated until the spring of 1973,¹¹ gold convertibility was suspended in 1971. Figure 1.2 shows that after the suspension of convertibility the purchasing power of gold increased.

The one consistent factor which can be traced through periods of falling or rising wholesale prices is a return to the historic level of exchange with gold up until the early 1970s. Since then gold's purchasing power has been higher than its historic level, dropping off somewhat in the 1990s (see figure 1.2). In periods of inflation gold has tended to lose its purchasing power, only to regain it in periods of deflation, though this is something of a truism if the gold price is effectively fixed. The one exception to this general tendency came in the inflationary 1970s.

The explanation of these complex relationships is that gold plays at least two economic roles.¹² It has a role as money (a medium of exchange and a store of value) and as a commodity (a precious metal with industrial and adornment uses).

⁹ The gold price index for the US is constructed from the annual dollar per ounce price. For the years 1796-1933 the gold price is taken from *World Prices and the Building Industry*, George F. Warren and Frank A. Pearson, 1937 and for 1933-1968 from the *Commodity Yearbook*, Commodity Research Bureau, Chicago. From 1968-1997 the source is *Gold 1998*, Gold Fields Mineral Service Ltd. The WPI is constructed from *World Prices and the Building Industry*, George F. Warren and Frank A. Pearson, 1937 for the years 1796-1909. From 1890-1997 the Bureau of Labor Statistics' all-commodity price index is used. The combined index was calculated by Global Financial Data.

¹⁰ Appendix 2 contains a linear graph of the purchasing power of silver in the US over the last two hundred years. Looking at figures 1.2 and A.4 in appendix 2 illustrates how striking gold is as a store of value compared to silver, which could (and has) functioned as both money and commodity.

¹¹ It was 1975 before US citizens were again permitted legally to hold gold.

¹² *Is gold a legitimate pension fund asset class?*, Keith Ambachtsheer, published in *Gold in The Institutional Portfolio*, speakers' papers from the World Gold Council's Institutional Investment Forums, 1990-1991.

“The one consistent factor which can be traced through periods of falling or rising wholesale prices is a return to the historic level of exchange with gold up until the early 1970s. Since then gold’s purchasing power has been higher than its historic level, dropping off somewhat in the 1990s...”

Looking at the price of gold (the thin blue line in figure 1.1.) the three main periods of change are 1861-1879, 1933-1934 and 1968-1997. In the first, the changes in the price of gold were due to its dual economic function. Between 1861 and 1879 (the American Civil War and its immediate aftermath) paper notes were not redeemable in gold. With doubts about the government’s survival, people lost confidence in paper currency and substituted gold. There was also a massive demand for commodities to drive the war effort. Consequently, although both the price of gold and the wholesale price index rose during the American Civil War; in this period of political and economic instability with convertibility suspended, the price of gold did not rise sufficiently for it to maintain its purchasing power against other commodities. After the war, wholesale prices fell quicker than the gold price, which resulted in gold recovering some of its purchasing power over the period 1865-1879.

A further reason why the gold price may not have risen sufficiently to hold its purchasing power is that expectations of the eventual resumption of a gold standard parity may have influenced the price of gold. A recent study shows that this was the case.¹³ With the rapid gold price rise the resumption of near pre-war parity would have brought large capital gains to holders of paper currency and capital losses to holders of gold. Given rational expectations of this eventuality, the rise in the gold price would have been restricted.

In the 1930s the increase in the price (and purchasing power) of gold was due purely to its role as money. On 19 April 1933 President Roosevelt took the dollar off the gold standard to secure a competitive advantage. When the gold price had risen to \$35 an ounce on 31 January 1934 he fixed a new parity.¹⁴

In the mid to late 1970s however it was gold’s role as a commodity – rather than money – that led to speculators pushing the price beyond its long-term purchasing parity with other goods.¹⁵

¹³ *Greenback-Gold Returns and Expectations of Resumption, 1862-1869*, Gregor W. Smith & R. Todd Smith, *The Journal of Economic History*, Vol. 57, No.3, Sept. 1997.

¹⁴ The dollar was devalued by just over 40 per cent (the gold price was increased from \$20.67 an ounce to \$35 an ounce). The official value of the American gold stock jumped from \$4 billion to \$7.4 billion. See *The Central Banks*, Marjorie Dean and Robert Pringle.

¹⁵ Section 2.2 explains why gold’s role as a commodity was the dominant factor in demand post-1971, while gold’s role as money was the dominant factor pre-1971.

FIGURE 1.1
US: GOLD PRICE, WHOLESALE PRICES AND GOLD'S PURCHASING POWER 1796-1997.
 Indices, 1930 = 1, logarithmic scale

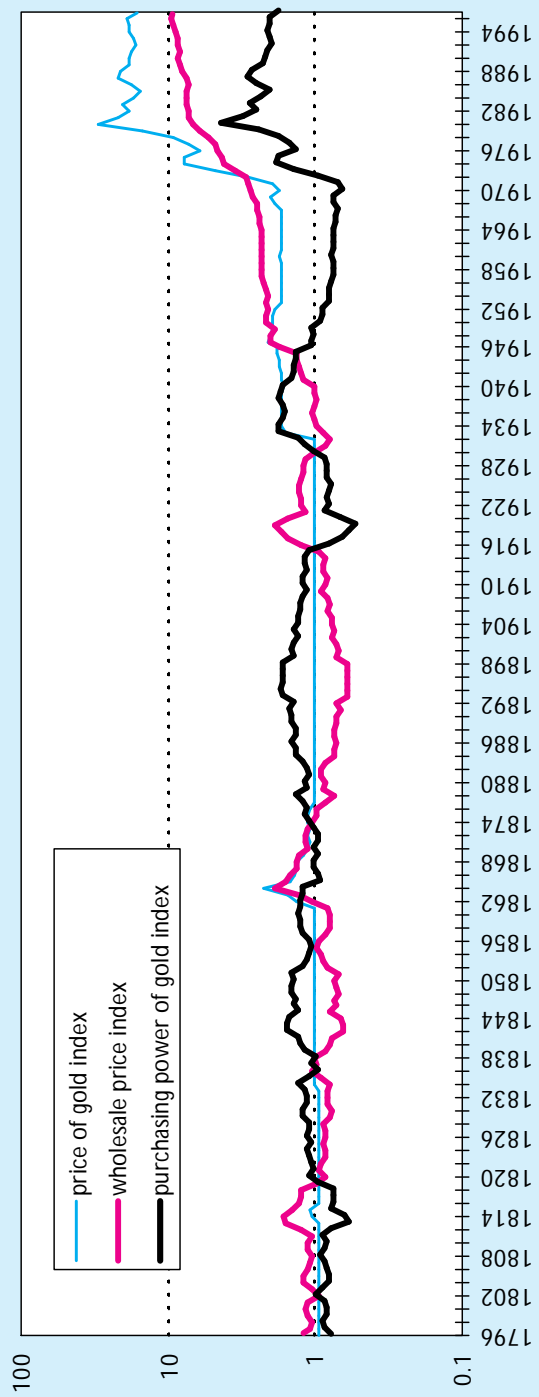
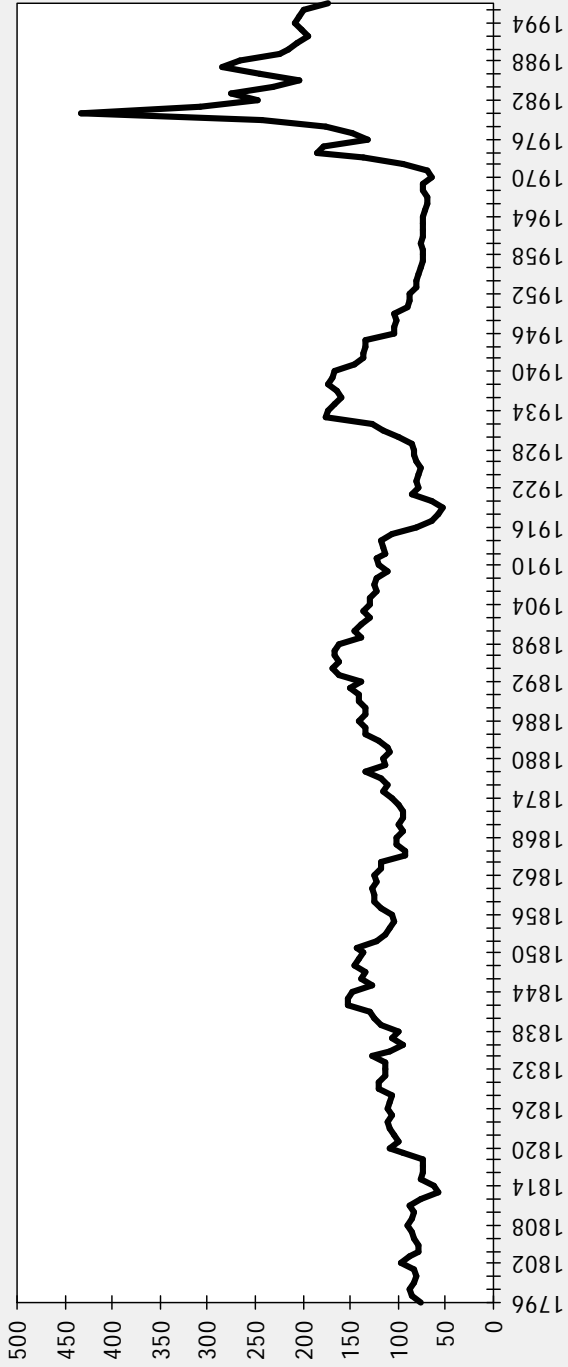


FIGURE 1.2
PURCHASING POWER OF GOLD IN THE US, 1796-1997
Index, 1930 = 100, linear scale



In some periods of crisis – such as the American Civil War, World War I and World War II – the purchasing power of gold actually decreased. In World War I and II the official price of gold was fixed and hence the large increase in wholesale prices led to a fall in the purchasing power of gold. The Vietnam War (1966-1973) corresponded with the collapse of Bretton Woods. In 1966 and 1967 the purchasing power of gold fell, but then rose by 7.7 per cent in 1968 (the Tet Offensive) before falling slightly in 1969. The marked increase in gold's purchasing power began in 1970 and peaked in 1980. During the 1990-91 Gulf War the purchasing power of gold fell.

All of this does not mean that gold does not have a role in wartime – on the contrary its universal acceptance and portability give it unique qualities as a liquid asset in times of crisis. This is especially important when exchange controls bar access to foreign currencies. These qualities of course represent another dimension to gold; section 1.3 indicates the importance of these qualities in France during World War II. Moreover, as section 3.4 shows, gold has been a haven in periods of economic instability outside wartime as it has afforded the maintenance of wealth.

1.2 Britain: 1596-1997 The logarithmic graph for Britain depicting the relationship between the price of gold, the price of commodities and intermediate products and the exchange rate between the two has been divided. The first (figure 1.3) shows the years 1597-1796, while the second (figure 1.4) shows the years 1796-1997.¹⁶ The graph has been divided into two parts to facilitate a clearer picture of the fluctuations in the various indices.

Figure 1.5 shows a gradual fall in the purchasing power of gold from the late 16th century to the 1660s. Figure 1.3 shows that this was a period when the gold price was increasing but wholesale prices were rising faster. With the fall in commodity prices in the late 17th century, gold recovered some of its purchasing power. Gold prices remained stable until the onset of the Napoleonic Wars in 1799. From the early 1700s until 1793, commodity prices fluctuated around a horizontal trend and the purchasing power of gold was preserved. Looking at figures 1.3, 1.4, and 1.5, it can be seen that the years 1797-1821 – when

¹⁶ The British gold price index is taken from *The Golden Constant*, Roy W. Jastram, 1976, pp26-28, for the years 1596-1799. From 1800-1997 the US dollar price of gold is taken and then converted into sterling using the US \$/British £ exchange rate. The exchange rate for 1800-1997 was provided by Global Financial Data which used *History of the Boston Stock and Money Markets*, Joseph G. Martin, 1898, for the years 1800-1897; Statistisches Reichsamt, Statistisches Jahrbuch f, r das Deutsches Reich, 1888-1941, for 1889-1912; *Monthly Statistical Bulletin*, League of Nations, for 1913-1945; *Pick's Currency Yearbook*, Franz Pick, for 1946-1979 and *International Financial Statistics*, IMF, for the years 1980-1997.

FIGURE 1.3
GOLD PRICE, WHOLESALE PRICES, AND GOLD'S PURCHASING POWER IN BRITAIN, 1596-1796.
 Indices, 1930 = 1, logarithmic scale.

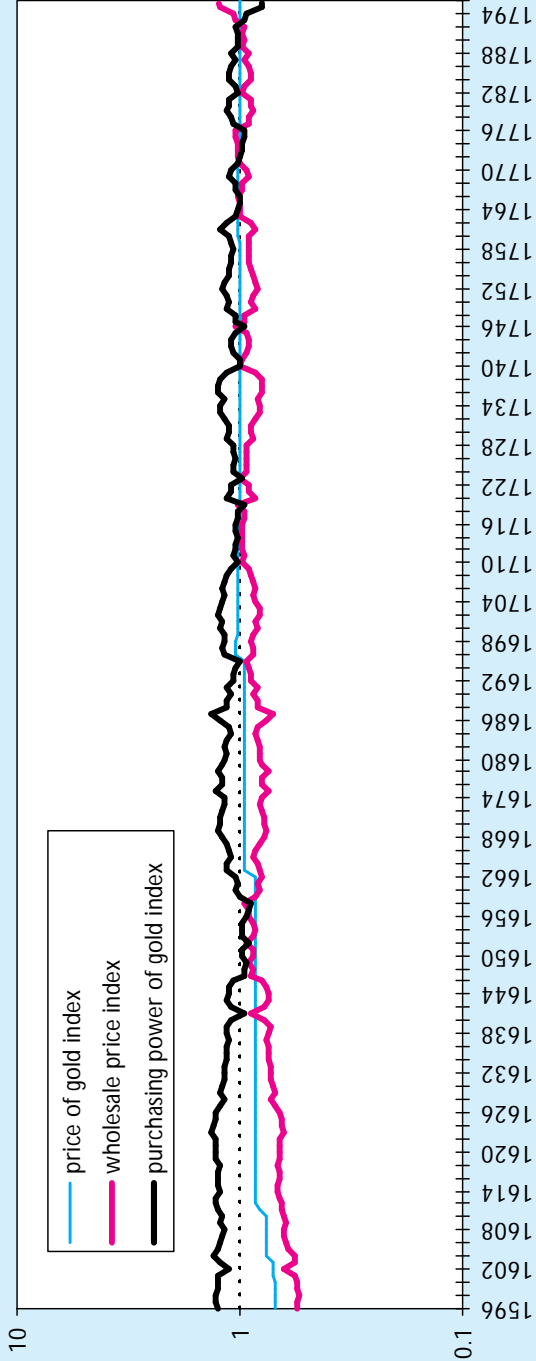


FIGURE 1.4
GOLD PRICE, WHOLESALE PRICES, AND PURCHASING POWER IN BRITAIN, 1796-1997.
 Indices, 1930 = 1, logarithmic scale.

