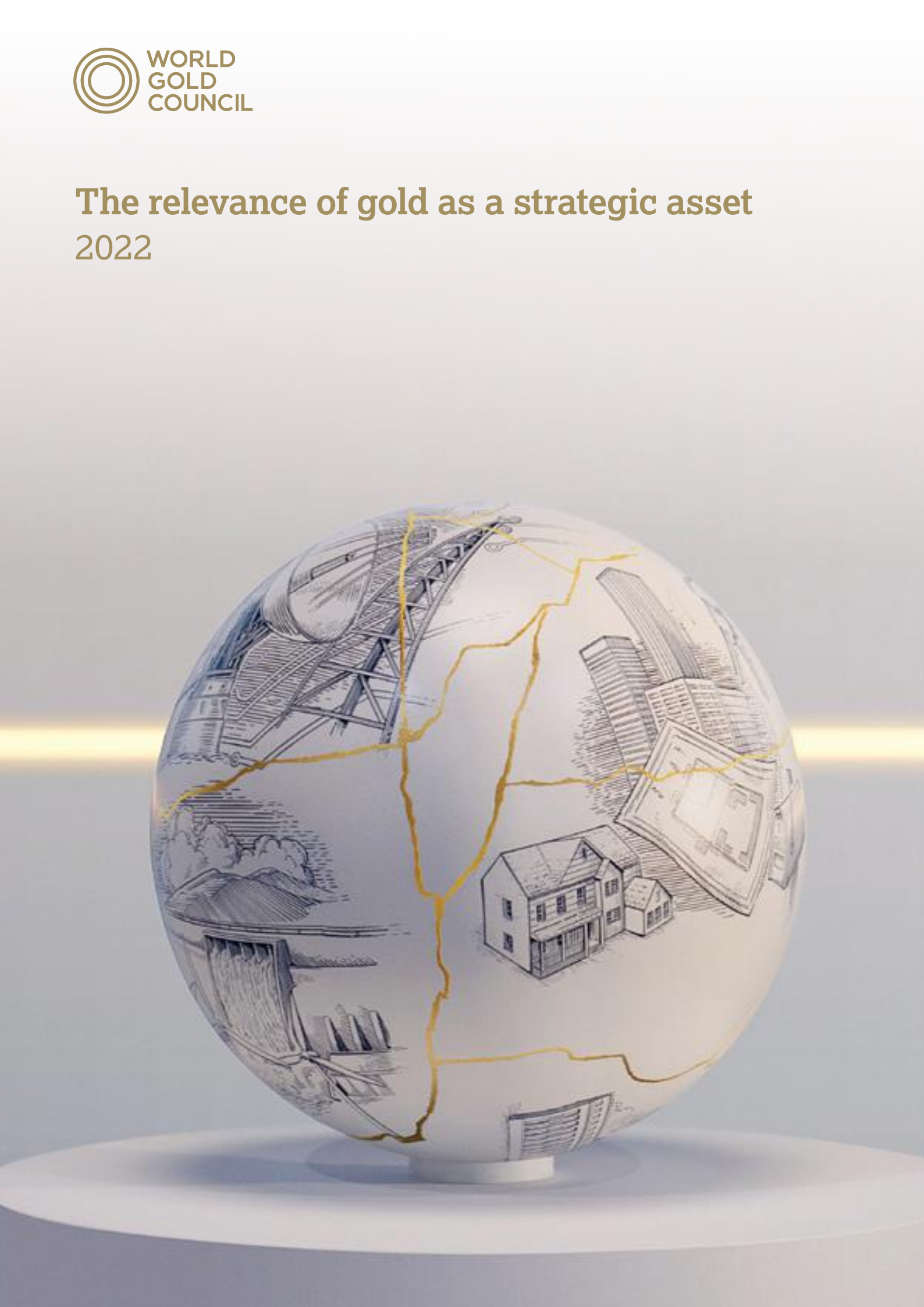
WORLD GOLD COUNCIL

The relevance of gold as a strategic asset

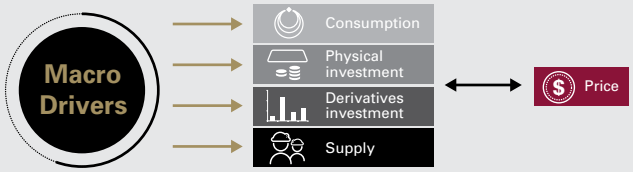
2022



How to value gold for maximum portfolio impact

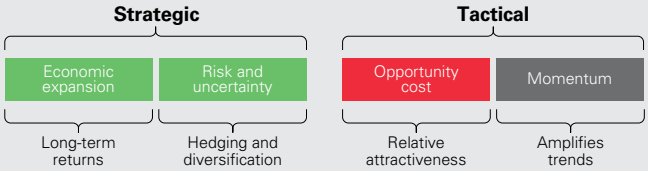
Gold does not directly conform to the majority of the most common valuation methodologies used for equities or bonds. Without a coupon or dividend, typical models based on discounted cash flows, expected earnings, or book-to-value ratios, struggle to provide an appropriate assessment for gold's underlying value. This presented an opportunity for the World Gold Council to develop a framework to better understand gold valuation.

What is the Gold Valuation Framework (GVF)?
GVF is a methodology that allows investors to understand the drivers of gold demand and supply and, based on market equilibrium, estimate their impact on price performance. GVF powers our web-based tool, **Qaurum**[SM], which allows users to assess the potential performance of gold under customisable hypothetical macroeconomic scenarios provided by Oxford Economics.[1]



Our analysis shows that **the price performance of gold** can be explained by the interaction of four key drivers:

- **Economic expansion:** periods of growth are very supportive of jewellery, technology and long-term savings
- **Risk and uncertainty:** market downturns often boost investment demand for gold as a safe-haven
- **Opportunity cost:** the price of competing assets, especially bonds (through interest rates) and currencies, influences investor attitudes towards gold
- **Momentum:** capital flows, positioning and price trends can boost or dampen gold's performance.



For more information on **long-** and **short-term** drivers of gold, visit the **data** section on **Goldhub.com**

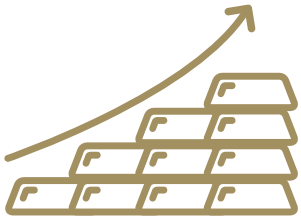
Contents

1 **Oxford Economics** is a leader in global forecasting and quantitative analysis and a specialist in modelling. Visit **Qaurum** for important disclosures about Oxford Economics' data, as well as a detailed description of the available scenarios; the assumptions underlying and data used for each scenario; and its respective hypothetical impact on gold demand, supply and performance

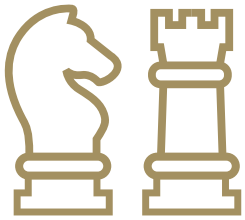
What makes gold a strategic asset?

Gold benefits from diverse sources of demand: as an investment, a reserve asset, jewellery, and a technology component. It is highly liquid, no one's liability, carries no credit risk, and is scarce, historically preserving its value over time.

