



June 2010

UBS research focus

Gold – the ultimate currency

Gold is more than meets the eye

The market for gold

Is gold really expensive? The question of valuation

Investment outlook

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Dear reader,

Like a mythical creature that changes its shape and appearance, our ferocious debt crisis takes on new forms as circumstances change. The crisis challenges past economic models and weighs heavily on future growth. It first appeared in 2007, when unsustainable levels of credit tied to the US housing market finally imploded, nearly choking the life out of global financial markets. As a result, many financial institutions, unable to meet their commitments, were rendered insolvent, with the worst recession in decades – another painful consequence of this malaise.

To avert an even more damaging systemic breakdown, governments the world over undertook drastic measures involving massive bailouts and even the nationalization of some stricken banks. Often, these rescue measures were themselves financed by new debt, even as public debt spiraled to unprecedented heights.

This could not have come at a worse time since government debt levels are already extremely high in many developed economies. No wonder that the creditworthiness of heavily indebted sovereign borrowers like Greece is being questioned. In our view, the usual prescription of fiscal austerity and economic growth will not remedy the debt problem this time around. Instead, we think that governments – at least in some of the major countries – will eventually yield to the temptation of using their printing presses to create the money they need to escape from debt. This would hardly be the first time when inflation is employed by a government as a policy tool to erode excessive debt levels.

Debt, its burdens and its punishments dominate the economic news everywhere today. In this environment, we think that gold stands to shine especially brightly. For 10 years now, gold has been on an unstoppable ascent against all the major currencies. Put in other words, gold has trumped paper money of all kinds over the past decade.

In 1999, former US Fed chairman Alan Greenspan said, “Gold still represents the ultimate form of payment in the world... gold is always accepted.” Indeed, in a world of drowning in debt, gold’s debt-free nature appeals even more strongly, we believe. Any transaction settled in gold is final – there are no further liabilities, nor is there any lingering counterparty risk. Thus, gold seems like the antidote to debt.

In this UBS research focus, we invite you to join us on a trip through the world of gold. The aim of our explorations is to give you a deeper understanding of the forces driving the gold price today and tomorrow. In this report, we present our views and recommendations on investing in gold. We wish you a rewarding journey.

Gold – the ultimate currency

Most people – analysts and investors – view gold as a commodity. They try to understand its price movements in the same way they look at those of copper or nickel. While it cannot be said that this approach is wrong, we believe gold is more than a commodity. Gold is money – a very special form of money.

It is gold's monetary function that drives its prices beyond its relative value as a commodity. Gold's monetary aspect is particularly appealing during periods of economic strife, especially when trust in paper money wavers. Indeed, the sharp rise in the price of gold in recent years can largely be attributed to its status as a safe-haven currency.

Like any other currency, gold actually has many prices. Thus, saying that gold is too expensive in USD terms is the same as saying that the USD is too cheap in terms of gold. Against a broad basket of all major currencies, we note that gold's value has remained remarkably stable over long periods of time.

The gold market

About 166,000 tons of gold are held above ground today and since the metal is virtually indestructible and is never really consumed, there is no risk that we might run out of gold the way that we may run out of oil or other raw materials. Nevertheless, since much of the gold stock is unavailable to the gold market, the annual shifts in supply and demand heavily influence the metal's price outlook.

Mining produces most of the world's "new" gold, but mines are capital-intensive and slow to respond to price changes. Scrap gold is another source of supply, as are central bank sales. Jewelry and investment are the main sources of demand. Investment demand has risen rapidly in recent years, reflecting investors' concerns over the sustainability of paper money systems. Central banks, which reduced their gold reserves during the 1990s, are now maintaining or even rebuilding their gold reserves. We believe that the growing importance of investment demand is likely to make the gold price more volatile in future.

Is gold really expensive?

Applying a valuation to gold is tricky. There is no absolute, independent measure that determines when gold is cheap, expensive or fairly valued. However, we believe that the parameters we discuss in this report offer reasonable guidance on gold's valuation. Our investigation into production costs convinces us that gold is certainly not cheap anymore. At the same time, compared to other assets, we find that gold is also not extremely expensive either. Indeed, compared to oil or stocks, gold appears to be at least fairly valued if not inexpensive.

Our longer-term inflation-adjusted gold price outlook reflects this view. Our price model, which relates gold's price to the quantities of gold and money, indicates that a significant share of gold's higher prices mirrors the expansion in the supply of US dollars in recent years. Our gold model also indicates that concerns over the future of major monetary systems are becoming visible in the price of gold.

Our investment outlook for gold

We think that the price of gold has yet further to rise. Our target is about USD 1,500 per ounce in 12 months' time. Of course, any sharp intensification of the sovereign debt crisis in Europe could propel the gold price even higher, but downside risks should not be discarded lightly either.

We think that prices below USD 1,200 represent buying opportunities. We would expect investors to be richly compensated for the risk they take. As always, investors should carefully analyze their reasons for buying gold because clarity on the aims of such an investment will determine the most suitable investment vehicle. In the current environment, we prefer unhedged, physically-backed positions over equities and paper investments in gold.

Chapter 1

Gold is more than meets the eye



"The golden age only comes to men when they have forgotten gold."

Gilbert K. Chesterton

"The gold standard, in one form or another, will prevail long after the present rash of national fiats is forgotten or remembered only in currency museums."

Hans F. Sennholz

"In truth, the gold standard is already a barbarous relic."

John Maynard Keynes, 1924

"In the absence of the gold standard, there is no way to protect savings from confiscation through inflation. There is no safe store of value. ... Deficit spending is simply a scheme for the confiscation of wealth. Gold stands in the way of this insidious process. It stands as a protector of property rights."

Alan Greenspan, 1966

An ancient Roman proverb says, "When gold speaks, the world is silent." For many years, gold did not speak. Its price, expressed in US dollars, fell precipitously in the 1990s and by 2000 investors seemed to have all but forgotten about the yellow metal. However, since 2001 gold's price started to increase, first steadily then more rapidly. As we write this report, the price of gold is rushing from one long-term high to another. Gold is back with a bang, or to belabor our Roman saying a bit more, gold is speaking again. This report is about the story that gold is telling. In the first chapter, we discuss the main properties of gold, which reveal many interesting and surprising insights. The second chapter discusses the market for gold and in the third chapter we look at the intricacies of gold valuation. The final chapter sets out our expectations, forecasts and recommendations for investors considering an engagement in gold.

Our story of gold has to start somewhere and defining gold's physical characteristics seems to be an appropriate place. Gold is the most ductile and malleable element on our planet. A single ounce (31.104 grams) of gold can be drawn into a wire 35 miles long and gold can be hammered into sheets less than five millionths of an inch thick, making it thin enough to become translucent. Next to silver, gold is also the best conductor of heat and electricity and the most reflective of light. But unlike silver, gold is extremely resistant to oxidation. Gold is in fact one of the most inert metals that can be found. These properties are

unique to gold and confer upon gold a very special status among the elements. Because of its unique physical properties, and the fact that gold is very scarce, it has long been a sought-after metal. On average, there is less than 0.004 ppm (parts per million) of gold in the earth's crust; compared to silver at 0.07 ppm, copper at 55 ppm and iron at 56,000 ppm. To find gold is very difficult. To find a large enough quantity of gold, so that it would be worthwhile mining it, is a rare occurrence indeed.

Gold as a fabrication commodity

Gold is a metal – this we know. But is gold also an industrial metal, i.e. a commodity, like copper or iron? Many people believe so and if they are correct, gold will derive its value from the aforementioned physical properties. The biggest market for gold would be in the electronics industry where it would compete with other metals, notably copper. If gold were to truly compete with copper in mass production of electrical components then the price of gold would have to be competitive with the price of copper. Yet, copper trades at around USD 6,900 a ton and gold at nearly USD 38,500,000 a ton. This means that the gold price would have to drop to around 20 cents an ounce to be in the same region as the copper price. Obviously, gold is not being priced as an industrial commodity. It never has been, not even in 2001, when the gold price expressed in US dollars reached a long-term low.

Gold is money

There is a demand for gold that inspires people to pay substantially more for it than fabrication demand would suggest. Some would say that this is so because gold is money. To answer this question requires a definition of money. A typical one would be that money is anything that is generally accepted in payment for goods and services and in repayment of debts. The main uses of money are as

- a medium of exchange,
- a unit of account, and
- a store of value.

According to economist Carl Menger, its acceptability in trade is the defining property of money. While money undoubtedly does serve as a store of value and a unit of account, these properties are derivative, not definitional. The reason that a medium of exchange necessarily is also a store of value is the anticipation of its exchange value in the future.

Medium of exchange and unit of account

At present, in the developed world, nearly every nation has its own money or belongs to a currency union. Some nations in the developing world use the US dollar or the euro. Hardly anywhere do we find gold generally accepted as a means of payment or as a unit of account. That was different in the past, but today gold must fail the definitional test of “moneyness,” despite the fact that gold can of course be turned relatively easily into all local currencies at nearly the same exchange value.

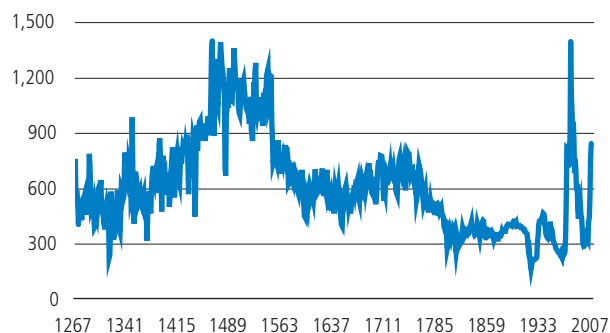
However, the story does not end here. Gold is not money as such but it has most of the desirable properties of money¹, and the process by which it became money in the past gives some clues about its value as money, even today. Interestingly, during the Asian crisis in the late 1990s, both South Korea and Thailand publicly called upon their citizens to turn in any private gold (coins, jewelry, etc.). The Thai and South Korean governments needed the gold to rebuild their foreign reserves after losing the battle to save their defunct currencies. Now, if gold is no longer money, why would these countries need their citizens’ gold? The fact is that in times of financial crisis all countries still have to turn to gold. In these instances, gold assumes the role of the ultimate currency, the only form of money that is not someone else’s liability.

This is an essential insight: gold may partly be a commodity, but first and foremost gold is money and this is true in particular during times of crisis, as we have indeed seen during the global financial crisis that started in 2008. We will see later in this report that this has important implications for our considerations regarding the valuation and the outlook for gold.

¹ The Greek philosopher Aristotle defined the ideal form of money to have these properties: durable, divisible, convenient, consistent and it has to have value in itself.

Fig. 1.1: Gold has retained its value

Gold price in British pound inflation-adjusted (1267–2009)



Source: Measuring Worth, UBS WMR, as of May 2010

Store of value

We have seen that gold is a special form of money, but is it also a true store of value? For anybody contemplating the merits of investing in gold bullion, this is a critical question. Most people would agree that the gold price can fluctuate widely and a look at Figure 1.1 seems to confirm this impression.

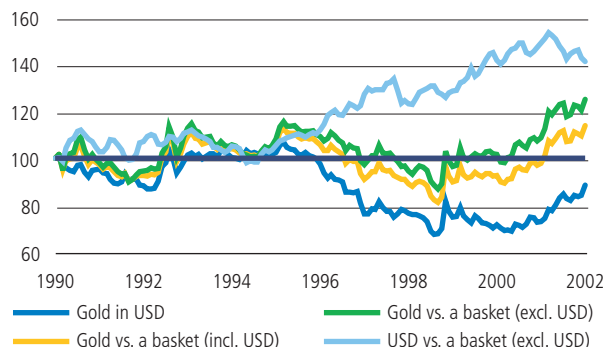
For whatever such reconstructed data are worth, the chart seems to show that the real gold price, i.e. the gold price expressed in terms of real goods such as wheat or cattle, fluctuated over time, albeit over very long periods of time. Then again, it also shows that in inflation-adjusted terms, the gold price today is more or less at the same level as 750 years ago. Not many assets can claim that for themselves. Whatever the matter, such long periods of time are out of scope from an investors’ point of view.