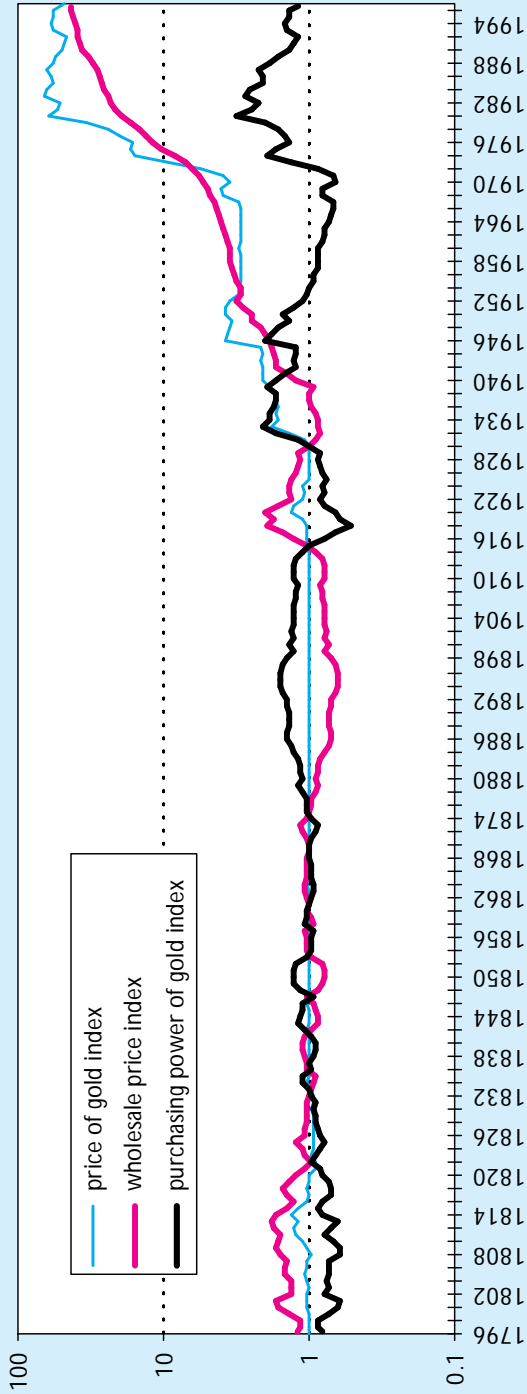
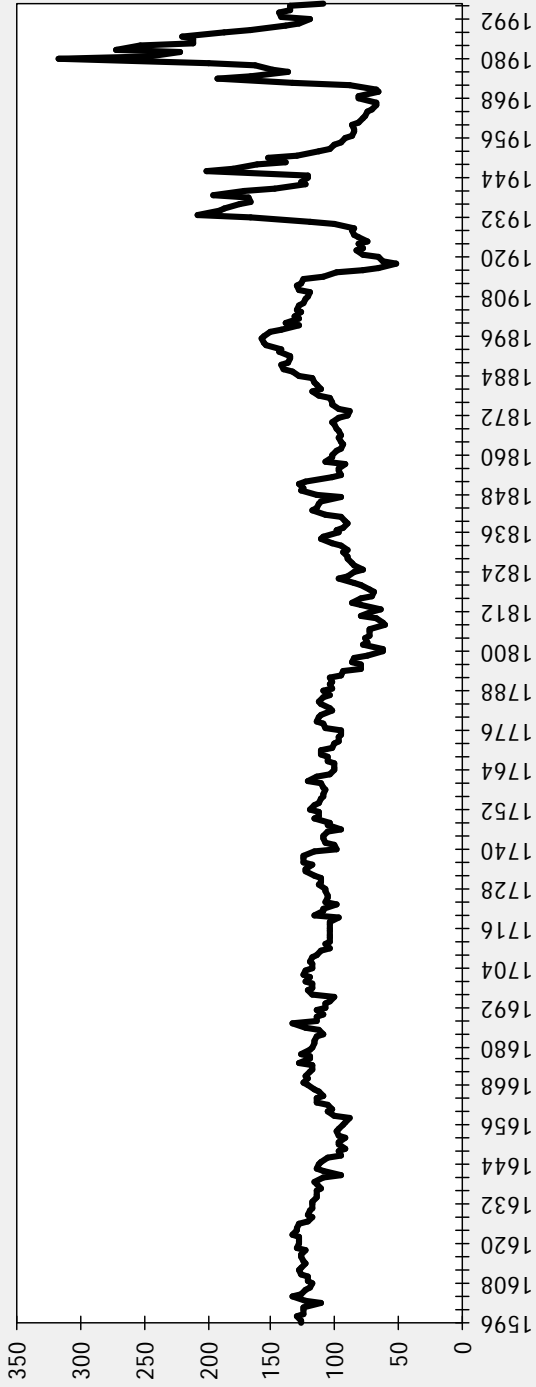


FIGURE 1.5
PURCHASING POWER OF GOLD IN BRITAIN, 1596-1997.
Index, 1930 = 100, linear scale.



the right of British citizens to convert their paper money into gold was suspended, including the period of the Napoleonic Wars (1799-1815) – were characterised by an increase in the price of gold. This was offset by a larger increase in the price of other commodities. Thus there was a decrease in gold's purchasing power. The parallel with the experience of the American Civil War is clear – in a time of crisis gold did not maintain its purchasing power. This can also be seen in Britain during World Wars I and II, and the Gulf War. In contrast, in deflationary periods, such as at the end of the 19th century, gold increased in terms of purchasing power.

1.3 France: 1820-1997 A comparison of figure 1.6 with figures 1.1, 1.3 and 1.4 shows that France has experienced greater price instability in the 20th century than Britain or the US.¹⁷ Yet it is noticeable that gold still maintains its purchasing power over time. The gold price index is constructed using the official dollar price converted into francs using the yearly average franc/dollar exchange rate.¹⁸

In figures 1.6 and 1.7 the lines for the price and purchasing power of gold are broken for the period 1939-49, as during this time France was cut off by stringent exchange controls. Thus the domestic price of gold would have been different to the official price in dollars (converted into francs at the official rate); the value of gold in terms of its official price during this period is therefore not a good indicator or measure of the worth of gold to its French owners at the time. Although expectations about the eventual relaxation of exchange controls may have restricted any price differential, with exchange controls barring access to foreign currencies, the immediate demand for gold as money and as a store of value ensured such a differential existed. Over this period gold was particularly attractive due to its acceptability and portability.

From about 1820 to World War I the price of gold in France was virtually constant, apart from the early 1860s, the time of the American Civil War. Figure 1.6 indicates that during this time there was a gradual overall decline in the wholesale price index and hence an increase

¹⁷ Inflation is again measured by movements in wholesale prices. The WPI is constructed from *European Historical Statistics 1750-1975*, Mitchell, for 1820-1975 and data from *International Financial Statistics*, International Monetary Fund for 1975-1997.

¹⁸ The sources for the exchange rate are *Inquiry into the Historical Prices in Holland*, N. W. Posthous, 1964, for the years 1820-1912; *Monthly Statistical Bulletin*, League of Nations, for 1913-June 1940; *Pick's Currency Yearbook*, Franz Pick for the years 1946-1973; *International Financial Statistics*, IMF for the years 1974-1997. The information was provided by Global Financial Data. In January 1960 a new franc was introduced which was worth 100 old francs. The gold price index is constructed in terms of these 'new' francs.

FIGURE 1.6
GOLD PRICE, WHOLESALE PRICES, AND GOLD'S PURCHASING POWER IN FRANCE, 1820-1997.
 Indices, 1930 = 1, logarithmic scale.

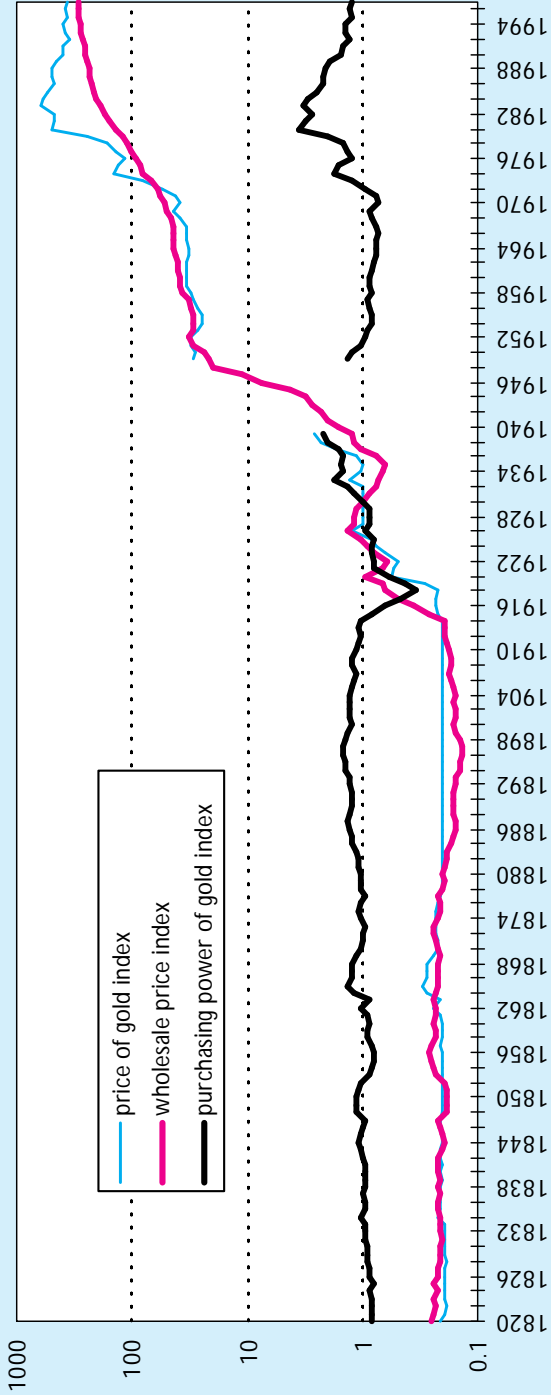
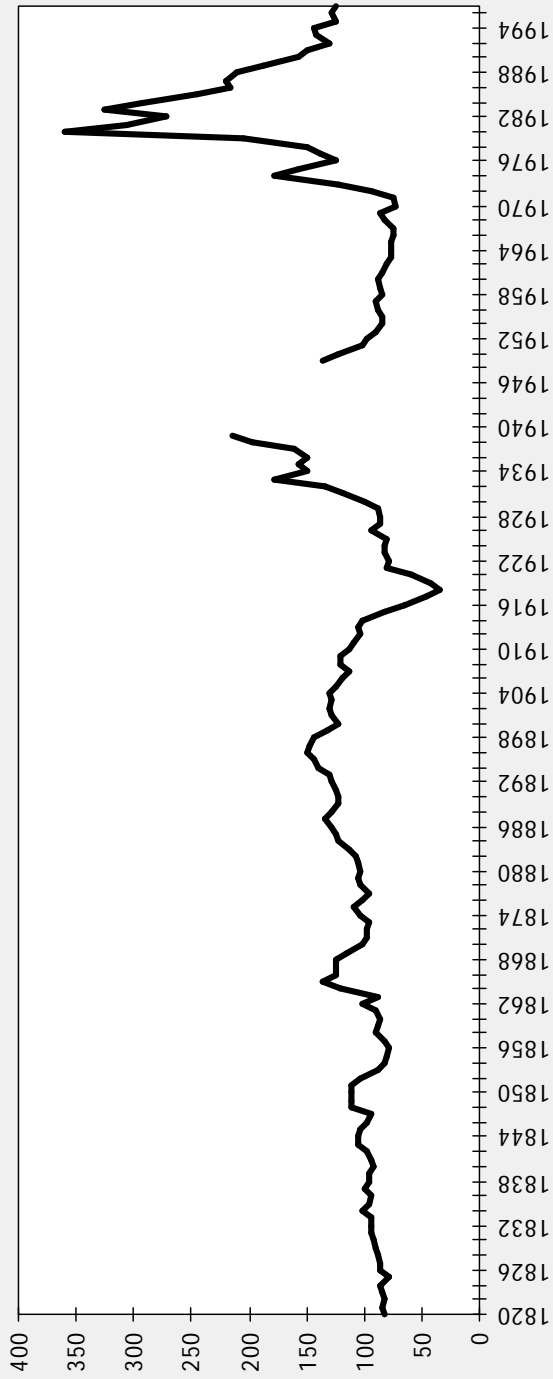


FIGURE 1.7
PURCHASING POWER OF GOLD IN FRANCE, 1820-1997.
Index, 1930 = 100, linear scale.



in the purchasing power of gold (see figure 1.7). The Franco-Prussian War (1870-1871) was characterised by rising commodity prices and a fall in the price of gold (and hence a fall in gold's purchasing power).

Pre-1968, two of the largest falls in the purchasing power of gold were during World War I and during 1939-49 (see figure 1.7). Figure 1.6 highlights that during both of these periods there was high inflation. Gold recovered its purchasing power in the depressions of the early 1920s and early 1930s, but the high levels of inflation during and after World War II quickly eroded this. From 1939 to 1949 the purchasing power of gold fell by 36 per cent.¹⁹ Gold's purchasing power levelled out during the relative price stability of the 1950s and 1960s. In 1967, the French government removed the ban on gold imports by French citizens. From the late 1960s to the early 1980s, the purchasing power of gold increased dramatically before falling back towards historic levels. By 1997, gold in France was approximately at its historic purchasing power parity with other commodities and intermediate products.

1.4 Germany: 1873-1997

The lines indicating the purchasing power of gold in figures 1.8 and 1.9 are broken for the years 1922-23 and 1941-50; the first because hyperinflation made the paper price of gold meaningless and a barter economy became the norm, and the second because of the suspension of foreign exchange transactions after 14 June 1941.²⁰ It also reflects the fact that in the Germany of 1941-49 the official price was a poor indicator of gold's value or worth to its owners. Figures 1.8 and 1.9 show that through all the massive economic and social upheavals faced by Germany, gold maintained its purchasing power.

Between 1873 and 1914 Germany committed to the gold standard and during this time the gold price remained virtually constant.²¹ As figure 1.8 shows, with the price of gold fixed, gold's purchasing power moved inversely to changes in the wholesale price index. Although

¹⁹ Section 3.3 shows that, in terms of maintenance of value, gold performed better than bonds over this period.

²⁰ These indices are constructed as in the previous sections. The sources for the wholesale price index are the *Indexziffer der reagiblen Warenpreise*, Institut für Konjunkturforschung; *European Historical Statistics 1750-1975*, Mitchell; *International Financial Statistics*, International Monetary Fund. The sources for the exchange rate are Schneider for 1873 to 1912; League of Nations, for 1913-June 1940; *Pick's Currency Yearbook*, Franz Pick for the years 1946-1973; *International Financial Statistics*, IMF, for the years 1974-1997. The information was provided by Global Financial Data. At the end of World War II, when the Allies liberated occupied Europe, they introduced a new official exchange rate in Germany but, as this varied significantly from black market rates, it was not used until 1950. The dollar/mark exchange rate was revised in 1948, 1949, 1951, 1954 (when 'Sperrmark' accounts were consolidated and made convertible), 1961 and 1969.

²¹ Pre-1871, the individual German states had been on a bimetallic standard.

FIGURE 1.8
GOLD PRICE, WHOLESALE PRICES, AND GOLD'S PURCHASING POWER IN GERMANY, 1873-1997.
 Indices, 1930 = 1, logarithmic scale.