Gold can enhance a portfolio in four key ways:

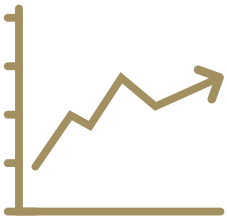


Returns



Diversification

Liquidity



Portfolio Performance

Inflation, supply-chain concerns and COVID uncertainty remain at the forefront for investors in 2022

Inflation was a prominent global theme throughout 2021 and is still a key input into 2022 investor decisions. While many central banks (CBs) felt the uptick in inflation levels was temporary on the back of COVID's impact in the first part of 2021, this consensus shifted in the latter part of the year. Some CBs now acknowledge that inflation is here to stay for longer and are expected to raise rates in 2022. Conversely, other countries like China, India and the ECB are expected to continue accommodative policies.

Meanwhile, supply chain bottlenecks caused by the pandemic have not fully dispersed. It is true that governments proved reluctant to respond to the recent spike in COVID cases with formal shutdown measures of the sort that disrupted economic growth over the last two years, but new variants could change this behaviour, and a resurgence of supply chain disruption – across multiple sectors from technology to shipping – could negatively affect economic growth and create additional inflationary pressure.

While the market expects rates increases and a strong US dollar – a negative for gold price performance – real and nominal rates should remain at historically low levels.

Our analysis shows that gold has performed well into CB hiking cycles and has been an effective inflation hedge. Coupled with healthy jewellery and CB demand, and the potential for market volatility in a vastly changing world, the strategic rationale for gold in a portfolio – particularly as a portfolio hedge – remains compelling (see ***2022 Gold Outlook***).

ESG considerations

Over recent years, investors have increased environmental, social and governance (ESG) considerations as part of their investment process. For example, in a MSCI survey of 200 institutional investors managing around $18 trillion (trn), 73% planned to increase ESG investment in 2021,[2] and in a survey of 800 individual US investors by Morgan Stanley in October 2021 79% were focused on prioritising sustainable investing.[3] This increased emphasis on ESG reflects growing pressure for businesses to actively watch and manage ESG risks. It also supports the position that good ESG performance can lead to better long-term financial performance.[4] The shift towards a greater integration of ESG objectives within investment strategies has important implications for gold, which investors expect to have been responsibly produced, and can play a role in supporting ESG goals and managing associated risks within a portfolio (**Focus 2: Gold as an ESG investment**).[5]

2 *MSCI Investment Insights Report 2021*

3 *2021 Sustainable Signals Individual Investor,* Morgan Stanley, January 2021

4 Refinitiv, *How do ESG scores relate to financial returns,* August 2020.

5 *Gold and climate change: Current and future impacts,* October 2019.

Our analysis illustrates that adding between 4% and 15% in gold to hypothetical average portfolios over the past decade, depending on the composition and the region, would have increased risk-adjusted returns.[9]

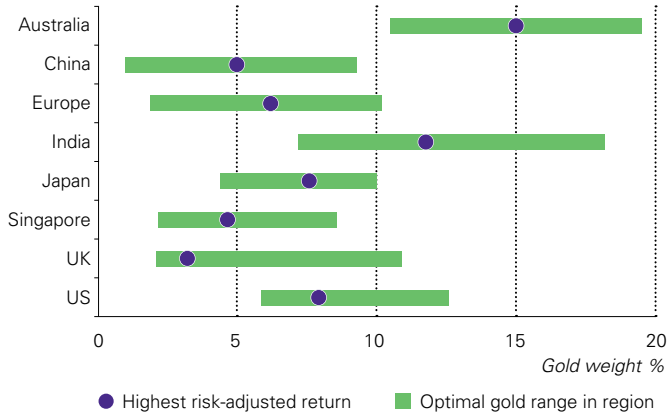
The increased relevance of gold

Institutional investors[6] have embraced alternatives to traditional investments such as equities and bonds in pursuit of diversification and higher risk-adjusted returns. For example, the share of non-traditional assets, such as hedge funds, private equity funds or commodities, among global pension funds increased from 7% in 1998 to 26% in 2020 – this figure is 30% in the US.[7]

Gold allocations have been recipients of this shift. Investors increasingly recognise gold as a mainstream investment; global investment demand has grown by an average of 10% per year since 2002 and the gold price has increased almost seven-fold over the same period.[8]

Chart 1: Gold allocations can increase risk-adjusted returns across global average hypothetical portfolios

Range of efficient frontier gold allocations for average investment portfolios in respective regions*



*The solid bars are the optimal range of gold for an average hypothetical portfolio in each region. The marker represents the allocation to gold with the highest risk-adjusted returns. For specifics on each region's portfolio makeup, please see **Charts 13,** p9 **14a** and **14b,** p10 and important disclaimers and disclosures at the end of this report.

Source: World Gold Council

Gold performance has been strong in recent decades, supported by key structural changes

Monetary policy

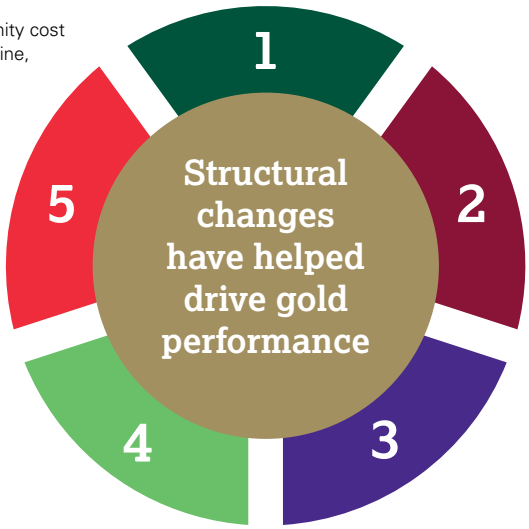
Persistently low interest rates reduce the opportunity cost of holding gold and highlight it as a source of genuine, long-term returns, particularly when compared to historically high levels of negative-yielding debt.

Emerging market growth

Economic expansion – particularly in China and India – increased and diversified gold's consumer and investor base.

Market access

Gold-backed ETFs have facilitated access to the gold market and materially bolstered interest in gold as a strategic investment, reduced total cost of ownership and increased efficiencies.



Central Bank Demand

A surge of interest in gold among central banks across the world, commonly used in foreign reserves for safety and diversification, has encouraged other investors to consider gold's positive investment attributes.

Market risk

The global financial crisis prompted a renewed focus on risk management and an appreciation of uncorrelated, highly liquid assets such as gold. Today, trade tensions and concerns about the economic and political outlook have encouraged investors to re-examine gold as a traditional hedge.

Source: World Gold Council

6 An institutional investor holds and/or manages assets for clients in larger, pooled portfolios often represented as mutual funds, banks, brokerages, hedge funds, etc.

7 *Willis Towers Watson, Global Pension Assets Study 2020,* February 2020 and *Global Alternatives Survey 2017,* July 2017.

8 31 December 2001 to 31 December 2021.