But many investors today still remember the seminal decline of the gold price in the 1990s. Expressed in US dollars, the gold price fell over 20% between 1990 and 2001. It is this experience that really undermined the belief that gold is a store of value. Yet, as we have just argued, gold is essentially a special form of money. Money, however, has no single price, but the price of money is its purchasing power, meaning its exchange value against all goods, services and other currencies. This is the same with gold. The price of gold is customarily expressed in terms of US dollars, but it can be and is expressed in any other currency as well.

What we have to do then is to look at the price of gold expressed in terms of a basket of currencies. We have used a weighted average of 29 currencies and the result is given in Figure 1.2. It may come as a surprise to many, but against a broad basket of currencies, gold’s price remained more or less constant throughout the 1990s. What happened is that the US dollar has appreciated as a result of large investment inflows into the United States. This by definition meant that the price of gold expressed in US dol-

Fig. 1.2: Stable average gold price in the 1990s

Rebased gold price in US Dollar and against a basket of 29 currencies



Note: 1990 = 100
Source: Reuters EcoWin, UBS WMR, as of May 2010

lars fell. Other explanations, like central banks selling gold, played a minor role for gold's price. We will explore this in more detail in chapter three.

The easiest way to demonstrate gold's function as a safe-haven store of value is to look at the gold price in terms of currencies that have been subject to financial turmoil in the past. It is immediately evident from Figure 1.3 that during times of financial crisis those investors who had gold in their portfolios were substantially better off than investors without gold. Mexican investors with assets in gold saw the gold price rise by 107% in less than three months during the 1995 crisis. Indonesian investors saw the gold price rise by 375% in seven months in 1998. In the same year, Russian investors experienced a rise of the gold price by 307% in the course of eight months. Indeed, with the global financial crisis that began in 2008, we do not have to go back to the 1990s to show gold's value as a safe-haven store of value. Since 2008, the gold price has risen 45% and 74% in US dollar and euro terms, respectively.

It should be clear now that gold has not lost its value as a store of wealth or as a protection for financial assets in times of turmoil. Importantly, the price of gold is currency specific. Thus, saying in the current situation that the gold price is too high is tantamount to saying that the price of the US dollar is too low. When we talk about the gold price in US dollars, we are by definition also talking about the US dollar exchange rate.

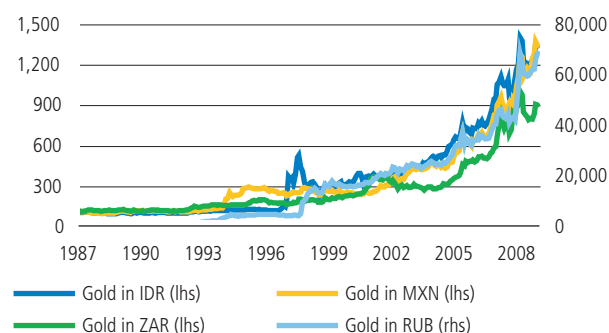
Conclusion

There are a few points that we would like the reader to take away from this chapter. Firstly, gold is partly a commodity and partly a special kind of money. Gold is never really priced as a commodity, though, and the higher its price the more it is valued for its monetary functions. Secondly, gold's price is currency specific. Thus, gold has many prices, which can simultaneously move in opposite directions.

Finally, like the value of any other economic good, the value of gold changes according to changing perceptions and situations. Thus, the gold price expressed in any currency is subject to sizable swings. This must be emphasized because there are many goldphiles who wax eloquent about the eternal, immovable value of gold. However, over time gold preserves its purchasing power and it does function as a long-term store of wealth, especially during periods of economic crisis. With this very important insight we now turn to the physical market for gold, which will give us further insight for assessing the outlook for gold in subsequent chapters.

Fig. 1.3: The gold price offers good protection against event risks

Gold price denominated in Ruble, Peso, Rand and Indonesian rupiah (rebased to 100)



Source: Reuters EcoWin, UBS WMR, as of May 2010

Coins and bars are worth their weight in gold



An investment in physical gold offers investors an additional degree of diversification.

Jürg Richter, Head of UBS Gold & Numismatics, explains the things investors should look out for when investing in bars and coins.

The price of gold is riding high at the moment. Are you noticing any impact from this at the counters of UBS Gold & Numismatics?

Jürg Richter: Clients are frequently having to stand in line at our counters – however quickly and efficiently we try to serve them. The vast majority want to buy precious metals or coins. A small number come to us wanting to sell their holdings.

What trends are developing in the field of bars and coins and precious metals in general?

A trend toward physical metals has been evolving. There are more and more clients who are actively reducing their bank accounts in order to invest in physical gold, which they then keep under lock and key as a “reserve currency”, so to speak, for times of crisis.

Can gold really function as a safety net?

Yes. Gold has always retained a certain value over the millennia and through countless crises. However, unlike bank accounts, investments in gold and other precious metals do not earn any interest. But like securities, gold bars and bullion coins can be bought and sold daily at a fixed market price and are therefore liquid assets.

Investors should nonetheless be aware that gold prices do not only go up and are often subject to fluctuations.

Let us assume that an investor wants to put his or her money in gold because of its store in value aspect. How should they go about this?

In this case gold bars would be a good choice. A whole range of bars can be traded – from mini plates weighing just one gram to about 12.5 kilogram-heavy bars, which are primarily intended for central banks and the gold industry. A simple rule of thumb applies: the larger the bar, the smaller the difference between the purchase price and the sale price. The widespread standard size of one kilogram is especially suitable for private investors.

Which coins come into play for investment purposes?

Marketable gold coins whose value is closely linked to the value of the precious metal are a good way to diversify a portfolio from an investment perspective. In contrast to gold bars, the manufacturing process for coins is more intricate, which is why the mark-up is higher compared with an equivalent gold bar. The extent of the mark-up versus the pure gold price is dependent on various factors, not only supply and demand. In theory, the South African Krugerrand (whose mark-up compared with the gold price is currently just 5.8%), the Canadian Maple Leaf or the Australian Nugget are well suited for investment purposes. However, investors should be familiar with the coins they are buying. For this reason, the Gold Vreneli is an interesting option for Swiss investors, even though its mark-up is higher – currently around 10% versus the gold price. Thus, before you can put a Vreneli back up for sale without incurring a loss, the gold price must have risen by at least 10%.

Not all gold coins have the same purity content. Should this be a criteria for investors?

No. Most state-minted gold coins have a high gold content of at least 21.6 carats or more. This means that every 1,000 grams contains at least 900 grams of pure gold, and the proportion of other metals – mostly silver and copper – is relatively low.

Let us turn our attention to coin collectors for a moment. Which coins are currently gaining popularity with numismatists?

Every collector has his/her own criteria when starting a collection – for example by region, theme or era. As a rule, rare or exceptionally well-preserved coins are very sought after. However, their prices are dependent on a number of other factors in addition to the precious metal price. At the moment, collectors are particularly interested in those countries where it was previously difficult to collect coins. China and Russia have some ground to make up in this area. In Russia, the prices for certain coins have increased ten-fold in the last ten years. I am convinced that Chinese coins will also shoot up in value in the medium to long term. Last but not least, Swiss and English coins exhibit an enduring popularity, as do those from the Balkan states. It should be remembered, however, that numismatic coins should not be regarded merely as an investment. The main motivation for collecting them is their intrinsic beauty, charm and of course, the fascination of their history or background.

Where should one buy gold?

People who buy gold from banks and established traders can rest assured that they are in safe hands. Gold content for bars and marketable gold coins are very strictly regulated. A goldsmith, by contrast, can label their jewelry as “manufactured in gold” even if, for example, the alloy used consists of only three-quarters pure gold, which in this case corresponds to 18 carats.

If you have acquired gold coins in the past, how should you look after them?

The less traces a coin has of its time in circulation, the more collectible it is. But gold does not have an “expiry date” and does not require any special care because it cannot oxidize. The only recommendation I would make is to keep the coins in a dry place. And, of course, coins and bars should never be cleaned.

Interviewer: Stephan Lehmann-Maldonado

The most important bullion coins**Krugerrand**

This gold coin from South Africa is one of the most well-known coins in the world. It has been manufactured since 1967, making it the oldest coin to be produced solely for investment purposes. Its name is derived from that of the first Boer President, Paul Kruger, and the place where gold was first discovered in South Africa, Witwatersrand. The Krugerrand has a red shimmer since it is manufactured from a gold alloy containing copper. Gold content: 22 carats.

Maple Leaf

In 1979 Canada introduced an alternative to the Krugerrand with the Maple Leaf. Today there is no other gold coin with a greater circulation than the one featuring a maple leaf on the front and the British monarch Queen Elizabeth II on the back. When it was launched the coin already had a high purity rating of 99.9% fine gold, which in the meantime has been increased to as much as 99.99%. Gold content: 24 carats.

American Eagle

After South Africa and Canada had successfully launched bullion coins, the US did not want to get left behind and in 1986 issued the American Eagle. Like the Krugerrand, the American Eagle is made not only of gold, but also contains copper and silver, which makes coins harder and more resilient. Gold content: 22 carats.

Australian Kangaroo

These coins from Australia are better known as Nuggets or Gold Nuggets. They have been minted in various denominations since 1987. Since the 1990s the front has featured a kangaroo. The actual kangaroo design changes each year. The coins are made of fine gold. Gold content: 24 carats.

Gold Panda

The decorative panda motifs have made the Gold Panda – which China has been minting since 1982 – an increasingly popular gift. In contrast to most other gold coins, the image on the reverse changes on an annual basis. Furthermore, the mark-up of the Gold Panda versus the gold price is relatively high, meaning it shouldn't be investors' first coin of choice. Gold content: 24 carats.

Goldvreneli

In contrast to the Krugerrand and the other bullion coins, the 20-franc Goldvreneli, a popular gift among Swiss godparents, was originally conceived as a means of payment. As a coin intended for circulation, the Vreneli had to be able to withstand getting knocked around, which is why it consists of just nine-tenths of gold. The coin was minted for the first time in 1897, and production was suspended in 1949. Between 1911 and 1922 the classical Vreneli was joined in circulation by the 10-franc Vreneli, and in 1925 even a 100-franc Vreneli was produced. Gold content: 21.6 carats.

Not everything that glitters is gold. Many bullion coins are made of silver or platinum instead. In theory, most of them are legal tender in their countries of issue. However, their nominal value is typically far lower than the metal value.

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The market for gold



In this chapter, we take a brief look at the main drivers behind gold supply and demand. The aim is to gain an understanding of the magnitude and relative importance of the different components that determine the market. We also focus on the price sensitivity or elasticity of these supply and demand components.

Gold supply is largely inelastic

Gold is practically indestructible and, unlike oil and the so-called soft commodities such as wheat and soybeans, is never really consumed. As such, all the gold that has ever been mined is still in existence. In this sense, the metal can never be in shortage; the world cannot run out of gold as it may be running out of oil. The World Gold Council, a lobby of producers, estimates today's above-ground gold stock at around 166,000 tons² (see Figure 2.1). Meanwhile, new annual supply has ranged between 3,390 and 4,107 tons over the last 10 years.