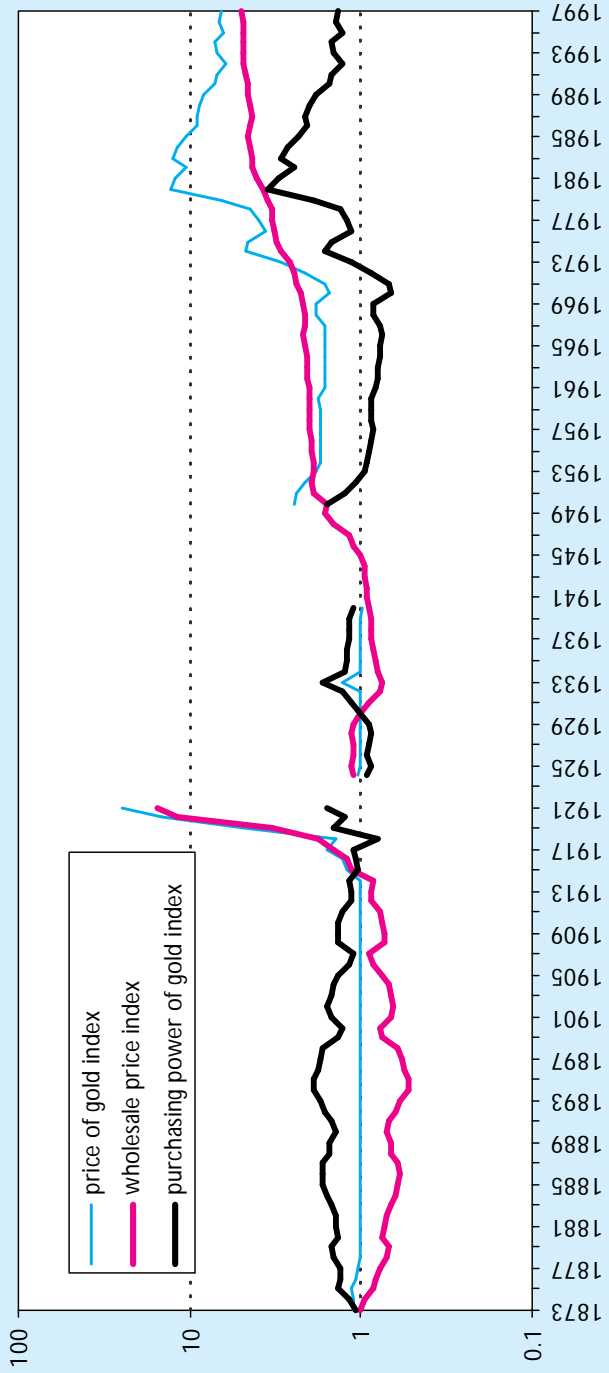
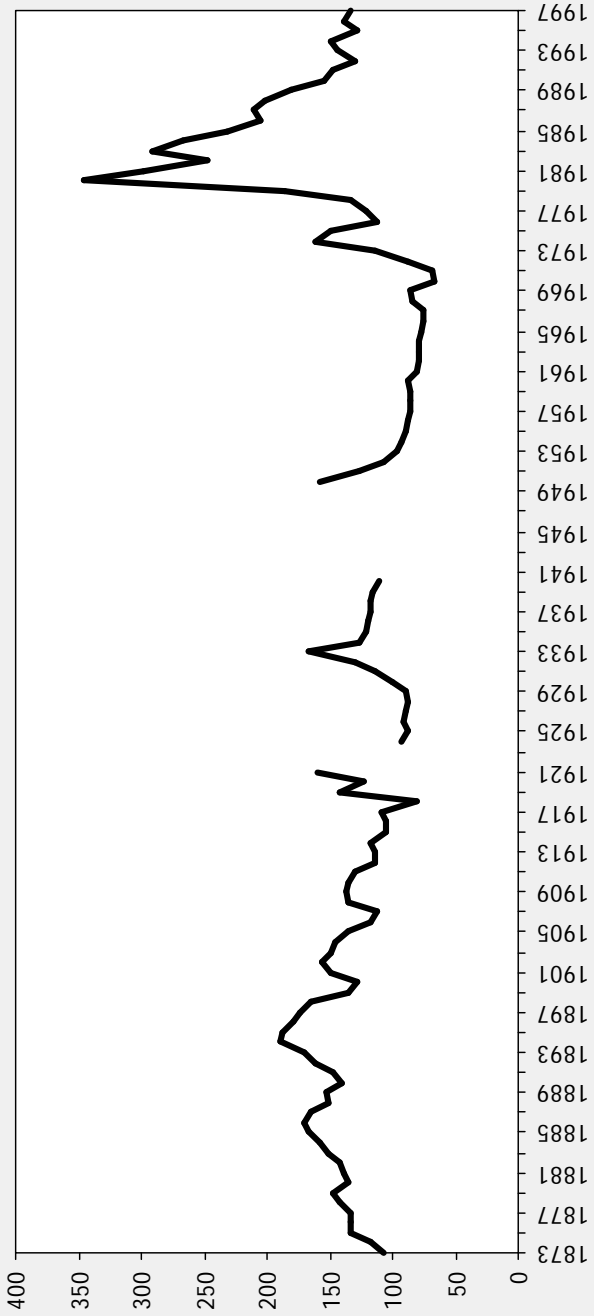


FIGURE 1.9
PURCHASING POWER OF GOLD IN GERMANY, 1873-1997.

Indices, 1930 = 100, linear scale.



the price of gold rose during World War I, it failed to match the rise in wholesale prices. With the hopeless mishandling of Germany's monetary affairs after World War I, wholesale prices rose rapidly (see figure 1.8). Gold's purchasing power increased during the social and economic instability which followed the political protests of the early 1920s.

Although the graph is broken for the period of hyperinflation in 1922-23, figure 1.9 shows how the purchasing power of gold in 1924²² was at nearly the same level as it was in 1918. That is to say, during six years of massive economic instability, gold maintained its rate of exchange with other commodities.

The purchasing power of gold increased from the late 1920s to early 1930s as wholesale prices fell. Germany devalued the Reichsmark after suspending convertibility in 1931. With the strengthening of the German economy in the late 1930s and the increased demand for commodities as Germany re-built its military and industrial complex, there was a rise in wholesale prices and a decrease in the purchasing power of gold. In 1950, gold's rate of exchange with other commodities and intermediate products was higher than it had been since the late 19th century, but it fell during the Bretton Woods years. The Germans floated their currency in May 1971, leading to President Richard Nixon's suspension of US dollar convertibility in August of that year. From then until 1980, the purchasing power of gold increased dramatically before falling back towards historic levels. By 1997, gold in Germany had once again reverted to approximately its historic purchasing power parity with other commodities and intermediate products.

1.5 Japan: 1880-1997

Comparing figures 1.10 and 1.11 with the graphs of the previous sections highlights that the Japanese experience has been broadly similar to that of the US, Britain, France and Germany; though the gold price has fluctuated,²³ over the long run it has reverted to its historic purchasing power parity with other commodities and intermediate products.²⁴

²² The Dawes Committee then stabilised the currency by replacing paper marks with the Reichsmark at a rate of one Reichsmark per trillion paper marks

²³ Pre- World War I, Japan adopted a silver standard in 1884 before adopting the gold standard in 1897. After suspending convertibility during World War I it switched back to gold in January 1930, before the yen was devalued and detached from gold in December 1931.

²⁴ The gold price index is constructed using the official dollar price converted into yen at the yearly average yen/dollar exchange rate. The sources for the exchange rate are *Problems of the Japanese Exchange*, Junnosuke Inoye; *Monthly Statistical Bulletin*, League of Nations; *Pick's Currency Yearbook*, Franz Pick, *International Financial Statistics*, IMF. The wholesale price index is taken from *Japan Statistical Yearbook* and from the IMF. The graph of purchasing power is broken for the period of World War II. The data were provided by Global Financial Data.

As in the US, Britain, France and Germany, the purchasing power of gold in Japan fell during World War I, and high inflation during and after World War II eroded gold's purchasing power, yet it levelled out during the relative price stability of the 1950s and 1960s. From the late 1960s to the early 1980s gold's purchasing power increased substantially before falling back towards historic levels. During the early 1990s, the yen price of gold was approximately at the historic purchasing power parity with other commodities and intermediate products; by 1997 the rate of exchange of gold with other commodities and intermediate products was close to historic levels.

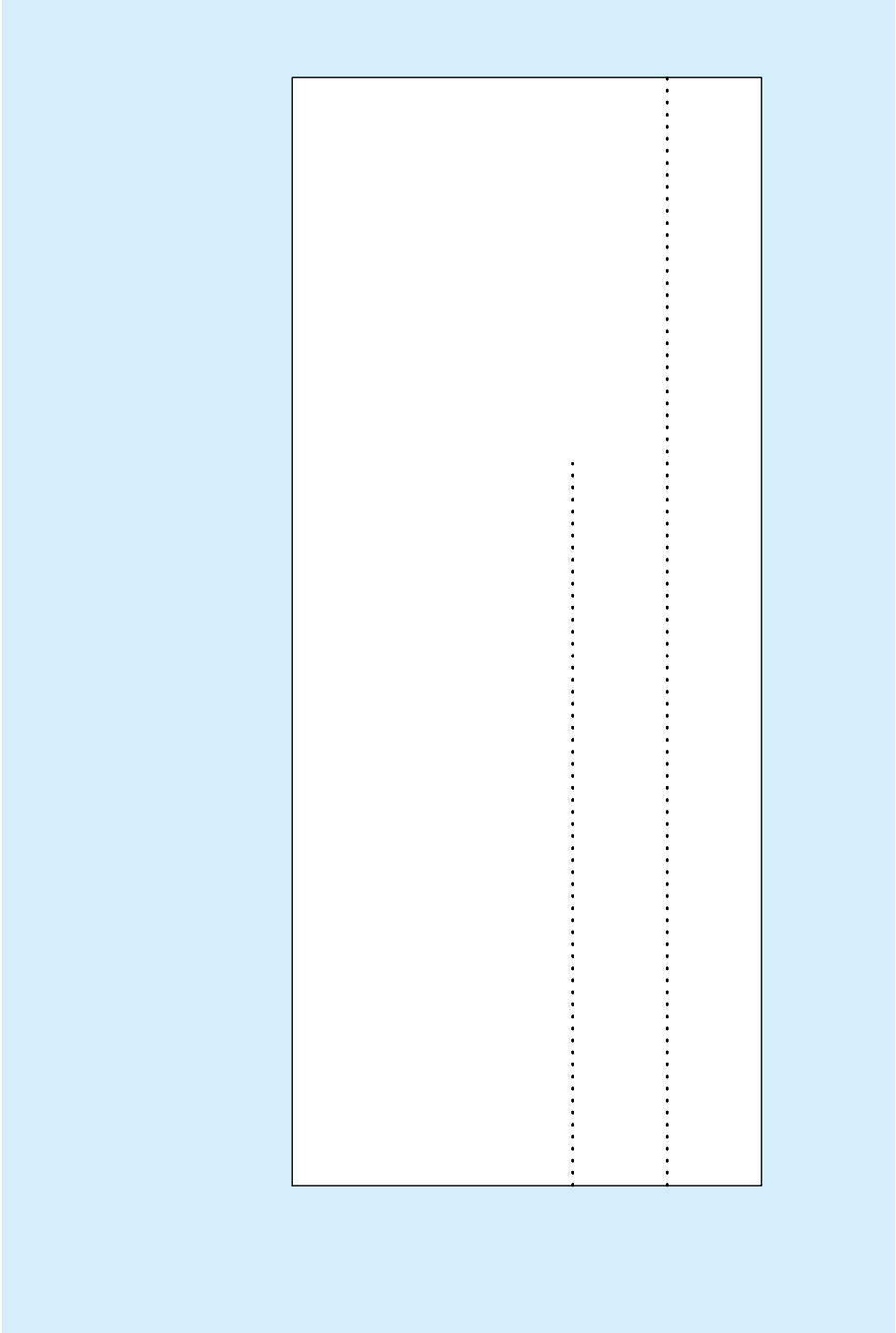
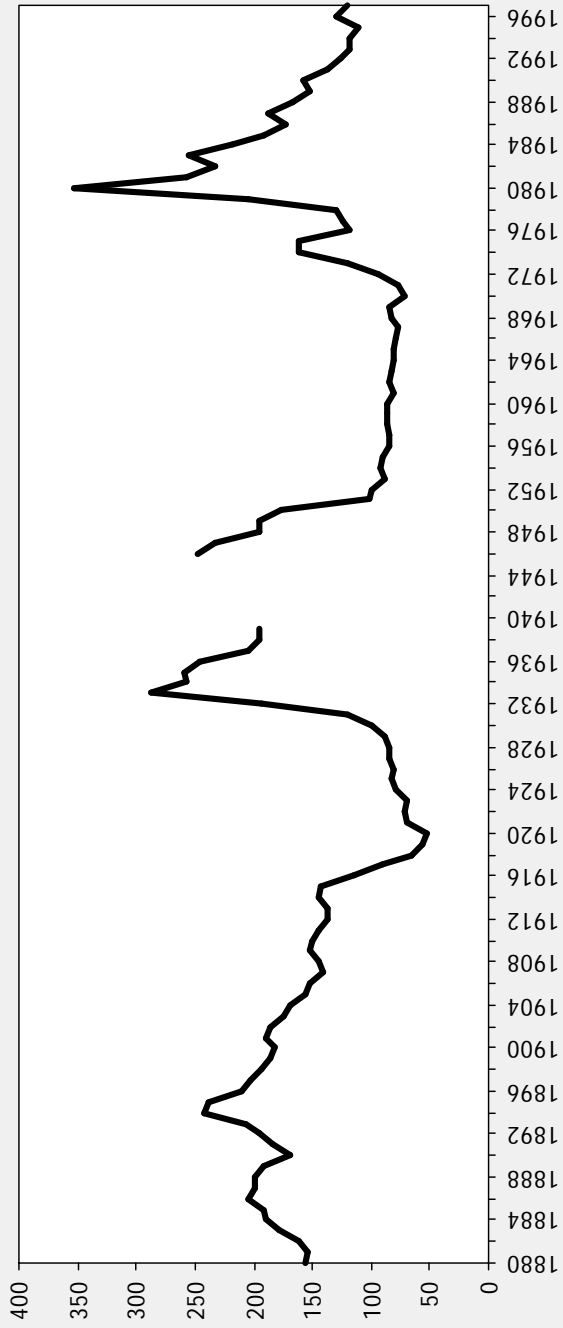


FIGURE 1.11
PURCHASING POWER OF GOLD IN JAPAN, 1880-1997.
Indices, 1930 = 100, linear scale.



2 THE RECENT GOLD PRICE IN RELATION TO HISTORIC LEVELS

2.1 The average purchasing power of gold over time

Figure 2.1 indicates that the price of gold was close to its long-term historic purchasing power parity with other commodities and intermediate products in the early to mid 1990s in Britain, France, Germany and Japan.²⁵ In the US the gold price has recently been above the level indicated by long-term purchasing power parity. Figure 2.1 demonstrates that although there are marked movements, there has been a tendency for gold to hold its rate of exchange against other commodities and intermediate products over the very long run in all five countries.

In this context it is tempting to try to move from descriptive analysis to prescription about the likely future movements of the price of gold in relation to other commodities and intermediate products. If what this analysis demonstrates to be the case in the past could be extrapolated into the future then – given expectations about the rate of inflation in a future time period – a calculation could be made about the exchange rate with gold (the gold price).