9 See **Chart 13** on p9 for more details behind the composition of the hypothetical regional portfolios. Based on 2001 – 2021. In addition, refer to important disclaimers and disclosures at the end of this report.

Gold's strategic role

Our analysis shows gold is a clear complement to equities, bonds, and broad-based portfolios. A store of wealth and a hedge against systemic risk, currency depreciation and inflation, gold has historically improved portfolios' risk-adjusted returns, delivered positive returns, and provided liquidity to meet liabilities in times of market stress.

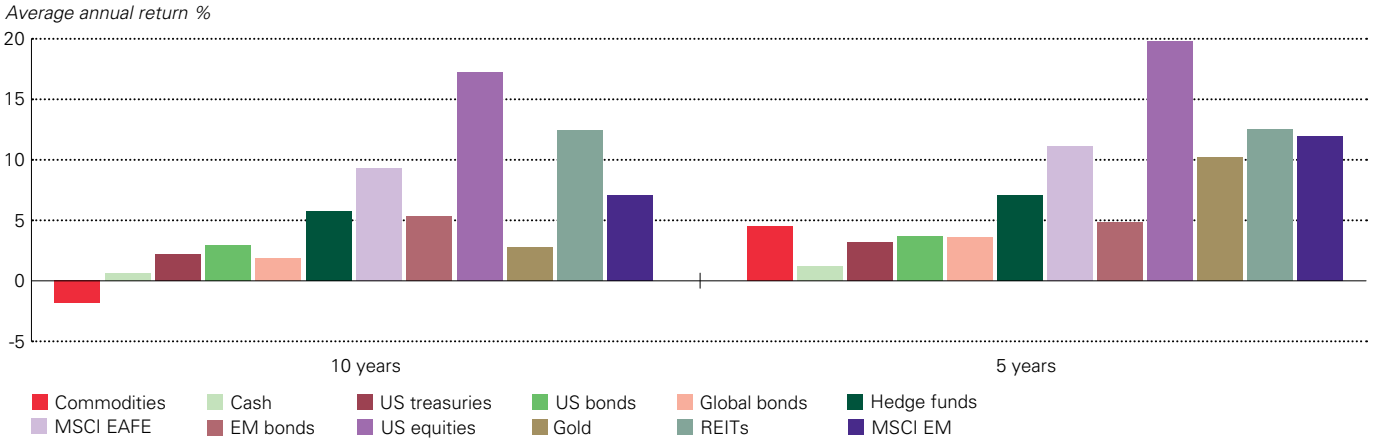
A source of returns

Investors have long considered gold a beneficial asset during periods of uncertainty. Historically, it has generated long-term positive returns in both good and bad economic times. Looking back almost half a century, the price of gold in US dollars has increased by an average of nearly 11% per year since 1971[10] when the gold standard collapsed.[11] Over this period, gold's long-term return is comparable to equities and higher than bonds.[12] Gold has also outperformed many other major asset classes over the past five, 10 and 20 years (**Chart 2** and **Chart 3,** p4).

This duality reflects the diverse sources of demand for gold and differentiates it from other investment assets. Gold is often used to protect and enhance wealth over the long term as it is no one's liability, and it works as a means of exchange due to its global recognition.

Gold is also in demand via the jewellery market, valued by consumers across the world. And it is a key component in electronics.[13] These diverse sources of demand give gold a particular resilience: the potential to deliver solid returns in various market conditions (**Chart 7,** p6).

Chart 2: Gold has performed well over the past decade, despite the strong performance of risk assets
Average annual return over the past five and 10 years*



*Returns in US dollars from 31 December 2011 to 31 December 2021.
See **Chart 3** p4 for respective indices.

On Goldhub.com see: **Gold returns**.

Source: Bloomberg, ICE Benchmark Administration, World Gold Council

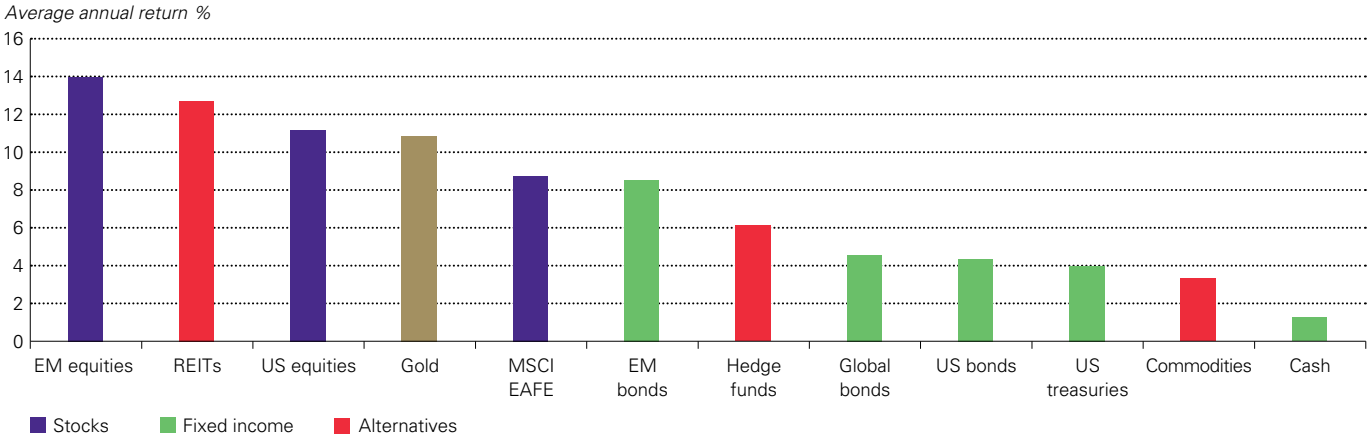
10 January 1971 – December 2021.

11 During the gold standard, the US dollar was backed by gold, and the foreign currency exchange rates were dictated by the Bretton Woods System. In August 1971, the Nixon Administration announced the halt of the free conversion between the US dollar and gold catalysing the collapse of the gold standard and, subsequently, the Bretton Woods system.

12 For other return metrics and performance see **Appendix II** on p17.

13 See **Chart 18a,** on p15.

Chart 3: Gold has outperformed most broad-based portfolio components over the past two decades*
Average annual return of key global assets in US dollars*



*Returns from 31 December 2001 to 31 December 2021.
Return computations in US dollars for 'cash': ICE BofA US 3-Month Treasury Bill Index; 'US bonds': Bloomberg Barclays US Agg Total Return Value Unhedged USD; 'US treasuries': Bloomberg Barclays US Treasury Total Return Unhedged USD; 'Global bonds': Bloomberg Barclays Global-Aggregate Total Return Index Value Unhedged USD; 'EM bonds': Bloomberg Barclays EM USD Aggregate Total Return Index Value Unhedged; 'US equities': MSCI Daily TR Gross USA USD; 'MSCI EAFE': MSCI Daily TR Gross EAFE USD; 'EM equities': MSCI Daily TR Gross EM USD; 'commodities': Bloomberg Commodity Index Total Return; 'hedge funds': Hedge Fund Research HFRI Fund Weighted Composite Index; 'REITs': FTSE Nareit Equity REITs Total Return Index USD; and 'gold': LBMA Gold Price PM USD.
On Goldhub.com see: **Gold returns**.