No matter how much gold is produced in South Africa or Russia, the current output is still rather negligible compared to the quantities in individual possession. This characteristic, which differentiates gold from all other metals, reduces the risk of sudden changes in the quantity and therefore, the value of gold. Even silver, which has many characteristics similar to gold, is subject to great changes in

production and consumption that may affect its value. However, much of the existing gold stock is illiquid. At least half is held in the form of jewelry, which does not easily become available to the market. Thus, annual flows of new supply and the corresponding demand do matter in determining the price of gold. There are three main sources of gold supply: mines, scrap, and central banks.

Mining supply accounted for about 60%³ of the total for each of the last five years on average. The key thing to know is that mining supply responds very slowly to changes in the price of gold. This low price elasticity is simply due to scarcity: gold is very difficult to find. Most discoveries cannot be mined economically either because there is too little gold in absolute terms or the gold is too dispersed (low-grade). Even if the gold price increases, it takes several years for production to grow substantially. In short, gold mine supply is extremely inelastic to changes in the gold price (Figure 2.2)⁴.

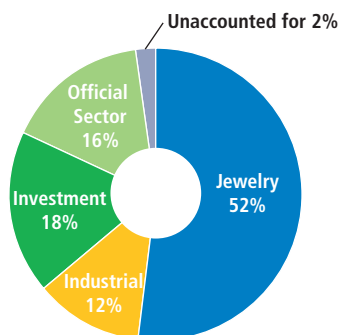
² Reportedly, all the gold produced throughout history could fit into a cube 25 meters a side.

³ Mine supply including de-hedging.

⁴ Since 2001 mine supply was not able to grow, with production peaking at 2646 tons of gold. The sharp rise in gold prices in recent years appears to have halted the downtrend in gold supply. In this structurally constraint supply environment traditional gold mining countries fell back and allowed China to emerge as the leading gold producer. The country now accounts for 13% (some 300 tons) of mine supply per year. Overall output reached 2554 tons in 2009, up from levels around 2409 tons the year before.

Fig. 2.1: Above ground, world gold holdings are concentrated in jewelry

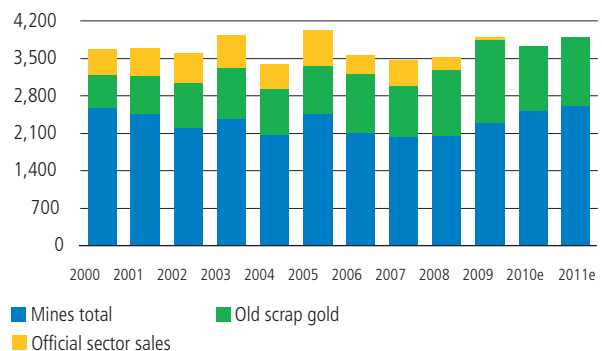
Total stocks stand at 166,000 tons in 2009



Source: Gold Fields Mineral Services, UBS WMR, as of May 2010

Fig. 2.2: Gold supply failed to grow

Values in tons



Source: World Gold Council, UBS WMR, as of May 2010

e = estimate

Scrap is the secondary source of gold supply, accounting for around 31% of the total over the last five years. In contrast to mining supply, scrap is quite responsive or elastic to changes in the price of gold. Most of the scrap supply comes from recycled jewelry. When the gold price rises, owners of old and unwanted jewelry have a higher incentive to sell for recycle value. Some are also forced to liquidate their jewelry during periods of economic hardship. With the gold price on a sharp ascent, scrap gold supply more than doubled over the last 10 years, reaching a high of 1,549 tons in 2009.

Central banks are the third source of gold supply, accounting for about 9% of the total over the last five years. Until the 1960s when the major monetary systems were still based on the gold standard, most central banks sought to accumulate gold reserves. In the 1970s and 1980s, their stocks tended to remain stable. In the early 1990s, many economists and central banks became convinced that inflation was dead and gone. As a result, major central banks started to reduce their gold reserves and their selling activity became a fixture in global gold supply. Recently, central banks have cut back on their gold sales, with some even buying up substantial quantities⁵. If this trend continues, central banks could turn from net suppliers to net buyers.

Gold demand tends to be elastic

There are three main sources of demand for gold: industrial, jewelry, and financial.

In industrial production, gold is used for its unique properties and the lack of good substitutes. Because of its relatively high price, gold makes up only a tiny fraction of any industrial product. For these reasons, industrial demand does not really respond to changes in the price of gold and therefore has very low price elasticity. It also accounts for only 9–12% (350–460 tons) of total demand.

By far, the greatest demand comes from the jewelry sector, making up anywhere between 45% and 80% of the total. Unlike industrial demand, jewelry is quite responsive to changes in the price of gold. An increase curtails consumers' appetite for jewelry; a decrease stimulates demand. With the constant increase in the gold price over the last 10 years, jewelry demand has been on a steady decline, dropping from 3,001 tons in 2001 to only 1,747 tons in 2009 (see Figure 2.3).

The third and increasingly important source of gold demand is the financial market. Investment demand⁶ has become a key price driver in recent years, with interest soaring from around 510 tons in 1999 to more than 1,750

tons in 2009 – about the same level as jewelry demand. Globally, financial investors hold around 2,550–2,800 tons of gold through physically backed exchange-traded funds (ETFs) and futures contracts⁷. While there are clearly more open positions over-the-counter (OTC), the ETF and futures volumes we track allow us to proxy market dynamics.

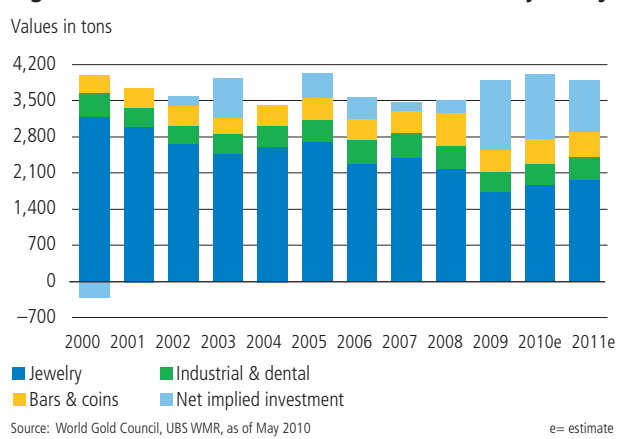
Investment demand for gold can shift quickly. Investors often interpret rising prices as a sign of heightened concern over inflation and the probity of the monetary system. Thus, rather counter-intuitively, a rising gold price can attract more demand from the financial market, thereby pushing the price even higher. Over the last five years, the funds and futures positions have increased by around 26% a year. Therefore, investors should be aware that this higher share of gold demand from the financial market could increase gold price volatility in future.

Conclusions

In this chapter, we explained that much of the annual supply of gold comes from mining operations, which are very slow to respond to changes in the metal's price. Scrap supply, mostly from recycled jewelry, is much more flexible but has a smaller share. Central banks have been a constant source of supply since the 1990s, but may become net buyers in coming years. On the demand side, jewelry, which takes up the lion's share, responds very strongly to price changes and has been on a constant downtrend over the last 10 years when the gold price increased rapidly. Another source of demand comes from the financial market. Investment demand has risen rapidly and will most likely introduce greater volatility to the gold market in the future. With these in mind, we turn to the question of whether gold is currently expensive, fairly valued or indeed cheap.

⁷ 56 million ounces in ETFs and 26 million ounces in futures.

Fig. 2.3: Investment demand – a new rival for jewelry



⁵ Over the last 12 months central banks in India, China and Russia bought 771 tons of gold (India 200 tons, China 454 tons and Russia 117 tons) (see also Fig. 4.2 in chapter 4).

⁶ Investment demand is primarily gold bars and coins as well as ETFs.

Is gold really expensive? The question of valuation



Perhaps the most common argument against investing in gold at the moment is that it is too expensive. While this may be true to some extent, we discussed in the first chapter how this argument can be problematic. The price of gold varies according to the currency in which it is quoted. For example, from 1995–98 when it declined 24% in US dollars, it increased 7% in Japanese yen and 20% in South African rand. As such, a statement on the level of the gold price is also a statement on that of the respective currency. To say that gold in US dollars is too expensive is to say that the dollar is too cheap.

Thus, would it not be great if we had an independent benchmark to determine whether gold is dear, cheap or fairly valued?

In the first chapter, we introduced the notion of an average gold price based on a basket of 29 currencies (see Figure 1.2, page 6). Some currencies, most notably the US dollar, appreciated strongly against gold while others, including the crisis-afflicted currencies of Asia and Russia, lost in value. However, since the beginning of this century, the average gold price started to increase steadily. Put differently, all paper currencies started to devalue against gold. While this insight is important, it does not help in our quest for a single measure against which to value gold. While we are no longer dependent on just one currency, an independent benchmark still eludes us. In other words, just because paper currencies have devalued against gold does

not tell us anything about whether gold is too expensive or whether paper currencies will lose even more value in future. Hence, in the following sections, we compare gold to other tangible assets. Specifically, we look at

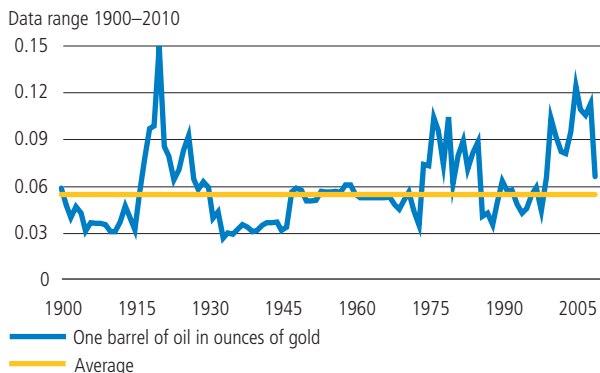
- gold ratios,
- a basket of goods,
- production cost,
- money growth versus gold supply growth, and
- the gold cover ratio.

Gold ratios and the basket of goods allow us to look at the purchasing power of gold in terms of individual goods and a basket of goods. Production costs give us an insight on the development of the supply side and show how increasing costs can explain market expectations. In a much generalized form, we derive a small valuation model based on money growth and gold supply growth. Concluding this chapter, we discuss the “gold cover ratio”, which shows the implications on the gold price if paper money were to be backed by gold.

Gold ratios and inflation

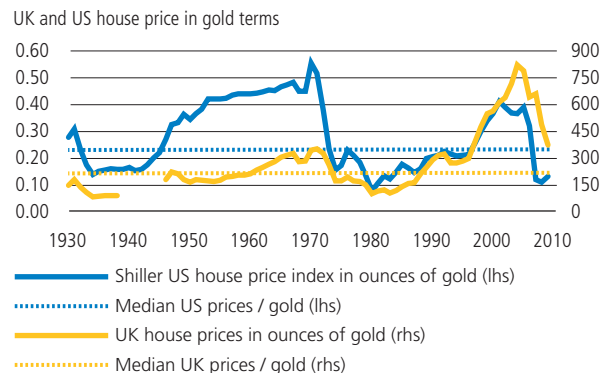
To overcome the problem of currency-specific gold quotes, the price of gold may be expressed in terms of another asset such as oil, property or the stock market. As can be seen in Figure 3.1, the ratio of oil to gold – the amount of gold necessary to buy a certain quantity of oil – has been

Fig. 3.1: Gold is still inexpensive when expressed in terms of oil



Source: Reuters EcoWin, UBS WMR, as of May 2010

Fig. 3.2: Gold is not at extreme values compared to house prices



Source: Reuters EcoWin, UBS WMR, as of May 2010

relatively stable over time. Since 1900, the average price of a barrel of oil was 0.05 ounces of gold. Thus, the long-term gold-to-oil ratio testifies to the fact that gold preserves its purchasing power over time. Compared to this long-term average, the current price of 0.07 ounces suggests that gold is still slightly cheap when expressed in terms of oil. Conversely, oil is expensive when expressed in gold. This may not be too surprising, considering that the world's supply of oil is diminishing through consumption, whereas gold is never really consumed.