But there are several reasons to be cautious. One concern is that inevitably there are doubts about the validity of various inflation indices. While the wholesale price index is a useful tool in very long-run historical analysis, it cannot capture movements in prices across the whole of the modern service economy, as for example, the consumer price index does. Appendix 1 contains a comparison for the US and Britain of the purchasing power of gold calculated with the consumer price index as opposed to the wholesale price index.

Moreover, inductive reasoning is always open to criticism. Merely because the sun has always risen in the past there is no guarantee it will do so tomorrow. Similarly, the fact that gold has in general throughout the long run of history tended to revert to an historic rate of exchange with other commodities and intermediate products contains no promise that it will always do so.

But if we examine the underlying factors behind this tendency to revert to an historic mean, and also try to ascertain if those factors still pertain today, a clearer understanding may be gained of the *likely* direction for the future.

²⁵ In 1997, the fall in the purchasing power of gold was greater in Britain and the U.S. than in France, Germany and Japan.

The 1970s rise in the gold price – which pushed gold’s price above its long-run rate of exchange with other commodities and intermediate products – could be seen as mainly a reaction to the prolonged period during which gold had been held at a fixed price. Equally, gold’s subsequent fall in price could be seen as, retrospectively, a comprehensible and perhaps necessary return to the historic mean. Yet even if convertibility marked a sea-change in the behaviour of gold, whether the gold price will revert to an historic mean must to some extent depend upon its demand and supply fundamentals (see section 2.2).

Measuring across 200 years the average purchasing power (APP) of gold over time in the US gives an indication of the increase in its purchasing power following the collapse of the Bretton Woods fixed exchange-rate system. During 1796-1996 the average index level of the purchasing power of gold²⁶ is 123 (where 1930 = 100); during 1896-1996 it was 134. In the five decades of 1946-96 it was 148, and during 1971-96, 212. These figures can be used to calculate the nominal dollar price that gold would have to be at in any given year for it to be at its purchasing power parity.²⁷ For example, taking the 200-year average purchasing power of gold and the 1997 WPI rate,²⁸ the implied purchasing power parity (PPP) of gold for 1997 is \$234/oz. Taking the 100-year APP of gold, the implied PPP for 1997 is \$256/oz. The 50-year APP of gold gives an implied PPP of \$283/oz. However, the 25-year APP gives an implied PPP of \$405/oz.²⁹ In 1997, the average London afternoon “fix” price of gold was \$331/oz. This was above the long-term average rate of exchange with other commodities and intermediate products, but below the 25-year average.

A slightly different perspective emerges if the consumer price index is used. Using the CPI, between 1913-96 the average historic level of the purchasing power of gold index was 159 (where 1930 = 100). Over the same period the APP of gold (as calculated with the WPI) was 134. For the nominal 1997 price of gold in the US to be at its

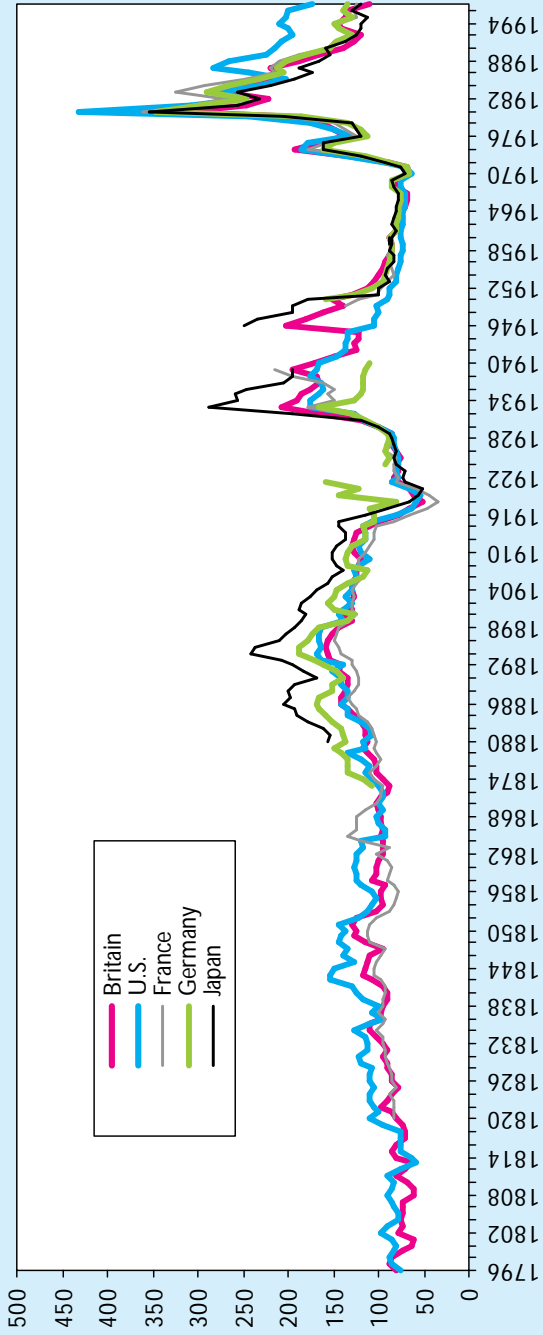
²⁶ Calculated using the WPI.

²⁷ To convert the purchasing power in a given year into the real dollar price for that year, the nominal gold price is multiplied by the indexing factor to get the gold price index level, before dividing by the WPI/100. In 1930 the nominal gold price was \$20.67. To index to 100 this obviously needs scaling up by a factor of 100/20.67 (4.84). One could clearly work backwards by assuming that the purchasing power of gold for a given year (e.g. 1997) is at the historical average purchasing power parity and then calculating the implied nominal gold price. Simplifying this to a formula, the implied price of gold for any given year is: $(\text{average purchasing power parity}/484) * \text{WPI} = \text{implied gold price}$.

²⁸ Decreasing the WPI by 1.63 per cent from the 1996 level of 940 to 925 (1930 = 100).

²⁹ The 25-year average reflects the fact that the 1970s was a period where there was the release of pent-up demand for gold.

FIGURE 2.1
THE PURCHASING POWER OF GOLD 1796-1997: A FIVE COUNTRY COMPARISON
Indices, 1930 = 100.



historic purchasing power parity with the basket of goods represented by the CPI it would have had to be at \$329/oz.³⁰ This is extremely close to the London afternoon “fix” during 1997 of \$331/oz. Taking the 25-year average purchasing power of gold as calculated using the CPI would give an implied 1997 gold price of nearly \$500/oz.

Thus in the US the 1997 average price of gold was above the 200, 100 or 50 year average rate of exchange between gold and commodities and intermediate products as represented by the WPI. If the rate of exchange of gold against the basket of goods represented by the CPI is taken as the historic measure, then the 1997 gold price was broadly in line with historic levels.

2.2 Demand and supply fundamentals

The abolition of convertibility of the dollar in 1971 was a significant turning point for the purchasing power of gold. The dramatic effect of this change can be gauged by comparing the demand and supply conditions for gold before and after the move away from the Bretton Woods fixed exchange rate system.

The use of gold as a commitment mechanism can be divided into three main periods: pre-1914; the interwar years; and the Bretton Woods years.³¹ The gold standard rule which preceded World War I had escape clauses. The monetary authorities maintained the standard by keeping the price of currency in terms of gold fixed, except in emergencies such as war; the market understood that the suspension of convertibility would only be for the period of war and its immediate aftermath.

During the Civil War in the US, the Napoleonic Wars and World War I for Britain, and the Franco-Prussian War for France, specie payments were suspended. During these periods of war, central banks were authorised to refuse payments for their notes in gold, but after the wartime emergencies had passed resumption policies were adopted. The inter-war gold exchange standard was a less successful application of the gold standard rule. After World War II (under the rules of Bretton Woods) only the US, which acted as the central reserve country, was required to peg its currency to gold; other countries pegged their currencies to the dollar. Although the three systems differed in detail, the tie between gold and currency was strong. In effect, a unit of a particular currency was held equivalent to a certain quantity of gold. There was, therefore, a direct relationship between

³⁰ Increasing the CPI by 1.7 per cent from the 1996 level of 985 to 1002 (1930=100). *Historical average purchasing power parity/484*CPI = implied gold price.*

³¹ See *Gold as a commitment mechanism: past, present and future*, Michael D. Bordo, World Gold Council Research Study No.11, 1995.

the amount of gold in an economy and the amount of money; gold demand and money supply were intimately linked. In order to maintain stability in the money supply, gold had to be regulated and its use as a commodity restricted.³² Any increase in the money supply - given a fixed gold price and level of reserves - was thus equivalent to an increase in the demand for gold.

With the recent global accumulation of gold, the annual amount of mined gold has become a decreasing percentage of the total amount available. Given this and the need of central authorities to hold gold as a reserve, the supply of gold under the period of the gold standard, interwar exchange standard and the Bretton Woods system was relatively stable. In periods of a long-run virtually fixed gold price, increases in the money supply had to correspond with increases in the gold supply. If this matched increases in the demand for money then there would be long run zero inflation. In the US, during 1796-1934 (as depicted in figure 1.1); in Britain, during 1596-1931 (as depicted in figures 1.3 and 1.4); and in France between 1820-1914 (as depicted in figure 1.6), the rigidity of the gold price corresponded with wholesale prices returning to a constant level. In the US, Britain, France, Germany and Japan before World War I wholesale prices and the gold price coexisted in a relatively stable relationship. This implies that governments (central banks) managed to retain long-run equivalence between the supply of money (demand for gold) and the demand for money (which would have increased with a growth of the economy and the increase in transactions etc).³³

“As central banks hold such a high proportion of above-ground stocks their actions can greatly affect the market...sales from central banks defy analysis in terms of going market price; they tend to be price-affective rather than price-reactive. Future action by the central banks is impossible to predict but the trend in the last decade has been for increased sales...”

Under convertibility, the other alternative for increasing the money supply (given fixed reserve levels) was ultimately to increase the price of gold exchangeable for a quantity of gold. Over the periods of price

³² See, for example, An overview of regulatory barriers to the world gold trade, Graham Bannock, Alan Doran and David Turnbull, World Gold Council Research Study No. 17, 1997.

³³ Although the stock of money is an important determinant of the price level, there are other factors that would affect an analysis of price history, particularly in the short term (for example the velocity of circulation and the role of organised labour). Moreover, the exact direction of causation between the demand and supply of money remains, of course, a controversial issue in economics, an issue that is beyond the scope of this paper.

stability mentioned above, the slight increases in the gold price (money supply) could be seen as adjusting for lack of gold supply. The devaluations (increase in the price of gold/supply of money) of the 1930s in the US, Britain and France were followed by an increase in wholesale prices, which then stabilised somewhat in the 1950s and 1960s. In all five countries studied, the period after the uncoupling of gold and the dollar in 1971 corresponded with an increase in inflation and in the purchasing power of gold. This implies that given a fairly stable supply, gold demand actually increased after abolition of convertibility of the dollar.

Since 1971 the demand for gold has consisted of demand for it as money; increasingly as a commodity, in other words gold with a physical use (by the jewellery or electronics sectors for instance); and as a store of value (by those who are seeking a speculative asset, for example). Gold supply derives from newly-mined production, scrap, disinvestment and official sector sales by central banks that accumulated huge reserves as a result of convertibility. By 1997, the combined annual sources of supply of gold accounted for approximately 3 per cent of the estimated above ground stocks of gold.³⁴ Although the bulk of the annual supply comes from mine production, this proportion has been falling (as has the proportion recycled from scrap) with a corresponding increase in the proportion from central banks.³⁵

With respect to the total stock of gold above ground, around a quarter is official holdings (mostly central banks): total world stocks at the end of 1997 were approximately 134,800 tonnes, with central banks holding nearly 31,900 tonnes. As central banks hold such a high proportion of above-ground stocks their actions can greatly affect the market. Moreover, sales from central banks defy analysis in terms of going market price; they tend to be price-affective rather than price-reactive. Future action by the central banks is impossible to predict but the trend in the last decade has been for increased sales: such sales accounted for less than 1 per cent of the total supply in 1987, but nearly 10 per cent in 1997.³⁶

Demand factors have also changed. Gold still has a monetary role in many economies such as India and China, but - since Bretton Woods - this has largely ceased to be the case among more industrialised nations such as the US, France and Britain. In global terms gold

³⁴ Source: *Gold 1998*, Gold Fields Mineral Services Ltd.

³⁵ In 1987, 73 per cent of annual supply came from mines, whereas in 1997 mines accounted for only 58 per cent of annual supply. See *Gold 1998*, Gold Field Mineral Services Ltd.

³⁶ See *Gold 1997* and *Gold 1998*, Gold Field Mineral Services Ltd.

demand is now much more reliant on its role as a commodity than it was pre-1971. Several factors have impinged upon this demand since 1971, including deregulation;³⁷ the strong growth in demand for gold jewellery and other industrial uses including electronics; and (to a lesser extent) gold's role as a diversifier – gold's counter-cyclical movement against stocks and bonds could be used to diversify multi-asset portfolios. Another important factor is the strong speculative component to demand. Gold has a high elasticity of expectations, as the ratio of expected price increases to present price increases is high. Put simply, the speculative component feeds off itself. Changes in the price of gold tend to have multiplier effects in the direction of change, which accounts for at least part of the volatility of the gold price since 1971.

Given that in the US the average annual gold price in real terms has been higher during the last 25 years than the previous 200, the deregulation of gold after 1971 (a direct result of moving away from convertibility) would seem to imply that increased average annual demand (from all sources, including speculative) outstripped supply. The recent fall in the price of gold has been due, *inter alia*, to an increase in the supply of gold from newly mined output, increased central bank sales (real and anticipated) and the growth in forward selling.³⁸

³⁷ See *An overview of regulatory barriers to the world gold trade*, Graham Bannock, Alan Doran and David Turnbull, World Gold Council Research Study No. 17, 1997.

³⁸ The supply of gold increased from 2,370 tonnes in 1987 to 4,254 in 1997. Source: Gold Field Minerals Services Ltd.

3 TOTAL RETURNS ON ASSETS

3.1 Cumulative wealth indices: bonds, stocks and gold in the US 1896-1996

Over the long run gold has maintained its value in terms of the rate of exchange with other commodities and intermediate products. How does it compare in this sense with bonds and stocks?³⁹

Figure 3.1 demonstrates that in the US, out of financial assets bought in 1896 and held until 1996, stocks far outperformed bonds, which in turn outperformed gold as an investment vehicle.⁴⁰

Figure 3.1 shows the movements in the cumulative wealth indices for stocks, bonds, bills and gold.⁴¹ It demonstrates that in 1896 if an ounce of gold had been sold for dollars, which in turn were invested in US Treasury bills, the real dollar value in 1996 would be sufficient to buy nearly 2.8 ounces of gold.⁴² An investment in long-term government bonds over the same period would have seen a return sufficient to buy approximately 4.8 ounces of gold. Investing in quoted equities, the return would depend upon the type of stock. If the same

³⁹ The calculations in this and the following four sections are based on total return indices, which reflect the cumulative effect of returns on a unit of currency invested. All returns are constructed using a buy-and-hold approach with dividends reinvested and ignoring transaction costs, stock selection and the cost of taxation. Total returns on stocks have been calculated by using historical data on dividend yields and stock indices. Total returns on bonds have been calculated by assuming that there was a single bond that had a price inversely related to the dividend. The indices are inflation-adjusted so as to show the growth of each asset class in real terms.