Source: Bloomberg, ICE Benchmark Administration, World Gold Council

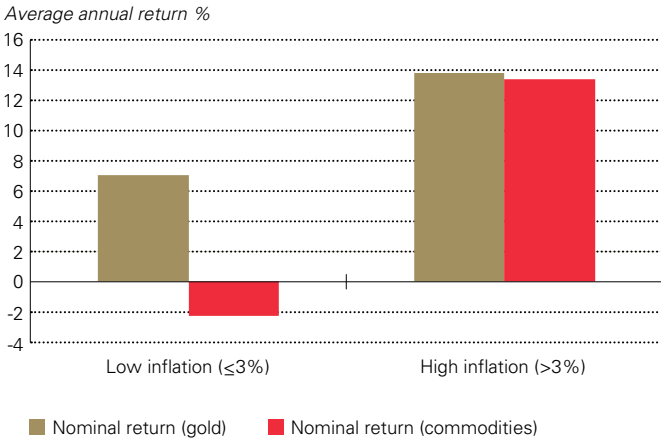
Beating inflation, combating deflation

Gold has long been considered a hedge against inflation and the data confirms this. The average annual return of 11% in US dollars over the past 50 years, has outpaced the US and world consumer price indices (CPI).[14]

Gold also protects investors against high and extreme inflation. In years when inflation was higher than 3%, gold's price increased 14% per year on average (**Chart 4**). This number increased significantly with even higher inflation levels.[15] Over the long term, therefore, gold has not just preserved capital but helped it grow.

Research also shows that gold should do well in periods of deflation.[16] Such periods are characterised by low interest rates, reduced consumption and investment, and financial stress, all of which tend to foster gold demand.

Chart 4: Gold historically rallies in periods of high inflation, outperforming broad-based commodities
Gold and commodity nominal returns in US dollars as a function of annual inflation*



*As of 31 December 2021. Based on y-o-y changes in US dollars for 'gold': LBMA Gold Price PM, 'commodities': Bloomberg Commodity Index and 'inflation': US CPI since January 1971.

Source: Bloomberg, ICE Benchmark Administration, World Gold Council

14 Based on average annual CPI changes for the US (3.94%) and world (10.4%) as measured by the IMF from December 1971 – December 2021.

15 The 15 instances US CPI was higher than 4%, the average gold return was 21%, while in the 10 instances that US CPI was higher than 5%, gold increased 27% on average.

16 Oxford Economics, *The impact of inflation and deflation on the case for gold*, July 2011.

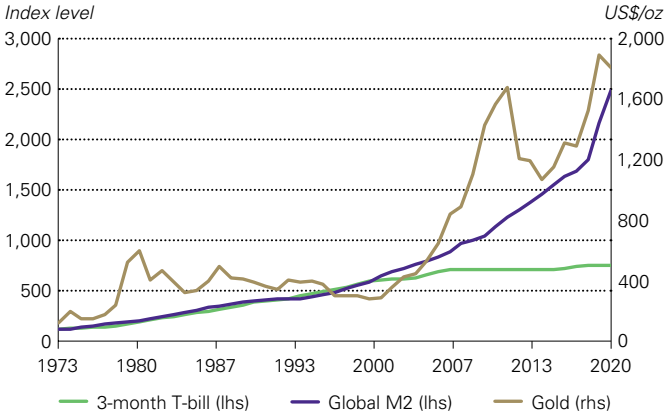
Outperforming fiat currencies

Investor demand has been boosted by persistently low interest rates and concerns about the outlook for the dollar, which affect the perceived opportunity cost of holding gold.

Historically, major currencies were pegged to gold. That changed with the unravelling of the US gold standard in 1971 and the eventual collapse of the Bretton Woods system.[17] Since then, with few exceptions, gold has significantly outperformed all major currencies and commodities as a means of exchange (**Chart 5**). This outperformance was particularly marked immediately after the end of the gold standard. A key factor behind this robust performance is that the supply growth of gold has changed little over time – increasing by approximately 1.6% per year over the past 20 years.[18]

By contrast, fiat money can be printed in unlimited quantities to support monetary policy, as exemplified by the quantitative easing measures in the aftermath of the Global Financial Crisis (GFC).[19] In recent years, the rapidly increasing global money supply and a low to negative rate environment have fostered an optimal environment for gold to outperform global sovereign debt, such as US treasuries and to track the global money supply (**Chart 6,** p6).

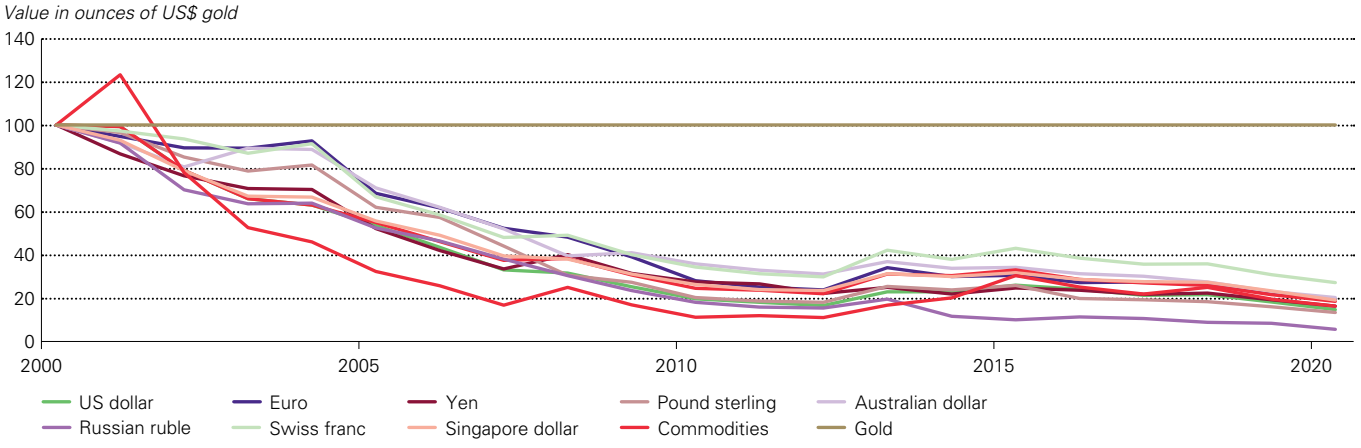
Chart 6: Gold prices have tracked the expansion of global money supply and outpaced T-bills over time
Global M2 growth, US 3-month T-bill total return, gold price*



*As of 31 December 2021. Data starts in 1973 due to data availability. Global M2 is first calculated by aggregating the available set of individual country M2s (excluding Venezuela due to data quality) in US dollars as provided by Oxford Economics. The resulting aggregate is then re-based to 100 on January 1973. US 3-month T-bill total returns were constructed using cumulative returns based on 3-month US T-bill yields and rebased to 100 on January 1973. Gold based on the LBMA Gold Price PM USD.