Property-to-gold ratio

The fact that gold preserves its purchasing power over long periods of time is also demonstrated in its exchange value for property. Figure 3.2 shows the price of an average single-family house expressed in ounces of gold. The data is for the United Kingdom and has been converted into US dollars. No data was available for the period of the Second World War. The chart shows that the price of a house increased gradually from about 100 ounces of gold in 1930 to 200 ounces by 1960. This gradual trend is worthy of note and may be attributed to the steady improvement in the quality of the housing stock. The price rose more rapidly in the 1960s, peaking at about 300 ounces by 1970.

The average house price dropped sharply after 1970, following the liberalization and subsequent appreciation of the gold price. By 1980, a typical house cost about 100 ounces of gold, the same price as in 1930. From the late 1980s onwards, it rose rapidly from about 200 ounces to a peak of more than 800 at the height of the housing boom in 2006. Since then, house prices have fallen rapidly to just more than 300 ounces on average. This is still above the long-term average of 200. Thus, UK house prices would still seem high compared to gold. Yet, this does not necessarily mean that house prices have to fall further. As noted earlier, there appears to be a gentle upward trend in the underlying house price-to-gold ratio.

Figure 3.2 also shows the same information for the US using the Case/Shiller house price index. The overall picture is similar to the situation in the UK, with two important differences. First, there is no noticeable upward trend in the house price index expressed in gold. Second, the current price would suggest that house prices are already cheap compared to gold.

Stock-to-gold ratio

The Dow Jones stock index was introduced in 1886 and, since it does not pay any dividends, it represents a good benchmark for gold, which does not pay interest or dividends either. In 1900, the ratio was 2 (see Figure 3.3), meaning it took two ounces of gold to buy the whole Dow Jones index. It remained below 5 for the next 25 years or so, then shot up to around 15 during the stock market boom of the late 1920s. After the crash of 1929 and the subsequent Great Depression, the price returned to around 3 ounces of gold for the entire index. By the 1950s, the ratio started to rise again, reaching past 25 in 1965. In the 1970s, the ratio fell sharply once again, and by 1980, when the US economy was headed for a deep recession, it fell to a low of about 1.

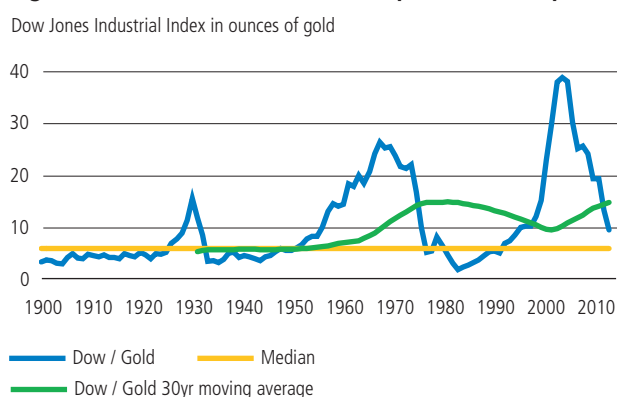
A rebound began in the 1980s and picked up speed in the 1990s, culminating with the technology bubble of 2000 when it took more than 35 ounces of gold to buy the index. Since then, the ratio has been on a sharp descent, reaching the current value of about 8. Given that the long-term average price of the Dow Jones index is 5 ounces, gold is still somewhat cheap compared to stocks, which is the same as saying that stocks are still somewhat expensive compared to gold. However, just as with the UK house price comparison, there appears to be a gentle upward trend in stock prices expressed in gold, which should be seen as a reflection of productivity gains by the companies included in the Dow Jones index. Thus, it is not clear that the stock price would have to fall all the way to the long-term average price.

While these ratios remove individual currency or currency-basket exchange rates from consideration, it should be clear that this approach yields ambiguous results that are hard to interpret, and that it does not offer an independent benchmark for the valuation of gold. Instead, it expresses the price of gold in terms of other tangible goods, the values of which are affected by all sorts of events. In other words, these ratios say just as much about these goods as they say about gold and so, in our view, they can hardly be more than pointers to the valuation of gold. However, our main point for discussing these methods is to show that in terms of these goods, the current gold price is not at extreme levels, which may come as a surprise to many.

General basket of goods

The question of whether gold is too expensive versus a basket of goods may be approached by a simple historical comparison. To do that, we only have to take the rate of price inflation (CPI) into account. This reveals that the gold price peaked at about USD 850 per ounce in 1979–80

Fig. 3.3: Gold is not overvalued compared to US equities



(see Figure 3.4). However, a US dollar then was worth considerably more than it is today. Indeed, the dollar has lost about 60% of its purchasing power over the last 30 years. Thus, USD 850 in 1980 is equivalent to about USD 2,300 today. That means the current gold price of about USD 1,200 per ounce would have to rise another 90% to reach its 1980 peak in real, inflation-adjusted terms. This contrasts with the oil price, which in 2007 exceeded its peak in 1980.

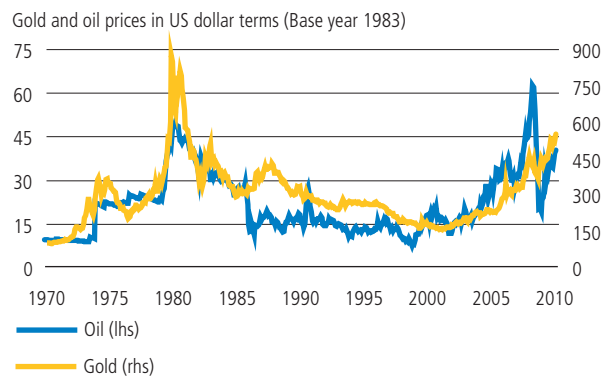
However, one has to be careful with historical comparisons. At any given time, the gold price is specific to the prevailing general conditions. Thus, the 1980s peak took place against the backdrop of rapidly rising consumer prices, while the trough in 2001 came when most people thought inflation was a thing of the past. In this sense, it is impossible to decide when gold was priced fairly, or when it was over- or underpriced. What can be gained from such comparisons is the confirmation that gold preserves its purchasing power over time and that it has not yet reached its previous peak.

Production cost has risen sharply

In this section, we take a look at gold’s production cost. If the price of gold is substantially above the cost of producing it, producers would enjoy windfall profits, which over time would attract more suppliers and thus drive down the metal’s price. Clearly, production costs vary widely. For some copper mines, for example, gold is just a by-product, meaning their actual gold production cost is close to zero. Here, we look at the high-cost producers⁸, who are the first to react to changes in the gold price. Looking at some 300 gold mines, which represent about 80% of global supply as of 2010, we find that gold’s average production cost⁹ is USD 880 per ounce for these high-cost producers (see Figure 3.5). This is some 40% below the current gold price. Nevertheless, given the extreme production inertia, this premium is no price threat as long as financial demand for the yellow metal is strong.

⁸ We define the high cost producers as the 10% of mine supply with the highest production costs.
⁹ Total costs: cash costs, depreciation, royalties and other indirect costs.

Fig. 3.4: Inflation-adjusted gold price still below the past peak



Source: Reuters EcoWin, UBS WMR, as of May 2010

But what would happen if demand were to drop significantly? Would the high-end production cost of USD 880 mark the maximum drawdown for the gold price?

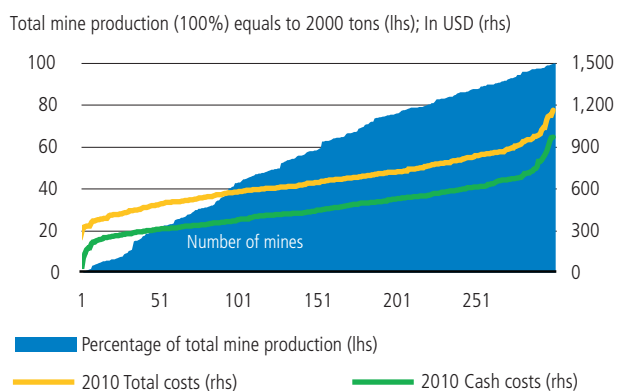
If demand were to fall sharply, which we do not expect, the price would probably fall well below USD 880 per ounce. In an environment of falling demand, total production cost is not the most important measure. Instead, variable production cost (the so-called cash costs) becomes the key factor to consider, because companies would continue to produce as long as they could cover their fixed costs. Only when the gold price drops below the variable cost of production would mines wind down or cease to produce. For the 300 high-cost producers we looked at, they had an average variable production cost of about USD 675 per ounce. Thus, we think a sharp fall in gold demand could push the gold price down to somewhere around USD 675.

We note that the average production cost of gold has risen sharply from USD 252 per ounce in 2001 to about USD 600 this year, which implies an annual increase of 9.3% in US dollar terms. Since mining output did not increase but in fact diminished during this period, the rise in production cost is not a result of higher output but reflects the sharp increases in input costs. Overall, production costs have more than doubled over the last 10 years, which may be seen as one factor behind the increase in the gold price. However, with the price currently around USD 1,200 per ounce, the increase certainly cannot be fully accounted for by the rising production costs.

Gold model: Money growth vs. gold supply growth

Another method of deriving a theoretical fair-value gold price is to use a model. Two factors always influence the relative value of gold in any currency: the increase in the amount of currency (money inflation) and the increase in the amount of gold (gold inflation). When the amount of dollars increases, the dollar loses its buying power, which

Fig. 3.5: Production costs justify the rise in the gold price



Source: Brook Hunt, UBS WMR, as of May 2010

typically shows up as increases in the prices of goods and services. It stands to reason that as the dollar is inflated, it also increases the price of gold in dollars, even though gold's inherent worth (buying power) is not affected.

Similarly, if the amount of gold increases, its value decreases. Due to its physical properties, almost all of the gold ever mined is still around in one form or another, which is one of the reasons why gold is so suitable as currency in the first place. The amount of gold mined every year is nothing more than inflation of the total amount of gold mined since the beginning of time. Thus, the inflation rate of gold is new mine production as a percentage of above-ground stock. Consequently, the change in the gold price, in dollars, over time will be in proportion to the inflation of the dollar and inversely proportional to the inflation of gold.

To arrive at a model that determines a theoretical gold price, we calculate the ratio of money inflation to gold inflation. This gives us a theoretical price path for gold, which we then fit to the actual gold price data using a statistical method called ordinary least square (OLS) regression. The result of this estimation can be seen in Figure 3.6. The technical details are given in the text box on page 17. Here, suffice it to say that the model has a relatively good fit, as the money-inflation-to-gold-inflation ratio explains about 64% of the variation in the gold price since 1970.

It is tempting to argue that our theoretical gold price is accurately determined by the inflation of the dollar relative to the inflation of gold, and that any deviation from this theoretical price is temporary. If we did this, we would argue that gold was overvalued in the period around 1980, undervalued around 2000, and overvalued currently. Our model suggests that the current theoretical gold price should be about USD 800 per ounce, below the actual USD 1,200.

Thus, based on this model, the answer to the question that we posed as the title of this chapter is that gold, quoted in US dollars, is indeed expensive. However, since we do not have a point in time where we know that gold was fairly valued, we had to derive the level for the theoretical price path ex-post, by fitting it to the actual gold price. In short, our estimated theoretical fair-value price of USD 800 should not be taken at face value, but should rather be regarded as a ballpark figure. The theoretical estimate suggests that the current actual gold price now reflects all of the growth in paper dollars in the past.