⁴⁰ The total return indices used in this chapter were calculated by Global Financial Data. Data were calculated assuming monthly reinvestment of dividends. The prices of stocks and the value of dividends for 1896-1917 are taken from Common-Stock Indexes, Cowles Commission for Research in Economics, 1939 and for 1918-1996 from Standard and Poor's Security Price Index, Standard Statistics Corp, 1931. The Standard and Poor's composite index was first calculated in 1918, but the Cowes Commission back-calculated the data to 1871 using the Commercial and Financial Chronicle. The long-term US Government Bond index assumes a constant maturity of 15 years, and a coupon of 6 per cent. This was the yield on most government bonds prior to World War One. The sources for the data are A History of Interest Rates, Sydney Homer, 1963, The Financial Review, William B. Dana Co. which reprinted data published by The Commercial and Financial Chronicle; and National Monetary Statistics, Federal Reserve Bank, 1941, 1970, and annually thereafter. From 1896 until December 1918, the 4 per cent US Government Bonds of 1925 are used. Between 1919-1975 the data are taken from the Federal Reserve Board's 10-15 year Treasury bond index. In 1976, the 20-year bond is used, and for 1977-1996 the source for data is the 30-year bond. For the short-term bond index for the years 1896-1918 the data were taken from The Movements of Interest Rates, Bond Yields and Stock Prices in the United States since 1856, F. R. Macaulay, NBER, 1938. For 1919-1996 the yield on Treasury Bills is used as calculated by the Federal Reserve and published in National Monetary Statistics, Federal Reserve Bank, 1941, 1970, and annually thereafter.

⁴¹ The 1996 values on this graph are: gold, 1.19; U.S. T-bills, 3.38; government long-term bonds, 5.67; utilities stock index, 124.11; composite stock index, 528.45.

⁴² 3.38/1.19. In 1996 the Treasury bill value was 3.3 times its 1896 value, while the real dollar price of gold bullion was 1.19 times the price of 1896.

FIGURE 3.1
CUMULATIVE REAL RETURNS ON STOCKS, BONDS, AND GOLD IN THE US 1896-1996
 Indices, 1896 = 1, logarithmic scale.

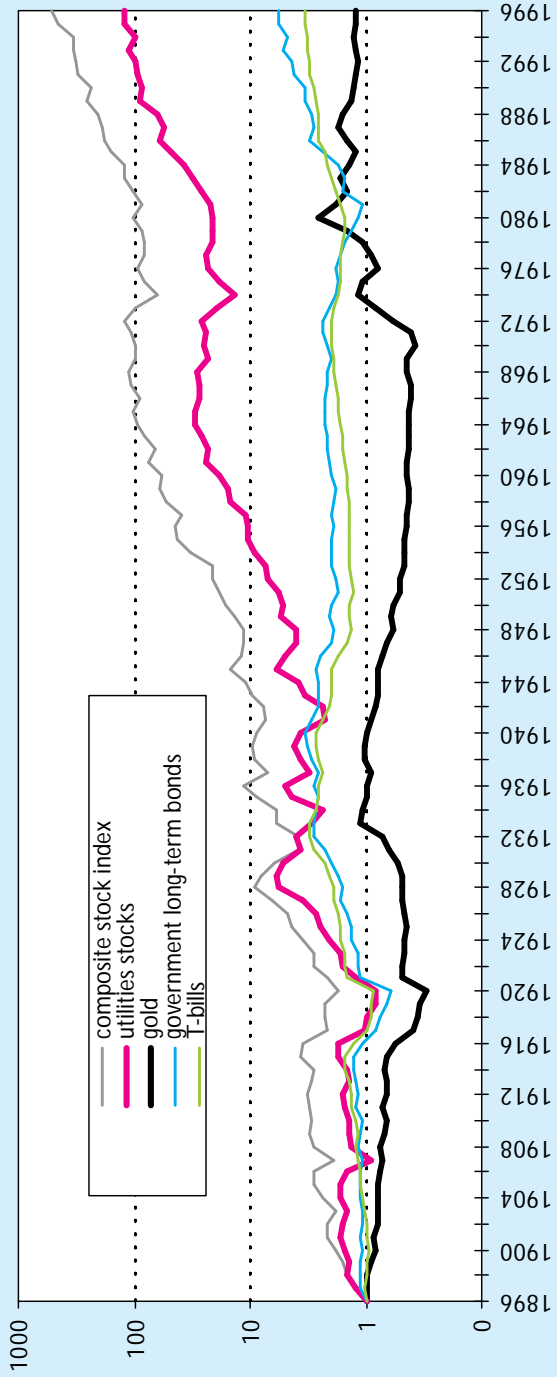
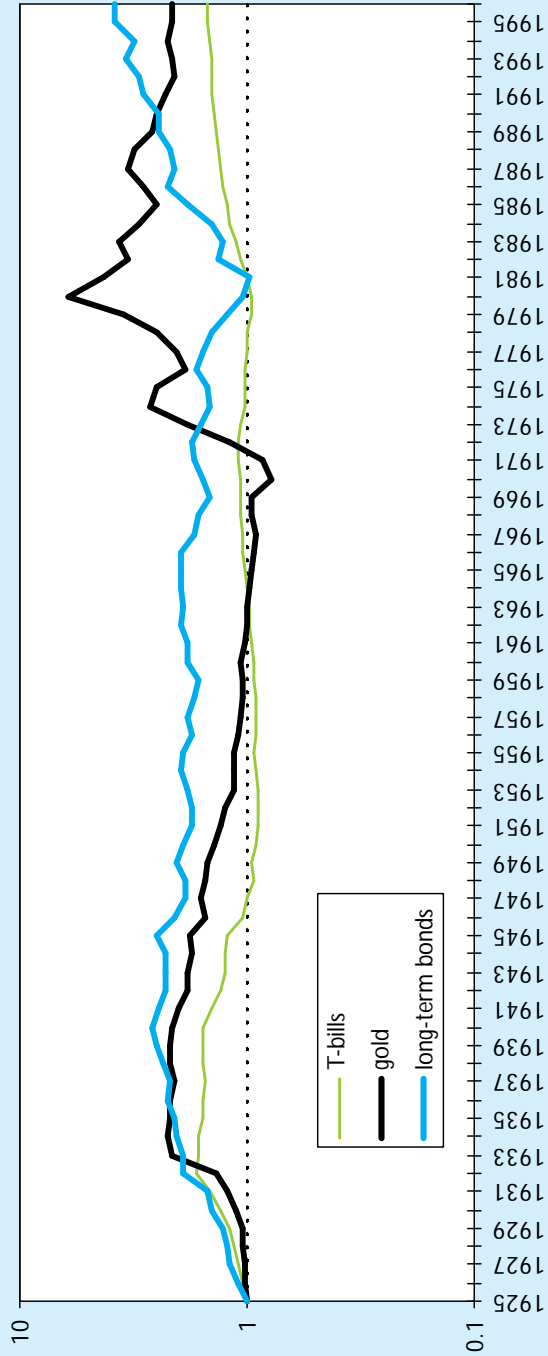


FIGURE 3.2
CUMULATIVE REAL RETURNS ON GOLD, T-BILLS AND LONGER TERM GOVERNMENT BONDS
IN THE US 1925-1996.

Indices, 1925 = 1, logarithmic scale.



ounce of gold in 1896 had been sold for dollars which were invested across the whole utility sector, those stocks could in 1996 have been sold and the real dollars used to buy 104 ounces of gold. If the investment had been in the composite index of stocks it would have been possible in 1996 to buy approximately 444 ounces of gold. Of course, in 1896 nobody could have known that stocks would perform so well over the next 100-year period in the US.

With respect to T-bills this picture is skewed by the deflation of the early 1920s, which led to an historically large increase in real cumulative wealth for an investor in bills. Since the mid-1920s T-bills have performed less well. Using the total return indices of Ibbotson Associates (which calculate the returns on assets from 1925) gold's performance against T-bills is cast in a different light.⁴³

Figure 3.2 indicates that over the last 70 years the cumulative real wealth index for gold has tended to be above that of short-term US Government bonds. Longer-term government bonds have tended to be a better investment except in the 1970s, when the higher inflation levels cut into their real return while the gold price increased. With the recent fall in the dollar price of gold, the overall real wealth index for gold has fallen below the long-term bond index, but it remains above that of the US T-bill.

3.2 Comparisons with Britain

A similar picture emerges in Britain over the long term.⁴⁴ After allowing for inflation the total real returns from buying the entire portfolio within the total stock index were 4.7 per cent *per annum* in the 1700s, 4.9 per cent in the 1800s and 4.4 per cent in the 1900s (7.4 per cent after 1950).⁴⁵ Going back 100 years, if an ounce of gold was used to track all shares in 1896, in 1996 it would have been worth 88 ounces of gold.⁴⁶ If gold had been used to buy into the total return stock index in 1950, those stocks could have been sold in 1996 for approximately 30 ounces of gold.⁴⁷

Bonds performed less well. In the 1800s bonds provided a total return of 4.3 per cent annually in real terms, but in the 1900s bonds only

⁴³ Ibbotson Associates, *Stocks Bonds Bills and Inflation*, Chicago, 1996.

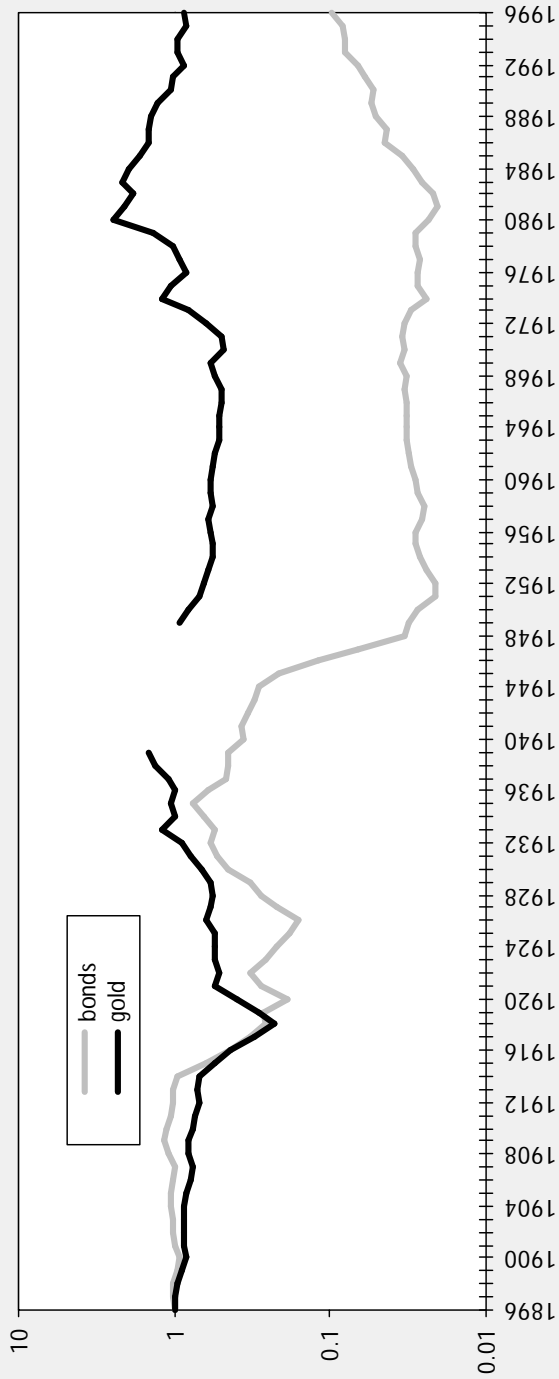
⁴⁴ The historical total return figures used in this section were provided by Global Financial Data.

⁴⁵ If the investor were to buy the quoted equity of individual firms then there would be the risk of losing the whole investment.

⁴⁶ Compounding the real return on stocks gives an increase by a factor of nearly 76, while gold decreased in real terms by a total of nearly 25 per cent.

⁴⁷ Compounding the real return on stocks gives an increase by a factor of just over 27, while gold decreased in real terms by approximately 20 per cent.

FIGURE 3.3
REAL CUMULATIVE WEALTH FROM INVESTING IN GOLD AND LONGER TERM GOVERNMENT BONDS
IN FRANCE, 1896-1996.
 Indices, 1896 = 1, logarithmic scale.



yielded 0.6 per cent after inflation because of the capital losses suffered from rising interest rates, which reduced the total return. If in 1896 an ounce of gold was sold for sterling and used to buy bonds, those bonds could have been sold in 1996 for approximately 2.5 ounces of gold. An ounce of gold used to buy bonds in 1950 would in 1996 have been worth approximately 1.5 ounces.

3.3 The case of longer term government bonds in France

Figure 3.3 depicts the real price of gold index as used for figures 1.7 and 1.8 and the real cumulative return index for government bonds.⁴⁸ It highlights the dramatic impact of inflation on cumulative returns from government bonds. In France, in terms of cumulative return on assets purchased in 1896 and sold in 1996, gold clearly outperformed longer-term government bonds.

Between 1896-1914 the real cumulative wealth gained by investing in bonds was higher than that from gold. While neither maintained value during World War I, investing in gold afforded less volatile changes in wealth than an investment in government bonds in the 1920s. From 1939 to 1949 there was a large negative return on bonds as the high level of inflation inflicted capital losses on bond holders.⁴⁹ Although the price of gold lagged behind wholesale price increases, it remained sufficiently high for gold to be a better store of wealth than bonds. During 1939-1949 gold offered an average annual real return of minus 4.4 per cent while bonds offered minus 21.8 per cent. Since the relative price stability of the early 1950s, bonds have provided approximately a 2 per cent annual gain.

3.4 Comparative returns in times of crisis

In terms of cumulative wealth over the last 100 years gold would have been a relatively mediocre investment in countries with relatively stable inflation such as the US or Britain. But countries where there has been bouts of economic dislocation and high inflation - almost every large country except the US and Britain - investors in blue chip equities and government bonds have suffered losses, and during such periods gold has outperformed them.

Germany's hyperinflation of the early 1920s wiped out the value of its stocks and bonds. Figure 3.3 (which depicts the real cumulative wealth from holding gold and bonds in France) highlights how destructive inflation can be to assets other than gold. The French experience is not unique. In Japan during 1940-49 the nominal annual total return on long-term government bonds was approximately 0.3 per cent, while consumer prices rose at an annual average rate of 54.8 per cent.

⁴⁸ The bond index is constructed by using the 5 per cent perpetual bond form 1896 to 1968 and 10-year bonds thereafter with all yields re-invested. The index has been deflated by the wholesale price index

⁴⁹ See figure 1.6 for the changes in French inflation over this period.

The annual average nominal total return from holding a portfolio of all blue-chip stocks during this period was 14.9 per cent, while the nominal annual return on gold was 73.6 per cent. Gold, however, yielded a positive average annual rate of return. During the same decade in Germany the nominal annual total return on long-term government bonds was 3.4 per cent, while consumer prices increased at an average annual rate of around 2 per cent. After accounting for inflation, the average annual total return from holding a portfolio of German stocks was minus 2.4 per cent. By comparison, the average annual real return from investing in gold during 1940-49 was 14.6 per cent.