Source: Bloomberg, ICE Benchmark Administration, Oxford Economics, World Gold Council

Chart 5: The purchasing power of major currencies and commodities has significantly eroded relative to gold
Value of currencies and broad commodities relative to gold (January 2000 = 100)*



*As of 31 December 2021. Relative value between 'gold': LBMA Gold Price PM, 'commodities': Bloomberg Commodity Index, and major currencies since 2000. Value of commodities and currencies measured in ounces of gold and indexed to 100 in January 2000.

On Goldhub.com see: **Gold prices**.

Source: Bloomberg, ICE Benchmark Administration, World Gold Council

17 Ibid footnote 11.

18 From 31 December 2001 – 31 December 2021. See the **Demand and Supply section** at Goldhub.com.

19 For more information please see: *The impact of monetary policy on gold and It may be time to replace bonds with gold.*

Diversification that works

Effective diversifiers are sometimes hard to find. Many assets become increasingly correlated as market uncertainty rises and volatility is more pronounced, driven in part by risk-on/risk-off investment decisions. As a result, many so-called diversifiers fail to protect portfolios when investors need them most.

Gold is different in that its negative correlation to equities and other risk assets increases as these assets sell off (**Chart 7**). The GFC is a case in point. Equities and other risk assets tumbled in value, as did hedge funds, real estate, and most commodities, which were long deemed portfolio diversifiers. Gold, by contrast, held its own and increased in price, rising 21% in US dollars from December 2007 to February 2009.[20] And in the most recent sharp equity market pullbacks of 2018 and 2020, gold performance remained positive.[21]

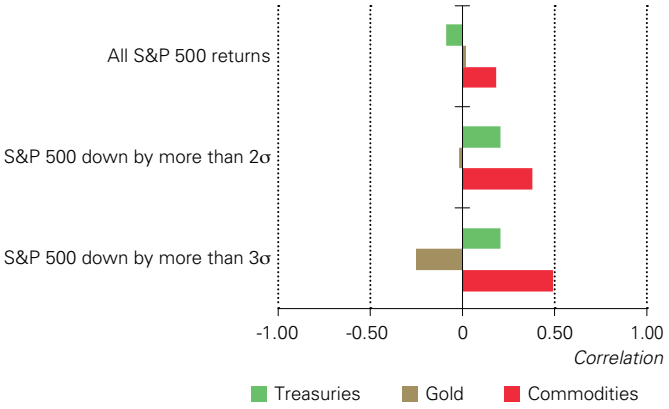
This robust performance is not surprising. With few exceptions, gold has been particularly effective during times of systemic risk, delivering positive returns and reducing overall portfolio losses (**Chart 8,** p7). Importantly too, gold allows investors to meet liabilities when less liquid assets in their portfolio are difficult to sell, or mispriced.

But gold's correlation does not just work for investors during periods of turmoil. It can also deliver positive correlation with equities and other risk assets in positive markets, making gold a well-rounded efficient hedge (**Chart 9,** p7), (see **Gold: an efficient hedge**).

This dual benefit arises from gold's dual nature: as both an investment and a consumer good (**Chart 18a,** p15). As such, the long-term performance of gold is supported by income growth. Our analysis bears this out, showing that when equities rally strongly, their correlation to gold can increase. This is driven by a wealth-effect supporting gold consumer demand, as well as demand from investors seeking protection against higher inflation expectations.

Gold has consistently benefited from 'flight-to-quality' inflows during periods of heightened risk.

Chart 7: Gold has been more negatively correlated with equities in extreme market selloffs than commodities and US treasuries
Correlation of US equities versus gold, commodities and US treasuries in various environments of US equity market performance since 1973*



*As of 31 December 2021. Correlations based on weekly returns in US dollars for 'US equities': S&P 500 Index; 'commodities': Bloomberg Commodity Index; 'US treasuries': Bloomberg Barclays US Treasury Index; 'gold' LBMA Gold Price PM since January 1973 due to US treasury availability of data. The top bar corresponds to the unconditional correlation over the full period. The middle bar corresponds to the respective correlations when the S&P 500 weekly return falls by more than two standard deviations (or 'σ'), while the bottom bar corresponds to the respective correlation when the S&P 500 weekly return falls by more than three standard deviations. The standard deviation for the S&P 500 is calculated using weekly returns over the full period.

On Goldhub.com see: **Gold correlation**.

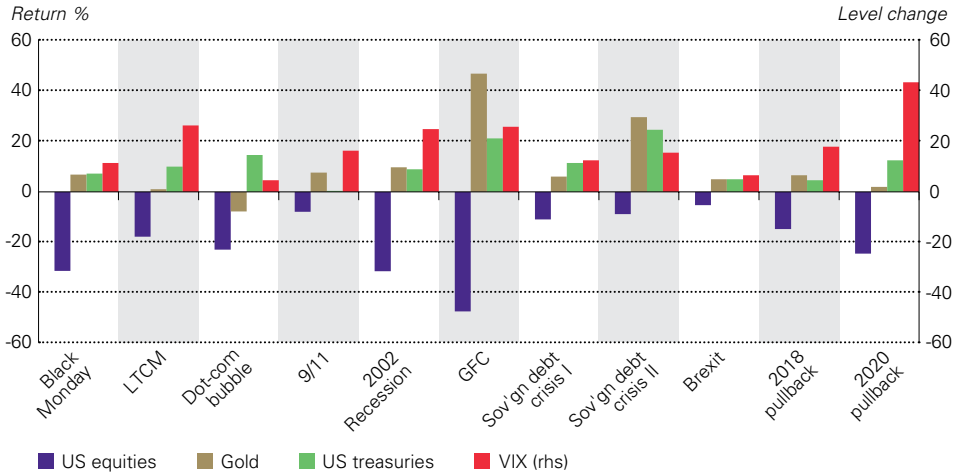
Source: Bloomberg, ICE Benchmark Administration, World Gold Council

20 Based on the LBMA Gold Price PM from 1 December 2007 to 27 February 2009.

21 Based on the LBMA Gold Price PM from 1 October 2018 to 27 December 2018 and from 31 January 2020 to 31 March 2020.

Gold behaves – and is used – as a safe-haven in periods of systemic risk…

Chart 8: The gold price tends to increase in periods of systemic risk
US equities, treasuries and gold versus the VIX index*



*As of 31 December 2020. Return computations in US dollars for 'US equities': S&P 500 Index; 'US treasuries': Bloomberg Barclays US Treasury Index; 'gold': LBMA Gold Price PM; and 'VIX': Cboe VIX Index. The VIX is available only after January 1990. For events occurring prior to that date annualised 30-day S&P 500 volatility is used as a proxy. Dates used: Black Monday: 9/1987 - 11/1987; LTCM: 8/1998; Dot-com: 3/2000 - 3/2001; September 11: 9/2001; 2002 recession: 3/2002 - 7/2002; global financial crisis (GFC): 10/2007 - 2/2009; Sovereign debt crisis I: 1/2010 - 6/2010; Sovereign debt crisis II: 2/2011-10/2011; Brexit: 23/6/2016 - 27/6/ 2016; 2018 pullback: 10/2018 - 12/2018; 2020 pullback: 31/1/2020 - 31/3/2020.