Estimating the model until 2001 would suggest that gold was significantly undervalued relative to its theoretical fair value. Hence, the risk-reward ratio then was strongly in favor of buying gold. In the current situation, the rise in the actual gold price since 2001 has eroded this favorable ratio. A further strong appreciation of gold against the US dollar would now probably require a new sequence of events affecting popular perception regarding price stability and the future of the dollar.

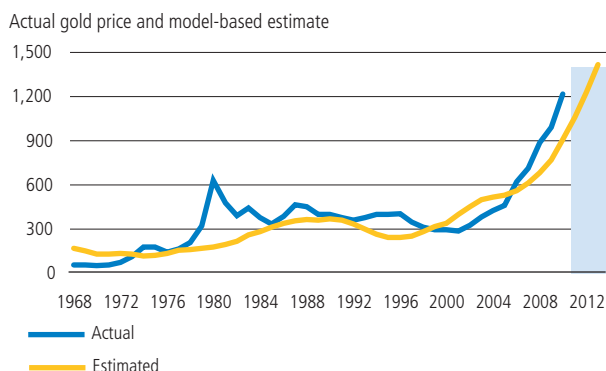
Of course, the same is true for other major developed-country currencies such as the euro and the pound. In the wake of the financial crisis and the global recession that began in 2008, these regions have amassed large amounts of public debt. In our *UBS research focus* "The challenges ahead" (April 2010), we argued that these debt problems probably cannot be solved with the usual combination of expenditure cuts, tax hikes and economic growth. Instead, inflation may at some point be the method of choice to erode the debt burden, especially in the US and the UK, and possibly even in the Eurozone. In such an event, the gold price is sure to appreciate further in future. Indeed, our forecast values in Figure 3.6 are based on the assumption of a slight acceleration in the growth rate of money supply in the next few years.

Gold cover ratio

The value of gold is determined by the same considerations as that of all other economic goods. Individuals give it value according to the enjoyment and satisfaction they expect from its possession. Economists explain this phenomenon in terms of utility and scarcity. Value rises or falls according to the utility people ascribe to an object and the scarcity they perceive.

We argued in the previous chapter that gold is part fabrication commodity and part money. But we also showed that gold is never really priced as a commodity because of its residual value as money i.e., a medium of exchange that could at some stage be reinstated as money proper. However, it is safe to assume that if gold's price is low, it is closer to being priced as a commodity than as money. Conversely, if the gold price rises, this is a sign that gold's monetary role is reasserting itself or, better, the increased value of gold as the ultimate currency is being added to the value derived from its commodity function. Thus, we may think of the gold price as a continuum ranging from its

Fig. 3.6: Our model could justify even higher prices in the future



Source: Reuters EcoWin, UBS WMR, as of May 2010

commodity price at the low end to a full fledged monetary price at the high end.

But what is gold's price as money? When economists tried to explain why money had an exchange value – i.e., why people were prepared to part with real goods in exchange for money that they could not really consume or use – they had long struggled with what may be called a circularity problem. Money, they argued, was useful and valuable because of its purchasing power, and because of its purchasing power it was useful and valuable. The problem was finally solved by the economist Ludwig von Mises with what is called the regression theorem. Mises emphasized a time element, saying that people today expect money to have a certain purchasing power tomorrow because of their memory of its purchasing power yesterday. We then push the problem back one step. People yesterday anticipated today's purchasing power because they remembered that money could be exchanged for other goods and services two days ago. And so on.

So far, Mises's explanation still seems dubious; it appears to involve an infinite regress. But this is not the case. We can trace the purchasing power of money back through time until we reach the point at which people first emerged from a state of barter. And at that point, the purchasing power of the money commodity can be explained in just the same way that the exchange value of any commodity is explained. People valued gold for its own sake before it became money, and thus a satisfactory theory of the current market value of gold must trace its development back to when gold was not a medium of exchange. Notice that all modern paper currencies emerged from their initial ties to commodity monies. For example, we can trace the purchasing power of US dollar bills back to when the notes were redeemable in gold, and at that point we need merely explain the purchasing power of gold.

Now, what does that have to do with the value of gold today? The regression theorem implies that the exchange value of paper money ultimately rests on the value of an underlying commodity like gold. However, since modern paper money is not backed by gold, the exchange value of paper money can theoretically decline to zero: all it takes is people starting to fear that the government will not stop printing new money. Indeed, the regression theorem can be interpreted to mean that all paper money that is not backed by a commodity like gold will eventually lose its value, lest of course the link to presumably gold is re-established at some point.

Thus, we may ask what gold's price would be if it were to assume a full monetary function. To this end, all we need to do is to divide the total amount of paper money by the central banks' stock of gold. The problem is deciding which part of the current money supply should be backed with gold and which should be allowed to degenerate. For example, if the US government decided to establish a 100% cover of all banknotes, coins and the mandatory

reserve holdings of the commercial banks at the central bank (the monetary base), the gold price would be nearly USD 3,000 per ounce. If the gold backing were to be extended to close money substitutes like checking accounts (the M1 money), the gold price would have to be around USD 6,000 per ounce. If the aggregate M2, which also includes savings deposits, were to be backed with gold, the price would theoretically have to jump to nearly USD 30,000.

Conclusions

The valuation of gold is extremely tricky. No independent measure can tell when gold is cheap, expensive or fairly valued. Nonetheless, we believe the measures we investigated in this chapter give some guidance. Looking at production cost confirms to us that gold is no longer cheap. However, more surprisingly, calculating the ratios of gold to other assets suggests that it is not at extremely high price levels either. Indeed, compared to oil or stocks, gold appears to be inexpensive or at least fairly valued.

An investigation of the longer-term inflation-adjusted gold price confirms this impression. Our gold model, which relates the gold price to the quantities of gold and money, shows that the expansion in supply of US dollars in recent years has been significantly responsible for the rise in gold price. Another important conclusion from our gold model is that the current concern over the future of major monetary systems is beginning to be reflected in the metal's price. Thus, a further major increase in the price of gold would require a new sequence of events affecting popular perception regarding the future of the US dollar or the euro.

Explaining our gold model

The underlying rationale for our model is very simple. The relative gold price measured in US dollars is basically determined by two factors: the increase in the amount of gold (gold inflation) and the increase in the amount of US dollars (money inflation).

The stock of gold available grows every year by the amount of gold mined globally. Dividing this global gold production by the total stock of gold that has been mined since the beginning of time, we get the annual growth rate of the amount of gold. Money inflation is approximated by the annual growth rate of M2. The gold price is then assumed to evolve according to the following equation:

$$P(t) = P(t-1) * [m(t) / g(t)] + c*t$$

where

P(t): Gold price in year t
m(t): Annual growth rate of M2
g(t): Annual growth rate of the amount of gold
c*t: Time trend

If the increase in the amount of dollars is bigger than the increase in the amount of gold, gold gains in value versus the dollar and vice versa. We add a variable factor (time trend) to account for the fact that the marginal costs of gold mining increase as gold mines are depleted, which should automatically push the gold price higher over time.

To estimate the price of gold in any given year according to our equation, we need a starting point at which gold was undoubtedly fairly priced. As this is a bit tricky, we arbitrarily set $P(1967) = 1$ and then fit the resulting estimated price path to the actual gold price between 1968 and 2009.

As a result, we obtain the estimated curve shown in Fig. 3.6. The coefficients of our model are all significant and the coefficient of determination is 0.64. We are aware that serial correlation affects the efficiency of our regression (by reducing the standard error terms). Yet, after correcting for serial correlation, the coefficients are still significant and therefore we are convinced that the model is well specified. Our model does not intend to precisely predict tomorrow's gold price but rather to give an indication whether gold is fundamentally over- or undervalued versus the US dollar. Given that there are only two explanatory variables in the model that cannot be expected to explain short-term volatility, we are satisfied with the results.

Investment outlook



Over the last 10 years, the price of gold has risen by 16% per year in US dollar terms, and by 13% against the euro. Such a sharp rate of appreciation will, in our view, not be sustainable. However, that does not mean that the price of gold cannot rise further, or that gold should not be part of a well-diversified portfolio. On the contrary, standard supply and demand considerations still indicate a higher gold price ahead, in our view. Importantly, given the uncertainties about the viability of current monetary systems, including gold in a portfolio is now more appropriate than ever. We derive our investment case by turning to basic supply and demand estimates.

Supply is stagnating

In the second chapter, we showed that the gold supply has three main sources: mining, scrap gold and central bank sales. Mining is the biggest contributor to total supply, but it is very price inelastic, which means that its response to changes in the price of gold is very sluggish.

However, last year, mining output rose by a strong 6.0%, but this was attributable mostly to a so-called base effect, resulting from very depressed mining production in the previous year. Thus, a further strong increase is unlikely this year. Instead, we expect gold mining output to grow by 1.6% (some 40 tons) at most this year. For 2011, we believe a further small increase of around 1.3% is possible. Further out, we expect mine production to peak in around 2014, followed by a sharp decline. Importantly, many

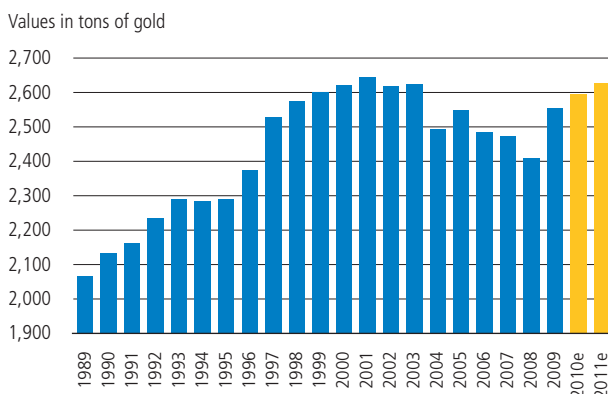
mines are nearing the end of their productive life. In order to maintain output, we believe that considerable investment will be necessary (see Figure 4.1).

Scrap gold supply is much more responsive to changes in the price of gold than mine production. The combination of sharply-rising gold prices and global economic recession has pushed up scrap gold supply to record levels. In 2009, scrap gold supply rose a sharp 27%. With the world economy growing again, the need to liquidate privately-held gold (mainly jewelry) is diminishing. Moreover, the number of people selling private holdings to profit from high prices should decline temporarily as more and more people realize that the price of gold is likely to remain high.

As a consequence, we expect scrap gold supply to fall to around 1,200 tons this year from 1,549 tons in 2009. Such a drop may seem counter-intuitive, given that we expect the price of gold to rise further. Yet, historically, sharp increases in scrap gold supply have often been followed by strong declines in subsequent years. However, for 2011, we expect scrap gold supply to rise again.

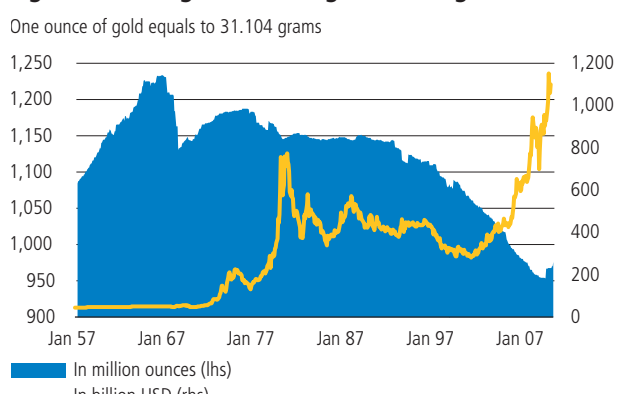
Lastly, central banks have been constant suppliers of gold throughout the 1990s. However, in recent years, central banks have reduced their gold sales, and some have even started to increase their gold reserves. In our view, central banks' perception of gold is changing. Two considerations are important here: first, as we have shown in chapter two, gold is the ultimate currency.