3.5 A model of historical trading in gold, bonds and stocks

Cumulative wealth indices over a long period of time can disguise the harsh reality facing any individual investor, taking tough decisions as to the timing of the sale or purchase of an asset. With the luxury of hindsight the trans-generational investor wishing to maximise return, faced with a choice of purchasing gold or US T-bills in 1896 to sell in 1996, would have been wiser to choose T-bills. But, offered the same choice in 1925, gold would have proved the better investment. In any case a trans-generational investor is unlikely merely to be seeking to maximise returns, but will be seeking a trade-off between the return on an asset, and the riskiness of choosing buying and selling dates.

To take account of these two points we have constructed a simple model to look at the real annual rate of return on an asset,⁵⁰ which assumes that the buy and sell years have to be selected randomly.⁵¹ In this model, in the start year an investor is asked to pick a buying year and a selling year anywhere between the start and end dates (e.g. anywhere between 1896 and 1996 for the calculations as depicted in table 3.2). The investor can pick any legal combination of years (i.e. any combination where the start year is before the end year) and is assumed to choose a random combination. Given all the possible

⁵⁰ For example, in 1968 our real gold index for the US stood at 75.2. In 1973 it was at 136.1. Taking the selling price (136.1) and dividing by the buying price (75.2) gives the factor by which the index increased over 5 years (1.81 or 81 per cent). To transform this into an annual rate of return one needs to take the logarithm of this factor, divide it by the number of years (in this case 5) and then raise 10 to the power of this amount. In this example this gives 1.1259. That is to say, if one purchased gold in 1968 and sold it in 1973, the annual real rate of return would have been 12.59 per cent.

⁵¹ The assumption of random selection is made to allow modelling of the comparative performance of assets without prejudicing the analysis with the hindsight that we now have. At the end of the twentieth century it is tempting to look back and say, for example, that in the US equities would have been the best long-run investment, but not a good investment in the early 1930s or early 1970s. But of course 100 years ago nobody could have known that this would be the case, just as now nobody can know what will be the best investment choice, or years to buy and sell, for the next 100 years. Our model is of historical interest and is not intended to predict the future performance of any assets.

buying and selling combinations⁵² it is possible to calculate the following: the average (mean) return on a particular asset; the maximum return (which would signify the best possible buying and selling combination); the minimum return (the worst or unluckiest buying and selling combination); and the risk of not making the average with a random selection of buy and sell years (the standard deviation from the average).⁵³

Table 3.1 contains the results of these calculations for the purchasing power of gold (or real gold price) in the US, Britain and France.⁵⁴ The table is split into various time periods so that the recent trade-off between risk and return on gold can be compared to the historical trade-off of the last 100, 200 and (in the case of Britain, 400 years). Table 3.2 contains the results of the calculations for the composite stock index, long-term government bond index, T-bill index and gold index in the US from 1896 to 1996. These indices are the ones depicted in figure 3.1.

⁵² From 1896 to 1996, for example, there are 5,050 buying and selling combinations. One could buy in 1896 and sell in any one of the subsequent 100 years, or one could buy in 1897 and sell in any of the subsequent 99 years, or one could buy in 1898 and sell in any of the subsequent 98 years etc. There are $100 + 99 + 98 + \dots + 3 + 2 + 1 = 5,050$ combinations.

⁵³ The choice of any method to make comparisons of price volatility is always open to objection when it involves the arbitrary selection of dates. This point is brought out by a comparison of figures 3.1 and 3.2. While we believe that our simple trading model is superior to an analysis in terms of cumulative wealth (which relies on simply holding an asset), the selection of the period over which trading is analysed (e.g. 1896-1996 in table 3.2) still has implications for the results. The reason for this is that the universe of choices that an investor faces will contain the middle years more than the end years. This increased representation need not, however, distort the results. For example, over all the buying and selling combinations for gold between 1896 and 1996, the 1970s (when gold had an abnormally high price) gets more weighting than the 1990s. However the 1950s and 1960s will also get more weighting, and it can be argued that returns during this period were abnormally low. As was pointed out in chapter 2, some of the surge in the price of gold that occurred during the 1970s was a reaction to the prolonged period during which gold had been held at a fixed price. If the gold price had not been fixed in the years up to 1968 it could be argued that some of the gain in investment made in the 1970s would have occurred in earlier years.

⁵⁴ Calculations are not included for Germany or Japan as data are only available for a shorter time period making it impossible to make comparisons for the very long run (in excess of 100 years). The indices used for these calculations are those found in chapter 1.

TABLE 3.1
RISK AND RETURN OF GOLD OVER TIME

Time Period	Year	Country	Average annual return	Maximum	Minimum	Standard deviation
Since 1968	1968 - 1996	US	4.21%	77.6%	-28.8%	10.5%
	1968 - 1996	Britain	1.92%	72.2%	-29.7%	10.8%
	1968 - 1996	France	2.39%	76.6%	-21.1%	10.5%
18th century – 1968	1796 - 1968	US	0.24%	38.4%	-25.1%	2.0%
	1796 - 1968	Britain	0.33%	59.9%	-26.1%	2.1%
	1820 - 1968	France	0.31%	38.4%	-29.4%	2.3%
Last 100 years	1896 - 1996	US	0.60%	77.6%	-28.7%	4.5%
	1896 - 1996	Britain	0.38%	72.2%	-29.7%	4.7%
	1896 - 1996	France	0.67%	76.6%	-29.4%	4.9%
Last 200 years	1796 - 1996	US	0.31%	77.6%	-28.7%	2.5%
	1820 - 1996	Britain	0.36%	72.2%	-29.7%	2.6%
	1820 - 1996	France	0.36%	76.6%	-29.4%	2.9%
Last 400 years	1596 - 1996	Britain	0.04%	72.2%	-29.7%	1.4%
16th – 18th centuries	1596 - 1796	Britain	-0.07%	20.0%	-14.5%	0.6%
16th century – 1968	1596 - 1968	Britain	0.03%	59.9%	-26.1%	1.1%

Tables 3.1 and 3.2 show the average (mean) return, standard deviation, maximum and minimum return, across the universe of choices that could have been made. Table 3.1 indicates how in the US, Britain, and France, for traders who had to pick random years to buy and sell gold, there would have been comparatively low average annual returns, but a comparatively high chance of making the average (which is measured by the standard deviation [risk] of the returns). Both risk and average return have increased dramatically since 1968. This model indicates that over the past 100 years gold has been a riskier asset to trade in France, with the average real return and volatility being slightly higher than that of trading in gold in the US. In both Britain and the US the largest gains and losses in the price index of gold occurred after 1968.⁵⁵ Over the 200-year period the returns on gold in all three countries are virtually identical (an average annual return across all the buying and selling combinations of just over 0.3 per cent).

⁵⁵ See chapter 1. Although the French indices only run from 1820 (and so the longest time period over which to carry out calculations is 176 years), they are included in the 200 year section of the table.

TABLE 3.2
RISK AND RETURN OF TRADING IN ASSETS OVER TIME
IN THE US

Index	Year	Average annual return	Maximum	Minimum	Standard deviation
Composite stock index	1896 - 1996	6.10%	55.8%	-37.7%	5.0%
	1896 - 1968	6.05%	55.8%	-37.8%	4.8%
	1968 - 1996	6.29%	34.2%	-34.4%	7.2%
Long term government bond index	1896 - 1996	0.42%	52.3%	-36.0%	3.8%
	1896 - 1968	0.12%	52.3%	-36.0%	3.0%
	1968 - 1996	3.70%	45.6%	-16.1%	8.3%
T-bill index	1896 - 1996	0.21%	42.6%	-32.7%	2.9%
	1896 - 1968	0.02%	42.6%	-32.7%	2.7%
	1968 - 1996	2.43%	9.9%	-10.9%	3.3%
Gold index	1896 - 1996	0.60%	77.6%	-28.7%	4.5%
	1896 - 1968	0.33%	58.1%	-27.2%	3.6%
	1968 - 1996	4.21%	77.6%	-28.7%	10.5%

The trade off between risk and return from trading in gold, bonds and stocks in the US between 1896 and 1996 is shown in table 3.2.⁵⁶

For the US, in terms of our model, one could imagine an investor given the choice of trading in any one of four indices (the real gold price index, the real total return T-bill index, the real total return longer term government bond index and the real total return composite share index). The trade-off between risk and return could be interpreted in the following way. Given a choice between having to trade in gold or bonds, investors who were relatively 'risk-loving' would have been wise to opt for gold (as the average return is higher than with bonds, but there is a lower chance of getting the average). Those who were relatively 'risk averse' may have been wiser to choose bonds.

Thus over the last 100 years gold has been a variable but potentially lucrative investment. However, publicly-quoted equities would have been the best choice of the four; the average (mean) annual returns

⁵⁶ The statistics for the return and risk (standard deviation) on stocks assume that the investment was made across the whole index. It would have been riskier, and there would be more variable return, if investments had been made in the stock of a particular firm.

across all buying and selling combinations for equities is substantially higher than those for gold (6.1 per cent compared to 0.6 per cent for gold), while the chances of not making this average are only slightly increased (the standard deviation from the average from trading in the stock index is 5 per cent whereas with gold it is 4.5 per cent).

Since 1968, all four indices modelled have afforded greater average (mean) returns, which have been offset by an increase in risk. The annual return on a random trade in gold has become more comparable with stocks (4.2 per cent as opposed to 6.3 per cent) but gold has become the most volatile asset with a standard deviation of 10.5 per cent. A comparison of table 3.2 with table 3.1 shows that the level of volatility for a US investor trading in gold is similar to that which would be experienced by a British or French investor buying gold with their own currency.

4 GOLD AS A DIVERSIFIER

4.1 Correlation of the real return on assets We have looked at the return on gold in isolation compared with other assets. We now look at the effect of including gold in a portfolio of financial assets.

The increase in gold's volatility since 1968 has led to claims it can offer investors significant benefits by diversifying risk within a multi-asset portfolio. Looking at the historical correlation between the movement in the real gold price index and changes in the cumulative wealth (total return) indices of other assets, an interesting picture emerges.

Since 1968 the annual movement in the gold index has been negatively correlated with changes in the cumulative wealth indices of both US T-bills and longer-term government bonds. This is highlighted in figures 4.1 and 4.2, which depict the yearly percentage change in the real cumulative wealth index of gold on the vertical axis and the annual change in the T-bill and longer term bond indices respectively on the horizontal axis.

Figures 4.3 and 4.4 show the relationship between annual movements in the bonds/bills indices (vertical axis) against movements in the Dow Jones Average Index (horizontal axis). The returns have been positively correlated. In comparison, figure 4.5 shows that the returns on gold have been slightly negatively correlated with returns on stocks. This implies that gold could have served as a risk diversifier in a multi-asset portfolio. For example, one could have used gold to hedge against a stock market correction.

4.2 Portfolio analysis: an example of the benefits of diversification Figure 4.6 depicts the trade off between the risk (standard deviation of the return from the average return) and the average annual return of using bonds, T-bills and gold to diversify an equity portfolio.⁵⁷

Figure 4.6 shows that from 1968 to 1996 buying 100 per cent equity in a random year to sell in a subsequent year would give, on average, an annual return of just over 6 per cent with a standard deviation of approximately 8 per cent. Looking at the dark black line (the equity/T-bill mix) each point represents a 5 per cent substitution towards T-bills (away from equity). There is a clear linear trade-off between risk and return as one moves down the line to the left (the furthestmost point representing a 100 per cent holding of T-bills).

⁵⁷ The equity portfolio is constructed from the total returns from the Dow Jones Average Index. The returns and risk are calculated in the same way as for the model described in section 3.5.

Starting at the same point (a 100 per cent holding of equity) and increasing the holding of long-term government bonds, there is an initial decrease in both return and risk, but after moving to a portfolio consisting of approximately 55 per cent equity and 45 per cent bonds, standard deviation (risk) increases as average annual return decreases. With gold the results are interesting. Moving from a portfolio consisting of 100 per cent equity to one consisting of 75 per cent equity and 25 per cent gold increases returns while significantly decreasing risk. This is a result of the negative correlation between the annualised return from investing in gold and the annualised return from investing in the cumulative return Dow Jones equity index (see section 4.1).⁵⁸

⁵⁸ One might expect a similar result from using gold to diversify a bond portfolio as the real returns from holding gold are negatively correlated with real total returns from both long and short-term US government bonds.