Source: Bloomberg, ICE Benchmark Administration, World Gold Council

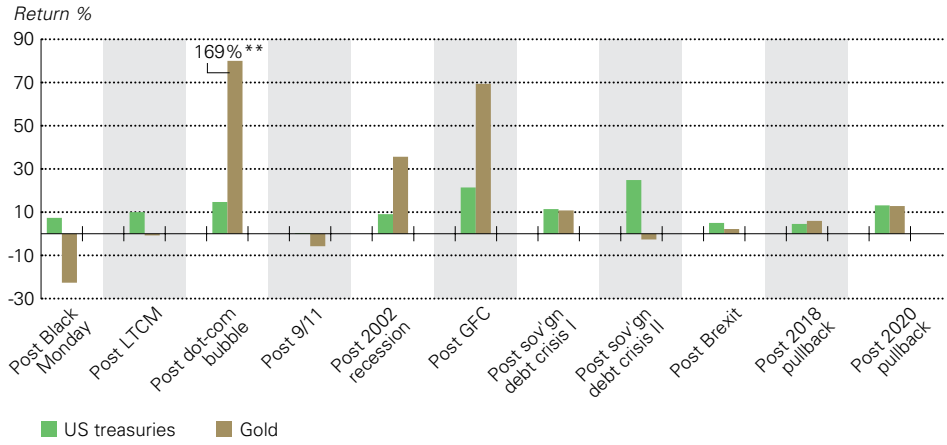
Asset	Performance during market sell-off*		Performance during market recovery*	
	Average	*Median*	*Average*	*Median*
Gold	10%	7%	25%	6%
US treasuries	11%	10%	13%	5%

*Average and median returns based on time horizons in **Chart 8** and **Chart 9**.

Source: Bloomberg, ICE Benchmark Administration, World Gold Council

…but also performs well in market recoveries.

Chart 9: Gold prices perform well following the period after a systemic selloff and its subsequent recovery
Performance of gold and treasuries from the market trough (bottom) to the market recovery point (equity market levels before the systemic selloff)



* As of 31 December 2020. Return computations in US dollars for 'US treasuries': Bloomberg Barclays US Treasury Index; 'gold': LBMA Gold Price PM.
Dates used are based off the end dates of **Chart 8**. Post Black Monday: 11/1987 - 6/1989; Post LTCM: 8/1998 - 11/1998; Post dot-com: 3/2001 - 5/2007; Post 9/11: 9/2001-11/2001; Post 2002 recession: 7/2002 - 11/2004; Post GFC: 2/2009 - 1/2013; Post sovereign debt crisis I: 6/2010 - 10/2010; Post sovereign debt crisis II: 10/2011 - 2/2012; Post Brexit: 6/2016 - 7/2016; Post 2018 pullback: 12/2018 - 6/2019; Post 2020 pullback: 3/2020 - 7/2020.

** The bar is truncated for the Dot-com bubble recovery due to its extreme differential between others and visibility

Source: Bloomberg, ICE Benchmark Administration, World Gold Council

A deep and liquid market

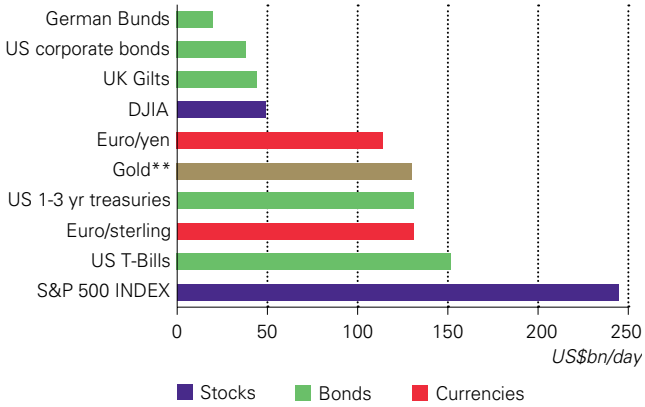
The gold market is large, global, and highly liquid.

We estimate that physical gold holdings by investors and central banks are worth approximately US$4.9trn, with an additional US$1.2trn in open interest through derivatives traded on exchanges or the over-the-counter (OTC) market (**Chart 16a,** p14).

The gold market is also more liquid than several major financial markets, including euro/yen and the Dow Jones Industrial Average, while trading volumes are like those of US 1-3 year treasuries and US T-Bills (**Chart 10**). Gold's trading volumes averaged approximately US$132bn per day in 2021. During that period, OTC spot and derivatives contracts accounted for US$74bn and gold futures traded US$56bn per day across various global exchanges. Gold-backed ETFs (gold ETFs) offer an added source of liquidity, with global gold ETFs trading an average of US$2.4bn per day (**Chart 11**).

The scale and depth of the market mean that it can comfortably accommodate large, buy-and-hold institutional investors. In stark contrast to many financial markets, gold's liquidity does not dry up, even at times of financial stress, making it a much less volatile asset (**Chart 12**).

Chart 10: Gold trades more than many other major financial assets
One-year average trading volumes of various major assets in US dollars*



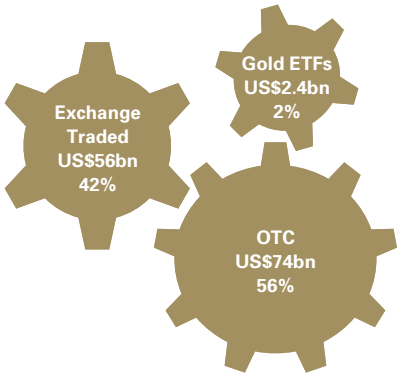
*Average daily volumes from 1 January 2021 to 31 December 2021, except for currencies that correspond to March 2019 volumes due to data availability.

**Gold liquidity includes estimates of OTC transactions and published statistics on futures exchanges, and gold-backed exchange-traded products.

On Goldhub.com see: **Gold trading volumes**.