Fig. 4.1: World mine supply has struggled to grow



Source: GFMS, WGC, UBS WMR, as of May 2010 e = estimate

Fig. 4.2: World government gold holdings stabilized



Source: IMF, Bloomberg, UBS WMR, as of May 2010

The gold standard of the past, offering convertibility of paper money into gold, ensured trust and confidence in fiat money. Indeed, without the gold standard, modern paper or fiat money would not have been possible. If inflationary policies, in the wake of the major developed economies' current fiscal debt problems were to dent this confidence in the regions' fiat money system, governments and their central banks would have no choice but to turn to gold again.

A second important consideration regarding central banks' role in the gold market relates to emerging markets, whose central banks hold rather small shares of gold as part of their foreign currency reserves. A good example is China, which holds less than 3% of its foreign reserves in gold compared with a global average of 12%. Central banks in emerging markets have accumulated very large foreign currency reserves, mainly US dollars.

Many of these countries are seeking to diversify their reserve holdings, and we believe that they are likely to raise their share of gold holdings in coming years. Therefore, we think the scene is set for central banks to turn from being net sellers of gold into being net buyers again; even if it is impossible, in our view, to forecast the precise quantities (see Figure 4.2). Given their size and potential impact on prices, we think that central banks may act as opportunity buyers, trying to add to their holdings when the price of gold is declining rather than buying outright into a rising market.¹⁰

Consolidating these supply components, we expect total gold supply to drop by 165 tons, or 4%, in 2010, despite a higher gold price. The drop in supply is likely to reverse in 2011 with higher mine output, less de-hedging activity¹¹ by mining companies, and higher scrap gold supply. This rather constrained supply outlook means that changes on the demand side could potentially have major effects on prices.

Normalizing demand

Traditionally, jewelry demand has been the biggest factor in the gold market, and as we have seen in chapter two, it is fairly price sensitive. Over the last few years, jewelry demand has been declining, and in 2009, this source of demand fell by 20%.

We believe that jewelry demand will pick up again, despite high and rising gold prices. Two factors are important here: first, strong economic growth in emerging markets (especially Asia) is leading to higher personal incomes, which in turn should boost demand for gold jewelry.¹² Second, stronger economic growth, coupled with higher inflation, should lead to an appreciation of Asian currencies, which increases the purchasing power of domestic households in US dollar terms. Additionally, we expect some pent-up demand to affect the market (see Figure 4.3).

Furthermore, once potential buyers of gold jewelry realize that the rise in prices is unlikely to reverse, their reserva-

tions about gold should diminish. This is also true for scrap gold supplies, once people realize that prices will stay higher for longer, scrap gold sales will diminish - at least temporarily. Following the sharp drop in jewelry demand last year, we forecast an increase of about 8%, to 1,880 tons, in 2010, and an increase of 5%, to 1,980 tons, in 2011. Changes in industrial demand have little impact on prices and our overall demand outlook, as explained in chapter two. As the world economy has managed to move out of recession, industrial demand should also recover somewhat. For 2010, we expect an increase in industrial demand of 13% with volumes reaching 415 tons, followed by a further increase of 5% in 2011.

Although jewelry and industrial demand for gold is likely to increase, we think that the most important component of demand, namely investment demand¹³, will probably decline somewhat. Last year's investment demand roughly doubled to above 1,750 tons. This is unlikely to be repeated in 2010, in our view. Instead, investment demand should fall back somewhat towards 1,690 tons in 2010 and 1,485 tons in 2011. These expectations are contingent on the assumption that current concerns about sovereign debt problems remain in place, but that said problems do not intensify sharply. In any case, our expected volumes of investment mentioned above are still very high on a historical comparison, and should generally be supportive for the price of gold. However, as explained in chapter two, investment demand is volatile and these forecasts are subject to considerable uncertainty.

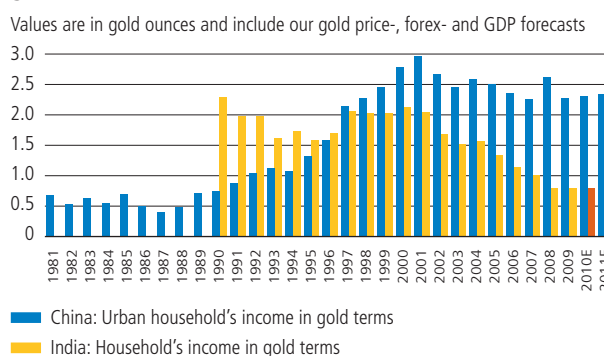
¹⁰ The sale of the remaining gold of around 190 tons by the IMF does not alter our view of official sector (central bank) sales. To be on the conservative side, we keep the central banks' expected supply/demand volume in our models at zero.

¹¹ De-hedging: mining companies reducing their hedging positions, i.e., they are buying back forward agreements.

¹² While the link between higher incomes and gold demand has often been found to be rather weak in developed countries, we expect the effect for developing countries to be quite significant.

¹³ Investment demand is primarily gold bars and coins as well as ETFs.

Fig. 4.3: Chinese and Indian household income in gold terms



Note: Rural income in China is only 1/3 of the average urban income
 Source: IMF, Bloomberg, UBS WMR, as of May 2010

e = estimate

Gold and the US dollar

In 1931, President Roosevelt confiscated all privately-held gold in the US. Following the confiscation, the US government first offered to pay USD 17, and then USD 35, an ounce for foreign gold. A substantial portion of the world's gold was sold to the US, and every dollar outside the US was convertible into gold. It was these two elements, the fact that the US owned a large percentage of the gold and that the dollar was convertible into gold, that enabled the US dollar to become the world's reserve currency.

When, in 1971, President Nixon reneged on the US's promise to redeem paper dollars into gold it was too late for the rest of the world. There were too many dollars in circulation already and no other major currency could take the dollar's place as reserve currency. At that point, it was also impossible for governments to return to the gold standard, as this would have caused astronomical gold prices. Hence, the US dollar remained the reserve currency, not because of the US's large and powerful economy, or its monetary and fiscal policy, but merely as a remnant of the time when the currency was backed by gold.

Supply and demand balance calls for higher prices

Looking at the supply and demand dynamics discussed earlier, we believe that the gold markets will be undersupplied this year. If prices do not increase any further, we expect the shortfall to be around 260 tons this year. For 2011, we expect supply and demand to be more or less at the same level. Investment demand is the big unknown. On balance, we believe that the factors that are causing investors to buy gold will not disappear anytime soon. Thus, we expect the price of gold to rise to USD 1,300 per ounce by third-quarter 2010 and to reach USD 1,500 over the next 12 months. In our view, such a price increase would temper investment demand, limit a recovery in jewelry demand, boost the gold supply, and balance the market (see Figure 4.4).

Upside risk – intensification of sovereign debt problems

In our base-case scenario, we assume that concerns both about excessive government debt and a return of the financial market crisis will not abate substantially. However, what happens if the sovereign debt crisis were to intensify? At the time of writing, the sovereign debt crisis in Greece, and its possible implications for the long-term future of the euro, are still gripping the financial markets. The latest massive rescue program for the euro may succeed in allaying these concerns. However, if the sovereign debt crisis were to flare up again, possibly spreading to other Eurozone countries and beyond, this would no doubt drive the price of gold above our 12-month forecast – possibly much higher. In such an event, large amounts of money would flow out of the sovereign debt market in search of a safe haven. The annual gold mine production has a market value of 'only' about USD 100 billion (at USD 1,200 per

ounce), which is tiny compared with the global fixed income market. A fraction of the fixed income market is enough to trigger a tidal wave of gold demand.

As regards the longer-term outlook for gold, the resolution of the substantial fiscal problems in the developed economies will most likely be a key factor. As noted elsewhere in this report, we discussed these fiscal challenges in depth in a previous *UBS research focus*. A main conclusion of that report is that inflation could play a role in eroding the public debt burden in the long run, especially in the US and the UK, both of which have full control of their monetary policies and their currencies. For the Eurozone, we argued that for individual countries the path to higher inflation and thus a devaluation of the currency is blocked. Most recently, however, even the European Central Bank (ECB), which has long been seen as the most credible inflation resistant central bank in the world, has taken measures that cast some doubt over this assessment.

Inflation is essentially nothing but an increase in the supply of money. Any rise in inflation would push the price of gold higher. Thus, the seminal appreciation of gold against all paper currencies that started in around 2002 would no doubt continue, most likely at an accelerated pace.

Downside risk – solid economic growth and higher real interest rates

In the 1960s, the US government stepped up the expansion of the supply of US dollars in order to pay for domestic social programs and the Vietnam War. By 1971, this expansion forced the government to remove the last remnants of the gold standard. The result was sharp price inflation, i.e., a rapid loss in the purchasing power of the dollar throughout the 1970s. The price of gold expressed in dollars rose sharply to an all-time high in 1980. By the early 1980s, inflation tolerance had worn thin and the US central bank, the Federal Reserve (Fed), raised interest rates sharply, meaning that it reined in the supply of US dollars. The result was a severe economic recession, a massive drop in price inflation and a sharp fall in the price of gold. Subsequently, the Fed ran monetary policy almost as if the dollar were pegged to gold.

Fig. 4.4: Forecast table

Values in USD per ounce

Spot price	3 months trading range		12 months	Yearly average		
25.05.10	View	L. Range	U. Range	Forecast	2010	2011
1177.1	Bullish	1140	1300	1500	1250	1390

Note: L. Range = Lower Range; U. Range = Upper Range
Source: UBS WMR, as of May 2010

By the early 1990s, the lessons of the ‘Great Devaluation’ of the 1970s seemed to have been forgotten. Major central banks, including the Fed, used monetary expansion generously as soon as economic momentum seemed to be faltering. Between 1965 and 1971, average money supply growth ran at 7.5% per year. Between 1995 and 2001, the rate of money expansion in the US was 8.4% on average per year. Yet, in contrast to the earlier period, price inflation now appears to be confined to asset prices rather than showing up in consumer prices. Thus, since 2001, gold has risen by around 350% against the US dollar. Over the same period, gold has gained more than 180% against the euro. In the 1990s, gold depreciated against some currencies and gained against others; since 2001, all major paper currencies have depreciated against gold. A situation similar to that in 1980 has arisen and the question is whether major central banks can find the resolve to rein in the supply of money and credit before it is too late.

If major central banks were to do that and raise interest rates, and thus reduce the money supply, the price of gold would fall strongly. In such an event, real interest rates, i.e., nominal interest rates minus inflation would rise strongly (see Figure 4.5), which in the past has always been accompanied by a lower gold price. In the current environment, with financial investors holding large gold positions of 2,550 to 2,800 tons via ETFs and futures contracts, the impact would be very considerable. High real interest rates could trigger sharp outflows of money from the gold market. The price of gold would fall sharply, perhaps to around USD 880 (see chapter three). The drop would likely be stabilized by rising jewelry demand and a pickup in central bank buying.

The question is, of course, are central banks in major developed markets in a position to raise interest rates. In our view, the likelihood of this scenario materializing is low. Consumer price inflation, which has been the trigger for Fed actions in the early 1990s, is still moderate, and it is doubtful that politicians and the wider public would be

willing to pay the price in the form of high unemployment and a substantial loss in economic output.