FIGURE 4.1
ANNUAL REAL RETURN ON GOLD AGAINST RETURN ON T-BILLS IN THE US 1968-1996

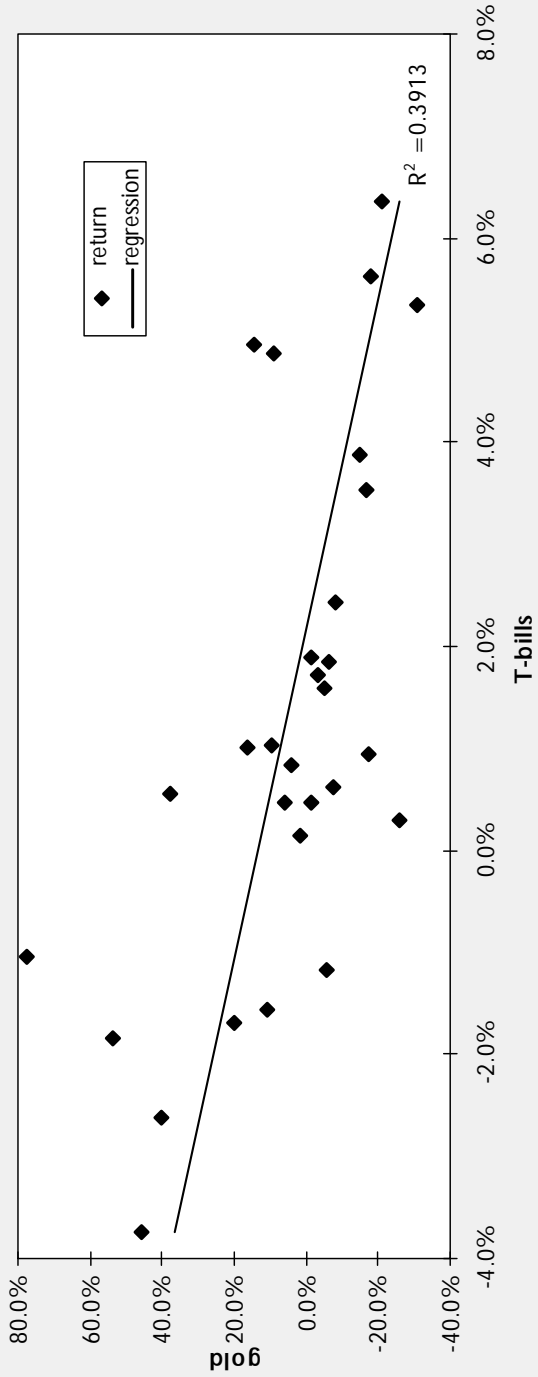


FIGURE 4.2
ANNUAL REAL RETURN ON GOLD AGAINST RETURN ON LONG-TERM GOVERNMENT BONDS
IN THE US 1968-1996

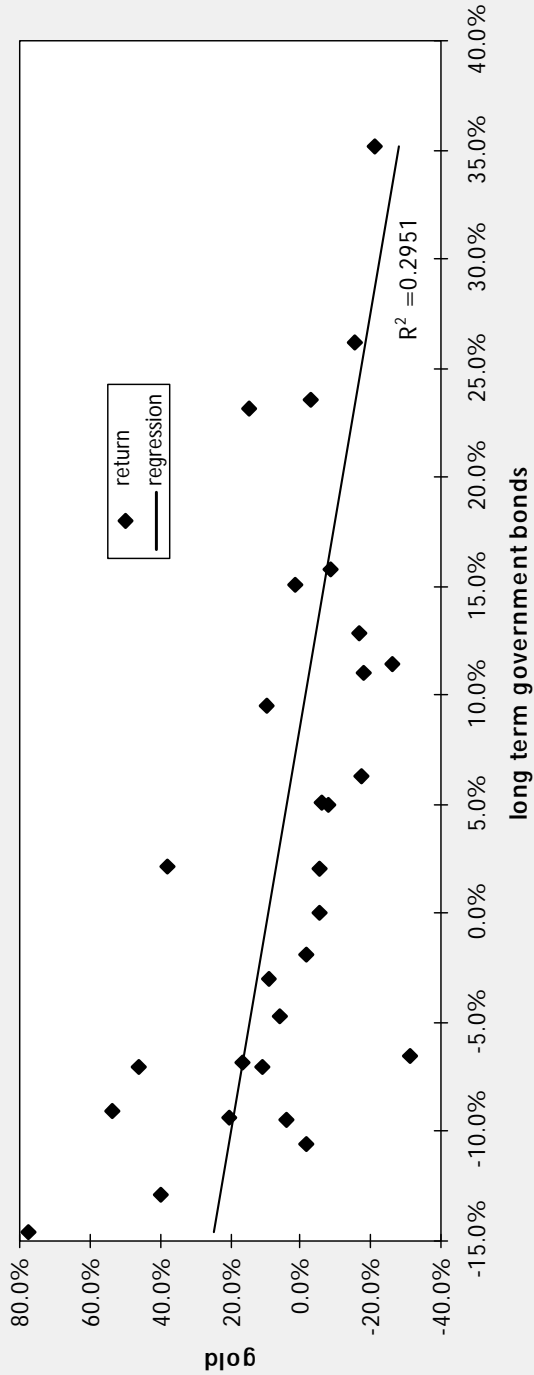


FIGURE 4.3
ANNUAL REAL RETURN ON LONG-TERM US GOVERNMENT BONDS AGAINST RETURN ON
DOW JONES AVERAGE INDEX 1968-1996

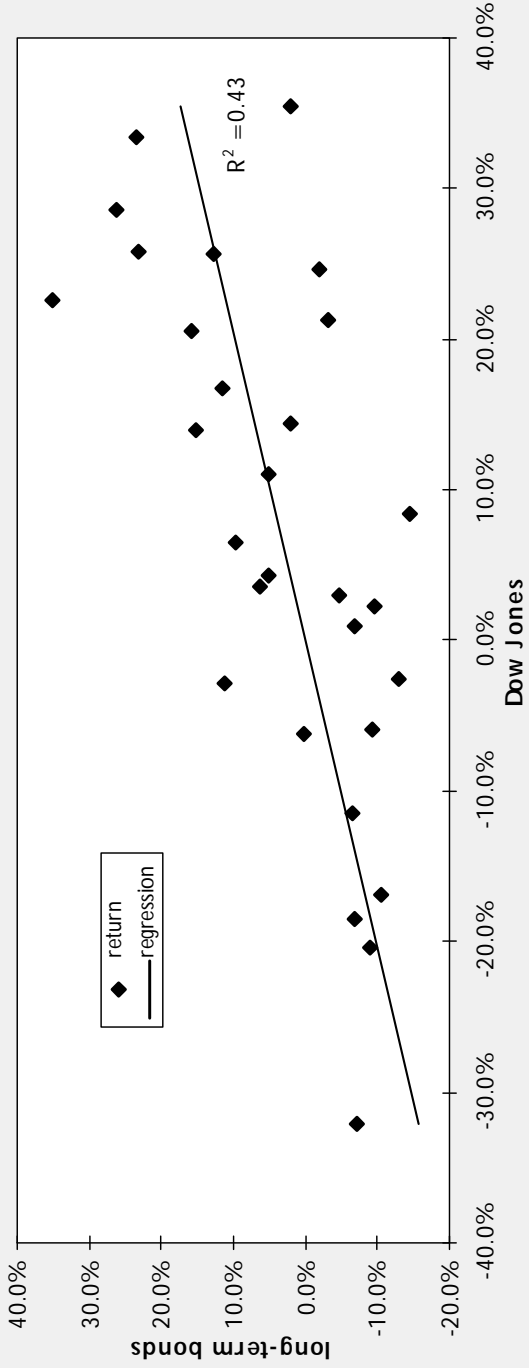


FIGURE 4.4
ANNUAL REAL RETURN ON US T-BILLS AGAINST RETURN ON DOW JONES AVERAGE INDEX 1968-1996

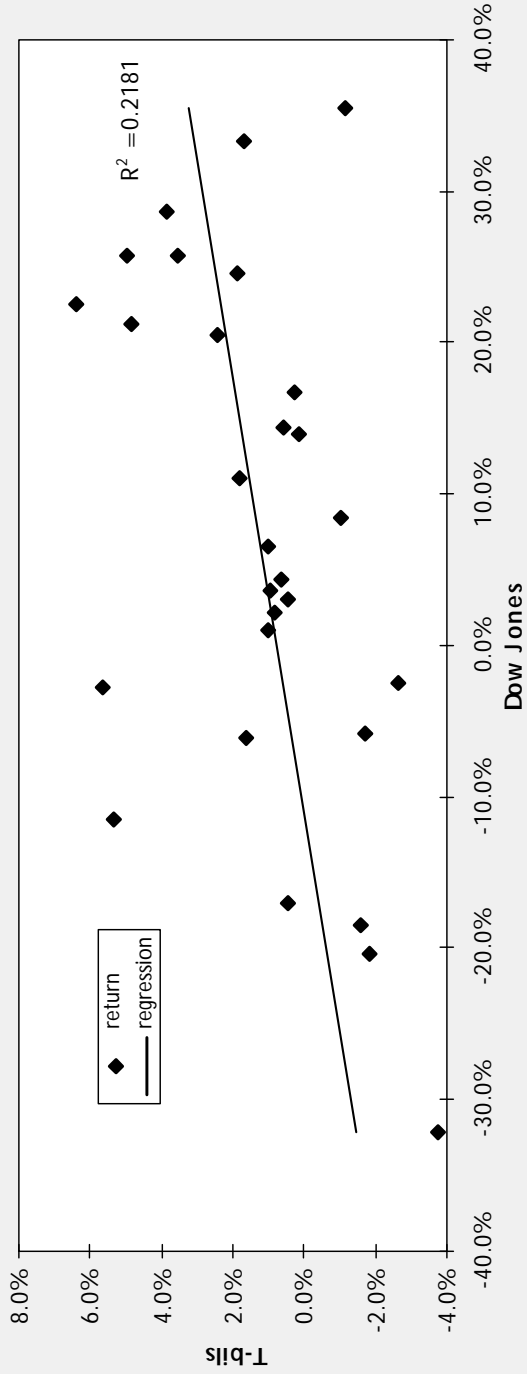


FIGURE 4.5
ANNUAL REAL RETURN ON GOLD IN THE US AGAINST RETURN ON DOW JONES AVERAGE INDEX 1968-1996

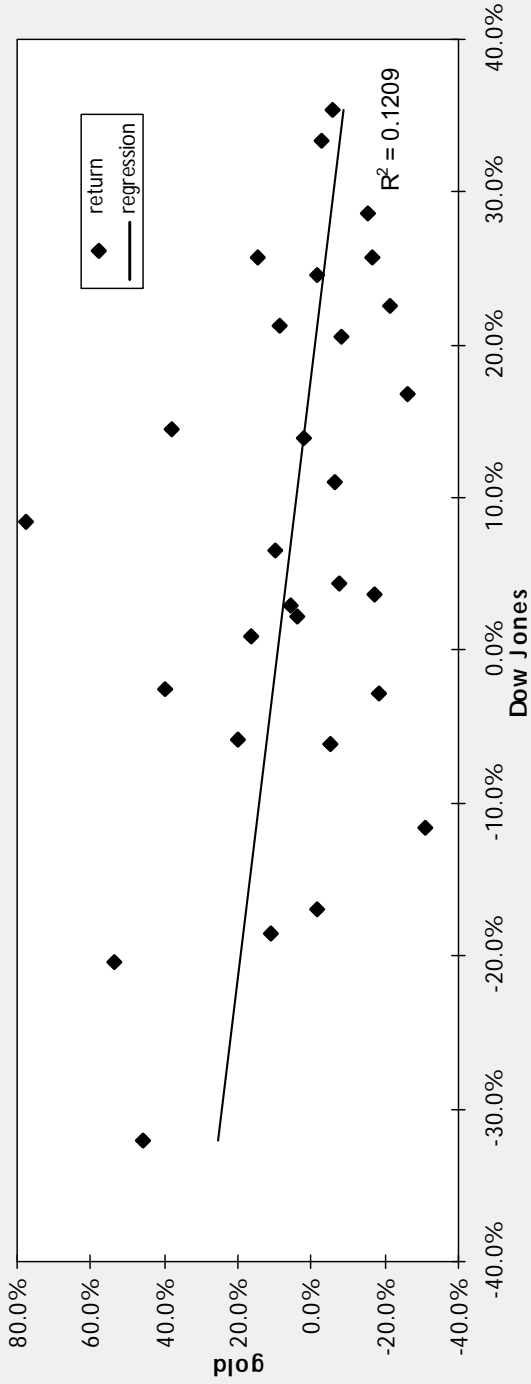
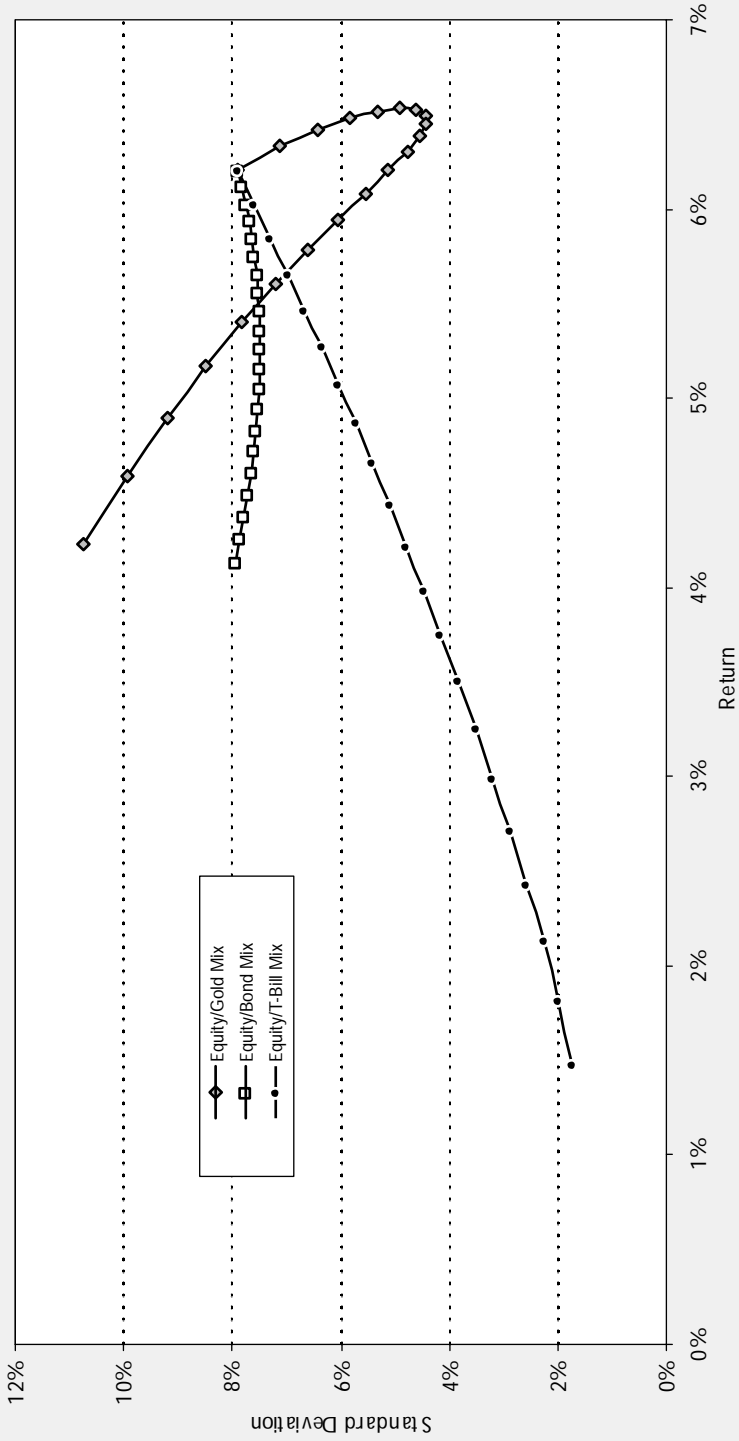


FIGURE 4.6
TRADE OFF BETWEEN RISK (STANDARD DEVIATION) AND REAL RETURN FOR DIFFERENT PORTFOLIO
MIXES IN THE US, 1968-1996



5 CONCLUSION

Gold functions as a long-term store of value. That is the key finding of this report. This analysis may not have established the veracity of the claim that gold has held its value since the time of King Nebuchadnezzar, but it has proved that gold has maintained its real purchasing power in terms of commodities and intermediate products since the early days of the United States of America, since the reign of Queen Elizabeth I, and since shortly after the end of the First Republic in France. It has also maintained its value since the late 19th century in Japan and since the time of the political unification of Germany in the early 1870s.

Gold has not always held its value in terms of purchasing power in periods of instability such as the the Napoleonic Wars, the American Civil War, the Franco-Prussian War, World War I, World War II or the Gulf War. Part of the reason for this, at least, is that in times of war the prices of other commodities, more directly needed for the war effort, tend to rise faster.

However, during periods of occupation by a foreign power or the collapse of a monetary system, gold's liquidity, acceptability and portability have been particularly important qualities and may well be more pertinent than gold's rate of exchange with paper money. In periods of economic dislocation and high inflation gold has consistently proved a better wealth preserver than other assets.

Ultimately, the lesson from the experiences of the US, Britain, France, Germany and Japan is that, although the gold price may fluctuate, over the very long run gold has consistently reverted to its historic purchasing power parity against other commodities and intermediate products. Historically, gold has proved to be an effective preserver of wealth. It has also proved to be a safe haven in times of economic and social instability.

In a period of a long bull run in equities, with low inflation and relative stability in foreign exchange markets, it is tempting for investors to expect continual high rates of return on investments. It sometimes takes a period of falling stock prices and market turmoil to focus the mind on the fact that it may be important to invest part of one's portfolio in an asset that will, at least, hold its value.

History suggests, and the global economic crises and uncertainties experienced in the past couple of years add force to the suggestion, that over the long run periods of economic turbulence are inescapable.

While participants in markets may know that such periods will occur they will seldom, if ever, be able to predict with much precision when they will occur. Even in a major European economy such as Germany, where it is tempting to believe that relative stability is the norm, in living memory there have been periods of huge economic upheaval.

At the turn of the century nobody could have anticipated two world wars and a rash of smaller armed conflicts, nor that economies such as the German, French or Japanese would experience a collapse of their financial institutions and bouts of massive inflation. As we approach the next century, the future is equally unpredictable. We may be aware of future events that could potentially trigger a destabilisation (for example, the introduction of the euro currency in the EU, the Millennium “bug”, or the Japanese banking crisis) but we cannot know whether such a destabilisation will happen nor how serious it might be. It is against this background of perennial economic uncertainty that gold’s continued function as a store of value needs to be recognised.