Source: Bank for International Settlements, Bloomberg, Germany Finance Agency, Japan Securities Dealers Association, Nasdaq, UK Debt Management Office (DMO), World Gold Council

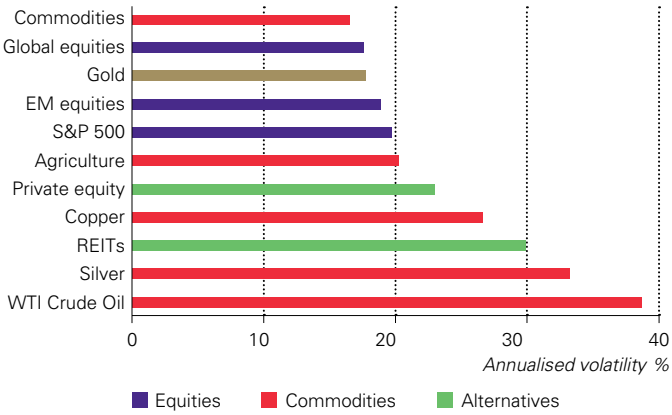
Chart 11: Gold is liquid across key investment platforms
Average daily trading volume by point of access in 2021*



*Average daily trading volume from 1 January 2021 to 31 December 2021
Gold liquidity includes estimates of over-the-counter (OTC) transactions and published statistics on futures exchanges, and gold-backed exchange-traded products. For more information, see **Gold trading volumes** on **Goldhub.com**

Source: Bloomberg, Nasdaq, World Gold Council

Chart 12: Gold has been less volatile than many equity indices, alternatives and commodities because of its scale, liquidity and diverse sources of demand
Average daily volatility of several major assets since 2001*



*Annualised volatility is computed based on daily returns in US dollars between 31 December 2001 and 31 December 2021. Computations for 'S&P 500': S&P 500 Index; 'EM equities': MSCI Daily Gross EM; 'Global equities': MSCI Daily Gross EAFE, 'Gold': LBMA Gold Price PM, 'Commodities': Bloomberg Commodity Index, 'Silver': LBMA Silver Price; 'WTI Crude oil': Bloomberg WTI Crude Oil; 'Agriculture': S&P Agriculture Index; 'Copper': S&P GSCI Copper Official Close Index; 'Private Equity': S&P Listed Private Equity Index; 'REITs': FTSE Nareit Equity REITs Index USD.

On Goldhub.com see: **Gold volatility**.

Source: Bloomberg, COMEX, ICE Benchmark Administration, World Gold Council

Enhanced portfolio performance

Long-term returns, liquidity and effective diversification all benefit overall portfolio performance. In combination, they suggest that the addition of gold can materially enhance a portfolio's risk-adjusted returns.

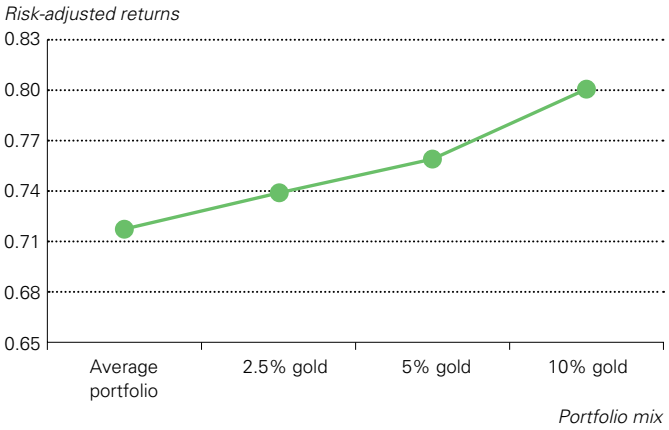
Our analysis of investment performance over the past two, five, 10 and 20 years underlines gold's positive impact on an institutional portfolio. It shows that the average US portfolio would have achieved higher risk-adjusted returns and lower drawdowns if 2.5%, 5% or 10% were allocated to gold (**Chart 13** and **Table 1**). This positive impact has been particularly marked since the GFC.

In addition to traditional back-testing, a more robust optimisation analysis based on 're-sampled efficiency'[22] suggests that an allocation to gold may result in a material enhancement to portfolio performance. For example, gold allocations between 6% and 10% across well-diversified US dollar-based portfolios with varying levels of risk could result in higher risk-adjusted returns (**Chart 14,** p10).

The 'optimal' amount of gold varies according to individual asset allocation decisions. Broadly speaking, the analysis suggests that the higher the risk in the portfolio – whether in terms of volatility, illiquidity or concentration of assets – the larger the required allocation to gold, within the range in consideration, to offset that risk (**Chart 14,** p10)

Our analysis also shows that gold's optimal weight in these hypothetical portfolios can be statistically significant even if investors assume an annual return for gold of 4.5% – less than half its performance over the past 20 years (**Chart 14,** p10). This works equally for investors who already hold other inflation-hedging assets, such as inflation-linked bonds,[23] and for investors who hold alternative assets, such as real estate, private equity, and hedge funds.[24]

Chart 13: Adding gold over the past 20 years would have increased risk-adjusted returns of a hypothetical US average portfolio
Performance of a hypothetical US average portfolio with and without gold*



*Based on US dollar performance between 31 December 2001 and 31 December 2021. The hypothetical average portfolio was created with market data from JP Morgan Asset Management and Coalition Greenwich (formerly Greenwich Associates) as well as data from Blackrock. It includes quarterly-rebalanced total returns of a 48% allocation to equities (30% Russell 3000 Total Return Index, 18% MSCI ACWI ex US), 28% allocation to fixed income (20% Barclays US Aggregate, 3% Bloomberg US Corporate High Yield Total Return Index Value Unhedged USD, 5% S&P/LSTA Leveraged Loan Total Return Index), and 24% alternative assets (9% FTSE REITs Index, 4% HFRI Hedge Fund Index, 10% S&P Private Equity Index and 1% Bloomberg Commodity Index). The allocation to gold comes from proportionally reducing all assets. Risk-adjusted returns are calculated as the annualised return/annualised volatility. See important disclaimers and disclosures at the end of this report.

Source: Bloomberg, ICE Benchmark Administration, World Gold Council

Table 1: Gold has increased risk-adjusted returns while reducing portfolio volatility and maximum drawdowns
Comparison of an average hypothetical US portfolio and an equivalent portfolio with 5% gold over the past one, five, 10 and 20 years based on US-dollar returns*

	20-year		10-year		5-year		2-year	
	No gold	*5% gold*	*No gold*	*5% gold*	*No gold*	*5% gold*	*No gold*	*5% gold*
Annualised return	8.29%	8.46 %	10.54 %	10.16%	11.96%	11.92%	14.56%	14.43%
Annualised volatility	11.57%	11.12 %	9.77%	9.42%	11.47%	10.96%	15.58%	14.88%
Risk-adjusted returns	0.72	0.76	1.08	1.08	1.04	1.09	0.93	0.97
Maximum drawdown	-45.5%	-43.1%	-17.6%	-16.6%	-17.6%	-16.6%	-17.6%	-16.6%

*As of 31 December 2021. The hypothetical average portfolio was created with market data from JP Morgan Asset Management and Coalition Greenwich (formerly Greenwich Associates) as well as data from Blackrock, as described in **Chart 13.** Risk-adjusted returns are calculated as the annualised return/annualised volatility. Maximum drawdown is calculated as the largest fall in a portfolio before the total value reaches a previous peak.