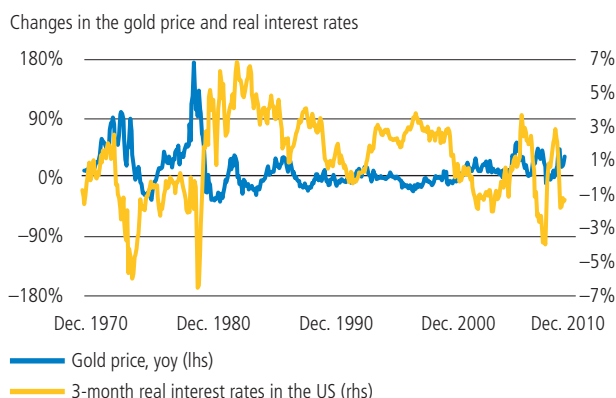
When and how to invest in gold

We regard gold prices below USD 1,200 per ounce as attractive entry levels. Our 12-month forecast stands at USD 1,500, implying a risk/return ratio of one. For one unit of risk (1% volatility), the investor is expected to be compensated by a return of 1%. Levels above USD 1,200 per ounce can also be used to build up long positions, but simply offer a lower risk-adjusted return. As long as this ratio does not drop below 0.5, we think it makes sense to build up new positions. Once the price of gold approaches our 12-month forecast, we advise investors to book profits, especially if the move happens fast (see Figure 4.6).

So how can an investor benefit from a higher gold price? The answer to this question starts with the investor’s investment objective. The investor should first be clear why she or he wants to hold gold. In our view, the four most common considerations are: portfolio diversification, thematic exposure, yield enhancement, and opportunistic trading. Along with different investment objectives, the investment horizon changes and so do the underlying investment vehicles. Before we go into further detail, we would like to address a long-standing debate with regard to direct investments into gold or gold mining companies.

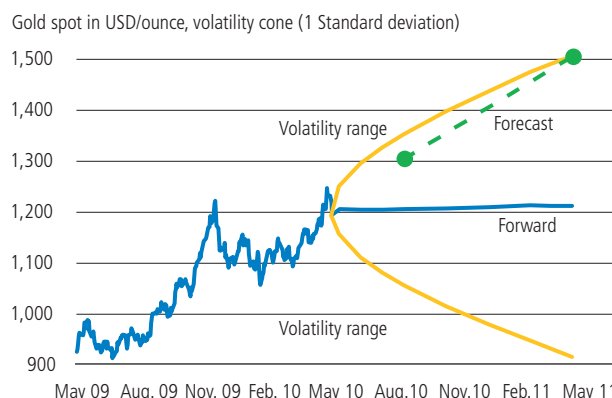
We favor direct investments in gold over gold mining companies. An investment in mining companies is in our view not equivalent to a direct investment in gold, even though gold is an important driver of these companies’ share prices. In the case of junior mines, the investment focus is on a mine’s output potential, and whether management can deliver or exceed expectations. The price of gold is typically of secondary importance. The more senior the mine, the higher tends to be its output predictability. Unfortunately, senior gold mines often face higher production costs and falling output volumes. When hedging activities by mining companies are considered as well, a higher gold

Fig. 4.5: High real interest rates a threat to gold



Source: Bloomberg, UBS WMR, as of May 2010

Fig. 4.6: Forecast – Strong directional view



Source: Bloomberg, UBS WMR, as of May 2010

price will therefore not necessarily have a strong impact on a company's share price. Moreover, during financial market crises the share prices of mining companies can easily drop by 50% or more, as happened in late 2008. Hence, the risk/return characteristics are essentially different to a direct investment in gold. Therefore, in the remainder of this chapter, we focus on direct investments and leave equity investments aside (see Figure 4.7).

Diversification: Store in value/asset of last resort

Investors, who are in search of diversification and who want to hold gold as a last-resort asset, should opt for physically-backed investment solutions. This can be done via gold bars and coins stored privately, custody solutions provided by banks or ETFs. The focus here lies on counterparty risk, the provider's trustworthiness, and accessibility and costs. Futures and forward-based gold solutions are not suitable in this case. In difficult market environments or when financial markets collapse, it might be difficult to get the gold physically. When diversification needs determine the purchase of gold, basic asset allocation rules still apply, meaning, for example, that the exposure would change over time.

Thematic-oriented investor

Thematic-oriented gold investors can also make use of physically-backed gold solutions, but have more options from which to choose, and tailor-made investment vehicles can add considerable value. For example, an investor might want to hold gold in a metal account and sell parts of the appreciation potential at a premium. If the price rises gradually, the investor participates from a higher price to a pre-defined level (110% of the initial spot price), and receives a market premium. This 'covered call strategy' is a more conservative investment solution versus a standard gold position. However, this is not the only option. If a very strong price move is expected, the investor might want to participate in the price increase by a factor of, say, two. In essence, there are endless possibilities in designing payoff structures with forward/futures contracts as well as

options. Tailor-made solutions have natural drawbacks such as higher investment costs¹⁴ and the credit risk of the issuing institution.

Yield enhancement

The most conservative way to benefit from a higher price of gold is via yield enhancement strategies. In the case of gold, the investor sells the downside potential of the gold price for a premium. In other words, the investor sells insurance for which she or he will be compensated by a market premium (typically 2–10%) above money market rates. The investor does not benefit from higher prices. Depending on the level at which the insurance starts to kick in, the investor enjoys a certain price buffer before the received premium is affected. Conservative investors tend to choose insurance levels which are considerably below the spot price. As the investor sells an option, the volatility needs to be considered as well. The lower the option volatility, the smaller the premium received. We regard such a strategy as very attractive from a risk/return perspective (see Figure 4.8).

Portfolio considerations

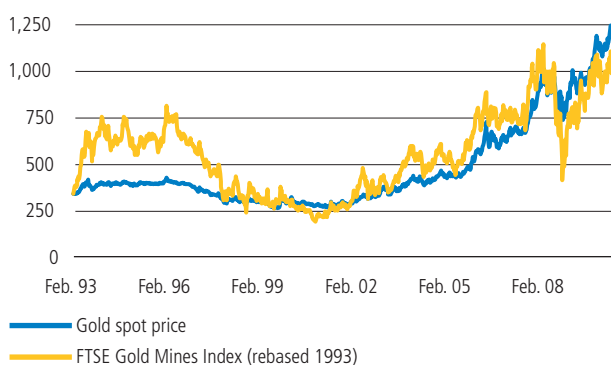
We believe gold has a place in a broadly-diversified investment portfolio. Its record in stabilizing portfolio returns during financial crises has been proven repeatedly. Over an investment horizon of five years or longer, an allocation of up to 10–15% can be regarded as adequate exposure, based on historical data. A higher allocation could be justified over very short periods of time, but are less advisable in the long run, in our view. Even though the correlation with equities is rather low, especially in difficult investment environments, gold fails to deliver adequate returns over a multi-decade investment horizon. An allocation of more than 10–15% harms the historical risk/return profile of a balanced US dollar portfolio.

For non-US dollar investors with so-called "safe-haven" currencies like the Swiss franc as a reference currency, the gold allocation should be smaller. The solid currency performance in difficult times mitigates gold's safe-haven characteristics. Judging by historical data, for Swiss franc investors the allocation should not surpass 5–10% in the long-run. Under normal considerations, this also applies to euro-based investors. Investors with commodity currencies as reference could actually hold more gold. In difficult economic times, these currencies tend to underperform or even sell-off sharply, making gold's characteristics more desirable.

When it comes to hedging considerations of currency risks, there are no clear rules. If the expected appreciation of gold is to result only from a weaker US dollar, hedging the currency risks should be considered. Otherwise, we prefer un-hedged positions.

Fig. 4.7: Gold mining equities have a higher risk profile

Equity investments have higher volatility and are more exposed to event risks



Source: Bloomberg, UBS WMR, as of May 2010

¹⁴ An upward sloping forward curve (so called contango) forces investors to pay a premium versus the spot price.

Conclusion

To sum up our investment case, we believe that the price of gold has further room to rise. Our target is about USD 1,500 per ounce in 12 months' time. Any sharp intensification of the current sovereign debt crisis in Europe could propel the gold price even higher, but downside risks should not be dismissed either. We think that a gold price below USD 1,200 offers a buying opportunity. We would expect investors to be well compensated for the risk they take. As always, investors should reflect carefully on their objectives when buying gold, because the aim of such an investment would determine the most suitable investment vehicle. In the current environment, we prefer un-hedged physically-backed gold positions over gold equities and paper gold.

Fig. 4.8: Investment vehicles overview

	Investment Vehicle	Advantages	Disadvantages	When to use / Investment Focus
Physical Gold	Bars and coins	No counterparty risk No management or brokerage fee	Agio for physical delivery Significant bid-ask spreads (production) Not tradable via e-banking	"Apocalyptic" world view / maximal availability of gold
	Custody solutions with banks	No counterparty risk Lower costs versus ETFs Relative fast physical availability	Custody fee (still low) Bid-ask-spreads needs to be considered	Diversification / for long-term investments
	Exchange Traded Funds (ETF) physically backed	No counterparty risk Low minimum investment amount Tradable via exchanges and e-banking Available in USD, EUR, CHF (currency hedged and unhedged)	Management fee, brokerage fee, stamp duty Additional cost for physical delivery if requested	Diversification / for medium- to long-term investments
Paper Gold	Futures	No counterparty risk (exchange based)	Margin account Forward curve needs to be considered (contango) High investment volumes needed and commissions USD denominated only Fixed trading sizes and maturities Trading information available to third party	Trading and hedging / for short-term investments
	Forwards and options	Flexible maturities and amounts Gold can be traded versus other currencies	Counterparty risk (OTC based) Forward curve needs to be considered (contango)	Trading and hedging / for short-term investments
	Metal account	No management or brokerage fee Tend to have lower cost versus ETFs Available in major currencies (USD, EUR, CHF, GBP, JPY)	Custody fee Counterparty risk	Cash diversification and trading / for short- to medium-term investments
	Exchange Traded Commodities (ETC)	Low minimum investment amount Available in USD, EUR, CHF (currency hedged and unhedged)	Brokerage fee Underperforming physical gold, due to contango & index replication costs Counterparty risk (not backed by physical gold holdings)	Diversification / for medium- to long-term investments
Equity & Paper Gold	Structured products	Tailor-made return payoff Available on gold, gold mining stocks as well as baskets of stocks Exposure to promising specific mining projects	Brokerage fee Counterparty risk	Thematic and opportunistic/ for short- to medium-term investments
Equity	Gold mining stocks	Exposure to promising mining projects Exposure to company leverage	Brokerage fee Company-specific risks can be very high The stock price does not necessarily reflect the development of the gold price	Company investments with exposure to gold / all maturities

Source: UBS WMR, as of May 2010

What is the best way to invest in gold?



*Andreas Zingg
Senior Product Manager
Global Asset Management, UBS AG*

There are signs that gold will continue its upward trend. Gold ETFs and the direct purchase of physical gold make it possible to participate in the performance of gold – simply, directly and efficiently.

Investors have been driving up the price of gold, which has now risen past the level of USD 1,200 per ounce. Has the gold price peaked?

No, not at all. UBS Wealth Management Research thinks that gold is still attractively valued. Another advantage is that gold has only a low correlation to traditional asset classes such as stocks and bonds, adding breadth and diversification to a portfolio. But what is the best way to invest in gold?

Gold ETFs

When investing in physical gold, investors can choose between exchange-traded funds or a direct investment in physical gold. Please note that only exchange-traded funds issued in Switzerland (gold ETFs) are allowed to invest directly in physical gold. Exchange-traded gold products that are not issued in Switzerland usually take the form of asset-backed bonds (such as gold ETCs). Should the issuer of these instruments go bankrupt, there could in the worst case be a total loss of the invested capital. In contrast, Swiss gold ETFs do not harbor any issuer risk, nor are there any counterparty risks from gold derivatives. In addition, almost all Swiss gold ETFs include the right of physical delivery in gold.

Gold ETFs are traded on the SIX Swiss Exchange, which means they can be bought and sold at any time during the official trading hours.