APPENDIX 1

Price indices In order to construct a purchasing power index one must first establish an index of prices. Various price indices give different weights to various goods and services. Jastram discusses this issue at some length.⁵⁹ For the sake of rigour, we have compared three different indices to demonstrate that although any given one may in itself not be a perfect indicator of prices, as the basket of goods it represents may not be correctly weighted, any variations in the indices are sufficiently small for them not to affect the broad historical picture. The first index (the thick black line) is the US Bureau of Labor's consumer price index that began in 1913. The second (the red line) is the wholesale price index which is used in figures 1.1 and 1.2. The third is an update of Jastram's wholesale price index for the US⁶⁰ This index was updated for the last 20 years by comparing it with the all commodities producer price index and then scaling the former index appropriately.

In figure A.1 the base year for all three indices is 1930. The wholesale price indices have tended to understate inflation as expressed by the CPI. Figure A.2 demonstrates the impact that different price indices would have on the purchasing power of gold index.

Figure A.2 indicates that while the purchasing power of gold was higher in 1913 when calculated using the CPI, its fall during World War I was as dramatic as the fall in purchasing power calculated with the WPI. The changes in all three purchasing power indices are broadly similar. Of note is that the purchasing power of gold as calculated using the CPI rose to higher levels in the late 1970s than when calculated with the wholesale price index as used in figures 1.1 and 1.2. By the mid-1980s the two purchasing power indices were at similar levels, however. Indeed, in 1996 the purchasing power of gold as calculated using the consumer price index was at an almost identical level to that calculated with the WPI (the thick grey line in figure A.2 – equivalent to the purchasing power of gold as depicted in figures 1.1 and 1.2).

⁵⁹ *The Golden Constant – The English and American Experience 1560-1976*, Roy W. Jastram, University of California, Berkeley, 1977, Chapter 3.

⁶⁰ *op. cit.* pp 145-146.

The following figure, A.3, indicates how the movements in the purchasing power of gold in Britain are similar when calculated with either the wholesale or consumer price index. Using the consumer price index does not alter the conclusion that gold has maintained its value over the long run.⁶¹

⁶¹ The CPI was constructed from data from the Central Statistical Office, the IMF and the OECD (provided by Global Financial Data). The sources for the WPI were *The Golden Constant – The English and American Experience 1560-1976*, Roy W. Jastram, University of California, Berkeley, 1977; *The Growth and Fluctuation of the British Economy, 1790-1850*, Rostow and Schwartz, OUP, 1953; The League of Nations, and the IMF. One of Jastram's principal sources of data was Lord Beveridge's *Prices and Wages in England from the Twelfth to the Nineteenth Centuries*, 1939.

FIGURE A.1
A COMPARISON OF VARIOUS PRICE INDICES FOR THE US 1796-1996.
Logarithmic scale, 1930 = 1.

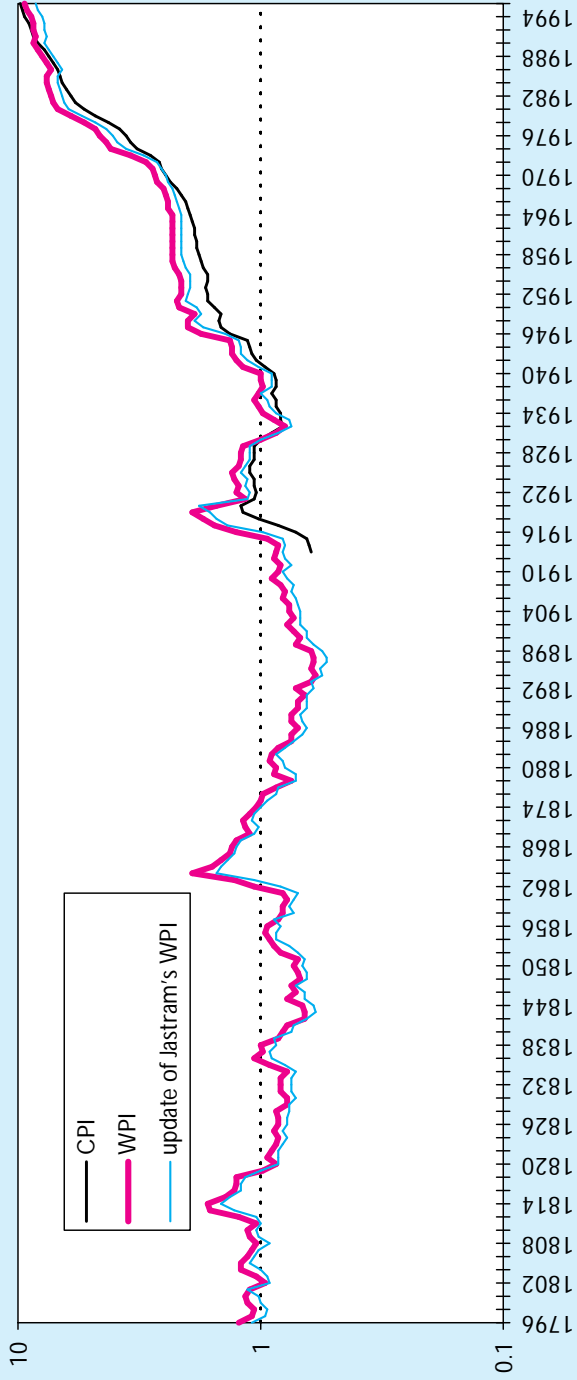


FIGURE A.2
COMPARISON OF THE PURCHASING POWER OF GOLD USING DIFFERENT PRICE INDICES FOR THE US 1796-1996.
 Linear scale, 1930 = 100

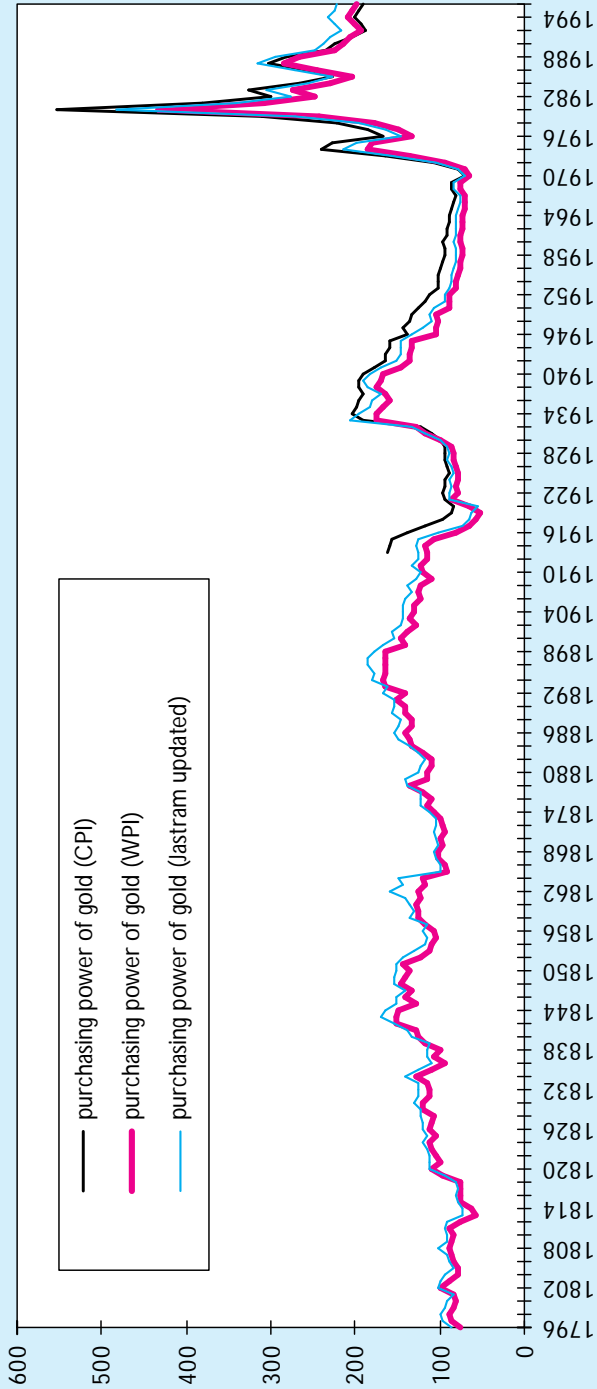
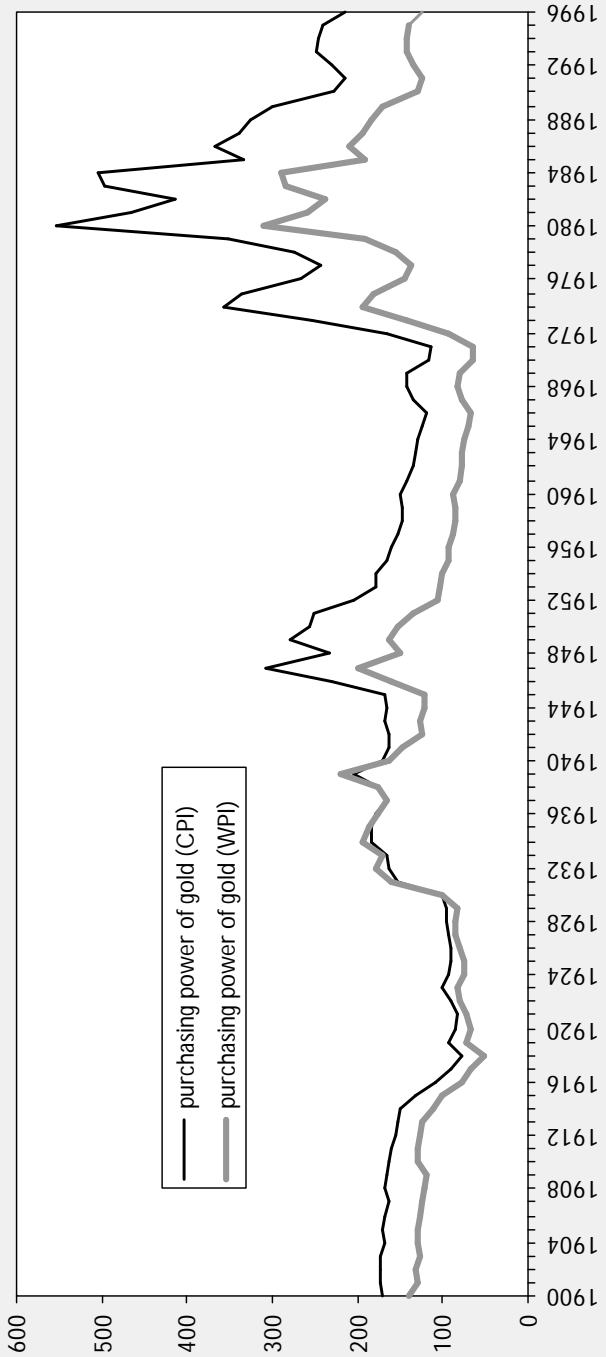


FIGURE A.3
COMPARISON OF THE PURCHASING POWER OF GOLD USING DIFFERENT PRICE INDICES FOR THE UK 1900-1996.
 Linear scale, 1930 = 100.



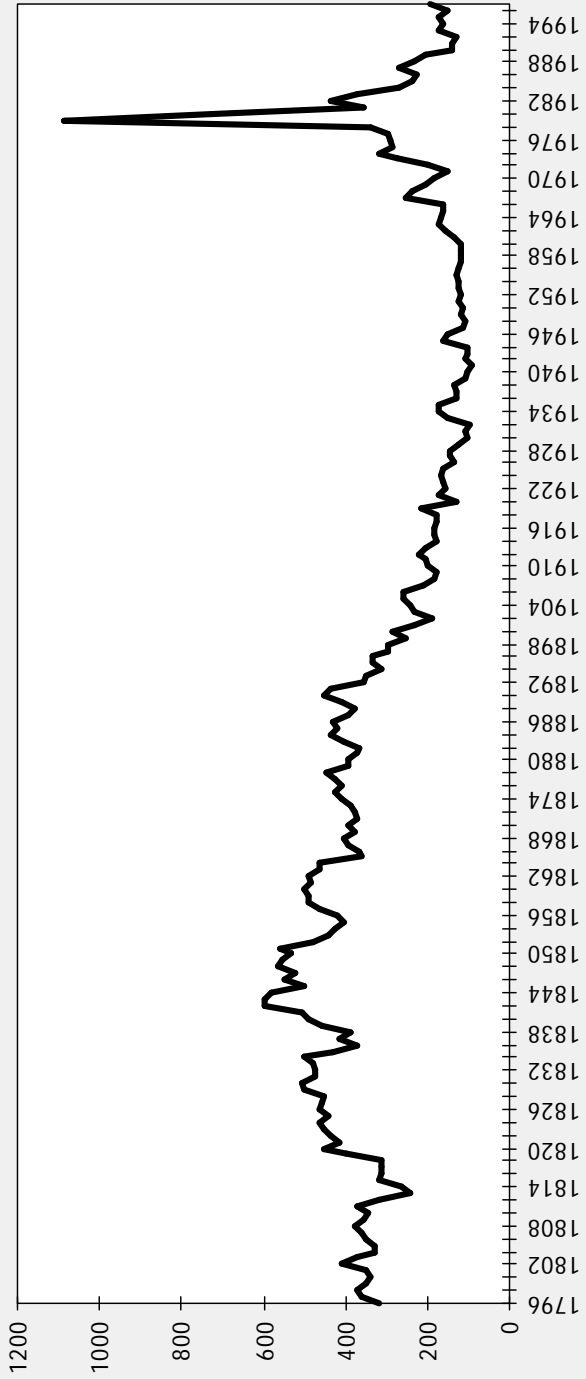
APPENDIX 2

A comparison with silver A comparison of figure A.4, below, with figure 1.2, demonstrates how striking gold is as a store of value compared to silver, which could (and has) functioned as both money and commodity.⁶²

In the 19th century the purchasing power of silver was considerably higher than it has been in the 20th century. From 1816 to the 1880s, despite fluctuations, silver broadly maintained its value in terms of purchasing power. However, the period from the end of the 19th century to the end of World War I was marked by a steep decline as silver was demonetised and lost two thirds of its value. After World War I, the price of silver stabilised at a much lower rate of exchange with other commodities and intermediate products. This new purchasing power parity lasted until the 1970s, when speculation led by the Hunt brothers pushed the price of silver (and its purchasing power) up to its highest level. Since the early 1980s the purchasing power of silver has declined and returned to its broad historical level for the 20th century. Given the sea-change in the purchasing power parity of silver at the turn of the century, some precious metal analysts have argued that there could be a similar shift in the purchasing power of gold if there were a dramatic shock to the demand or supply conditions. However, as is outlined in section 2.2, the abolition of convertibility in 1971 constituted such a sea-change, after which gold's purchasing power parity actually increased.

⁶² The silver price index is constructed from prices taken from *World Prices and the Building Industry*, George F. Warren and Frank A. Pearson, 1937 for the years 1796-1933 and from the Commodity Yearbook, Commodity Research Bureau, Chicago, for 1933-1997. It is deflated by the WPI.

FIGURE A.4
THE PURCHASING POWER OF SILVER IN THE US, 1796 - 1997.
Linear scale, 1930 = 100.



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