Almost all gold ETFs have narrow bid-ask spreads of between 0.15% and 0.40%. These narrow spreads have a positive impact on trading costs. The annual management

fee is between 0.30% and 0.40%, and there is also a custody account management fee. The trading of gold ETFs is also subject to stamp duties and brokerage fees, alongside the bid-ask spreads.

Physical gold

Physical gold can be held for safekeeping in a collective or segregated safe at the bank. The gold in the safe is not posted to the bank's balance sheet and remains the sole property of the client. Thus there is no counterparty risk. And in contrast to gold ETFs there are no management or brokerage fees for a direct investment in physical gold. However, the bid-ask spreads for physical gold are somewhat wider, especially for small investment amounts.

Non-physical gold investments

In addition to gold ETFs and the direct sale of physical gold, there are a wide range of non-physical gold products such as metal accounts, gold ETCs or structured products. Synthetic gold investments usually bear an issuer risk or counterparty risks from the use of gold derivatives. For some products these risks are physically backed. On the other hand, structured products offer the advantage that non-linear payoff profiles can be used.

Conclusion

For "linear" gold investments, gold ETFs and the purchase of physical gold offer clear advantages over synthetic gold products. When making a specific decision, the advantages and disadvantages of gold ETFs versus the direct purchase of physical gold must be taken into account.



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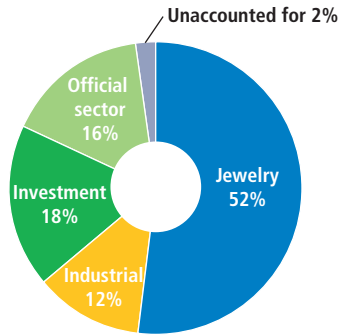
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World gold holdings

World gold holdings above ground are concentrated in jewelry

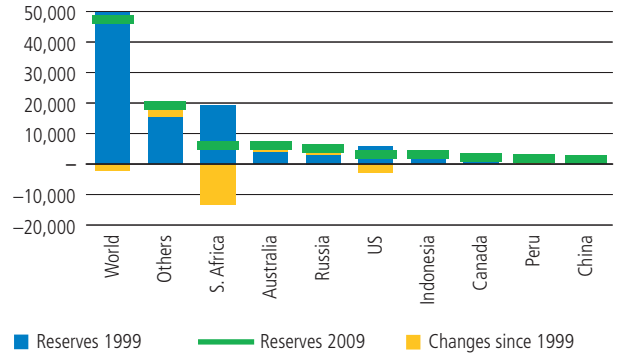
Total stocks stands at 166,000 tons in 2009



Source: Gold Fields Mineral Services, UBS WMR, as of May 2010

World gold reserves below ground in the hands of few

Reserves and changes in reserves by country between 1999 and 2008, in tons



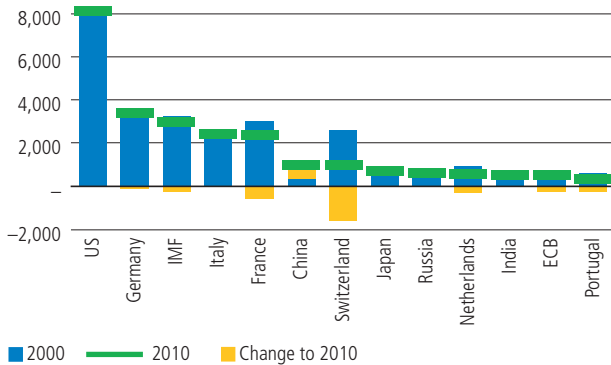
Source: USGS, UBS WMR, as of May 2010

Note: China – Reserves 2001 to 2009

Central Bank holdings

Central bank holdings (absolute terms in tons)

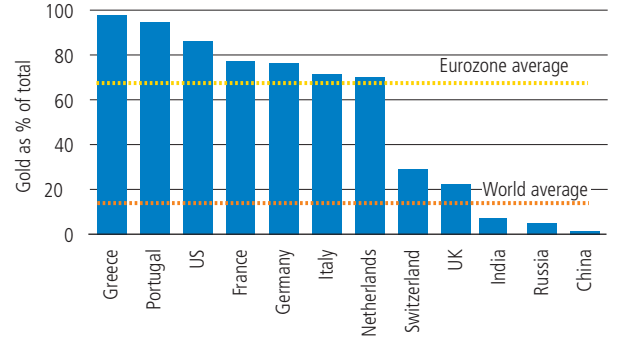
Change in central bank holdings within the last 10 years by country



Source: World Gold Council, Bloomberg, UBS WMR, as of May 2010

Central bank holdings (relative terms)

Gold as a percentage of total central bank foreign reserves (february data)

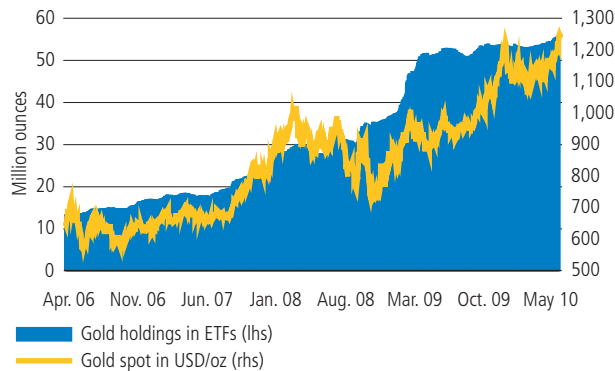


Note: Swiss foreign currency reserves have almost doubled from february levels
Source: World Gold Council, Bloomberg, UBS WMR, as of May 2010

Invested demand

Gold positions in ETF holdings reached all-time highs

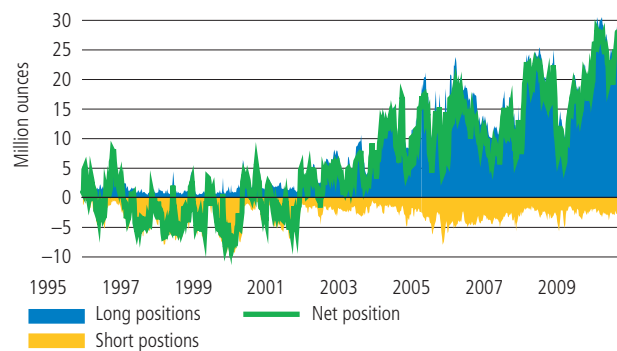
We used physically-backed ETFs



Source: ETFs, Ishares, JB, SPDR, ZKB, Bloomberg, UBS WMR, as of May 2010

Speculative account positions in futures and options are notoriously volatile

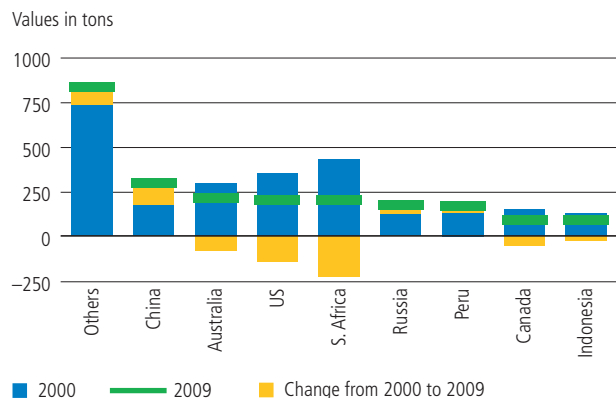
Speculative accounts = non-commercial accounts in the US



Source: CFTC, Bloomberg, UBS WMR, as of May 2010

Supply

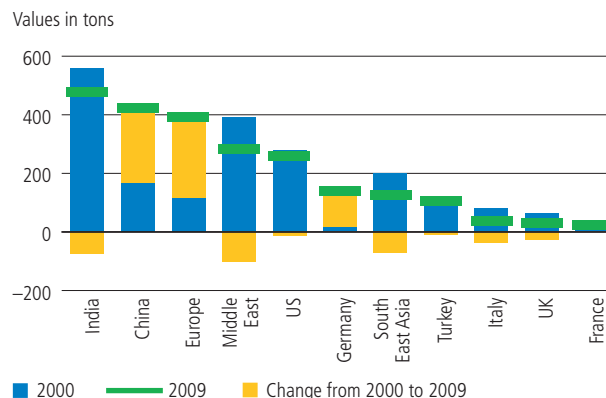
Traditional suppliers lost ground



Source: GFMS, UBS WMR, as of May 2010

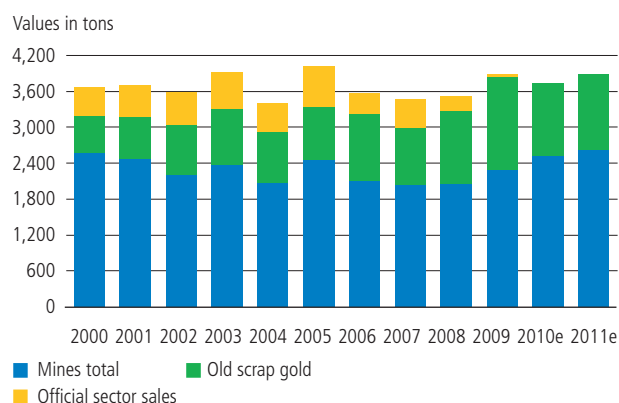
Demand

Consumer demand witnessed large shifts



Source: GFMS, UBS WMR, as of May 2010

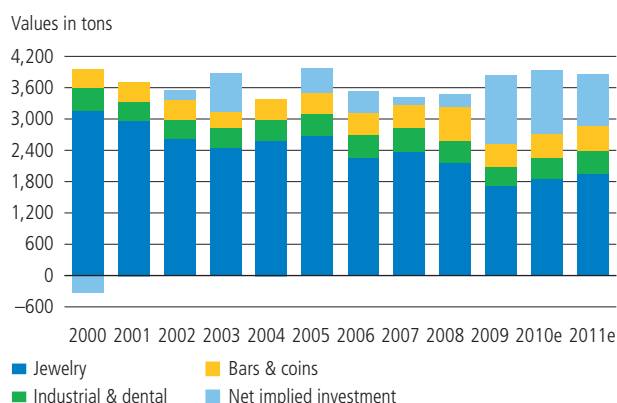
Gold supply failed to expand in the last 10 years



Source: World Gold Council, UBS WMR, as of May 2010

e = estimate

Investment demand – a new rival for jewelry



Source: World Gold Council, UBS WMR, as of May 2010

e = estimate

Gold: supply and demand

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010E	2011E
Supply in tons											
Mine production	2621	2612	2622	2494	2550	2483	2476	2409	2554	2595	2625
Net producer hedging	-151	-412	-255	-422	-86	-373	-444	-349	-257	-70	0
Total mine supply	2470	2200	2367	2072	2464	2110	2032	2060	2297	2525	2625
Official sector sales	520	547	617	469	674	352	484	236	44	0	0
Old gold scrap	713	841	944	849	886	1104	956	1217	1549	1200	1270
Total supply	3703	3588	3928	3390	4024	3566	3472	3513	3890	3725	3895
Demand in tons											
Jewelry	3001	2660	2480	2614	2707	2284	2405	2187	1747	1880	1980
Industrial & dental	363	357	382	412	431	458	462	436	368	415	435
Total fabrication	3364	3017	2862	3026	3138	2742	2867	2623	2115	2295	2415
Bars & coins	373	387	313	398	412	412	446	649	440	470	485
Net implied investment	-34	184	753	-34	474	412	159	241	1335	1220	1000
Total demand	3703	3588	3928	3390	4024	3566	3472	3513	3890	3985	3900
Stocks surplus/deficit										-260	-5

Source: World Gold Council, GFMS, UBS WMR

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