Source: Bloomberg, ICE Benchmark Administration, World Gold Council

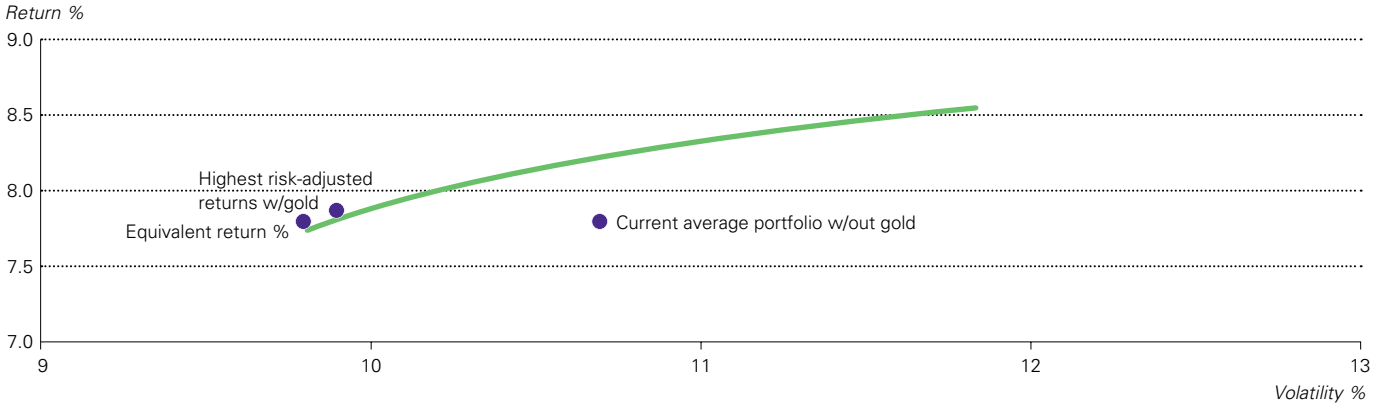
22 Re-sampled efficiency is a method developed by Richard and Robert Michaud and praised as a robust alternative to traditional mean-variance optimisation. See *Efficient Asset Management: A Practical Guide to Stock Portfolio Optimization and Asset Allocation,* Oxford University Press, January 2008.

23 *Gold as a tactical inflation hedge and long-term strategic asset,* July 2009.

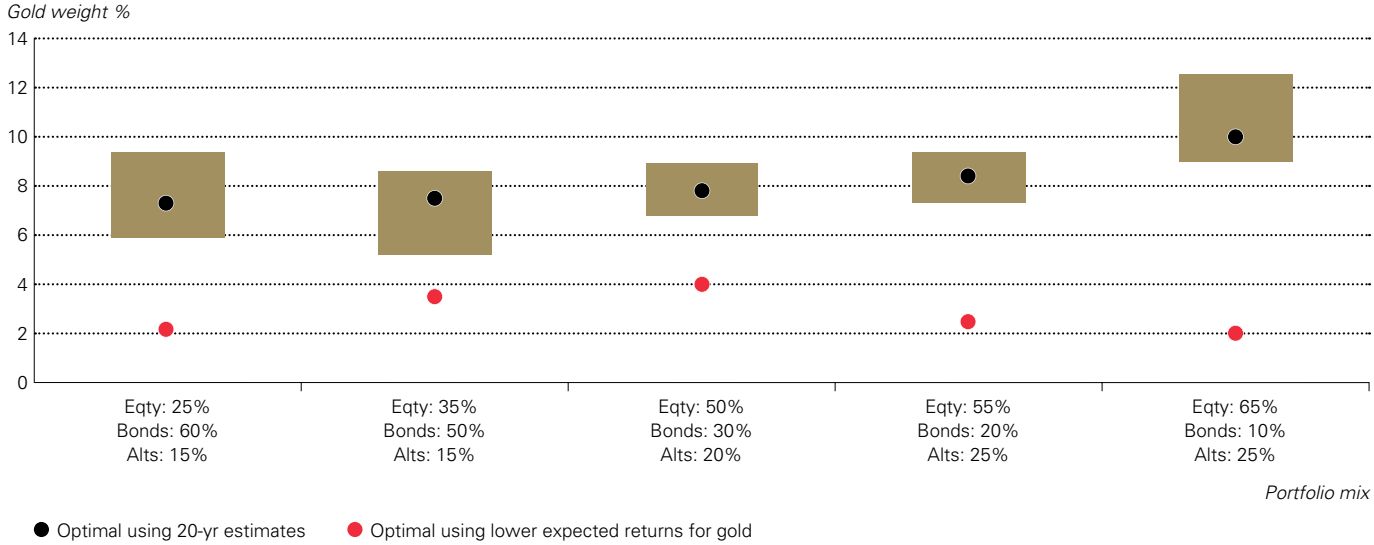
24 *Enhancing the performance of alternatives with gold,* February 2018.

Chart 14: Gold could significantly improve risk-adjusted portfolio returns across various levels of risk particularly when compared to non-gold portfolios of equivalent expected returns

(a) Efficient frontier of a hypothetical average US portfolio



(b) Range of gold allocations and the allocation that could deliver the maximum risk-adjusted return for each hypothetical portfolio mix*



* As of 31 December 2021. 'Highest risk-adjusted returns' represents the highest risk-adjusted returns for a given portfolio. 'Equivalent return %' represents the portfolio anticipated volatility for a portfolio with the same expected return of a current hypothetical portfolio. 'Current average portfolio is the current weightings resampled with no gold exposure. The gold bar on **Chart 14b** represents the optimal range of gold in the respective portfolio with the black dot within the bar representing the weight with the highest risk-adjusted return. The red dots represent the highest risk-adjusted adjusted return gold weight when reducing gold's average return in half to 4.5% to highlight the importance of gold in a lower expected gold return environment. See **Chart 13** (p9) for details on portfolio composition. Analysis based on New Frontier Advisors Resampled Efficiency. For more information see Efficient Asset Management: *A Practical Guide to Stock Portfolio Optimization and Asset Allocation,* Oxford University Press, January 2008.

See important disclaimers and disclosures at the end of this report.

Source: World Gold Council

Conclusion

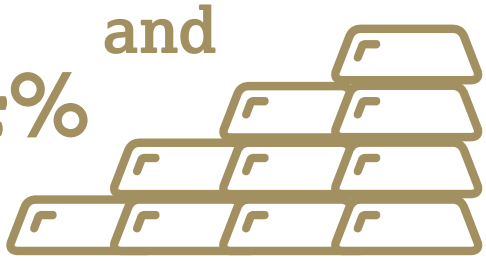
Perceptions of gold have changed substantially over the past two decades, reflecting increased wealth in the East and a growing worldwide appreciation of gold's role within an institutional investment portfolio.

Gold's unique attributes as a scarce, highly liquid, and un-correlated asset demonstrate that it can act as a diversifier over the long term. Gold's position as an investment and a luxury good has allowed it to deliver average returns of 11% over the past 50 years, comparable to equities and more than bonds and commodities.[25,26]

Gold's traditional role as a safe-haven asset means it comes into its own during times of high risk. But gold's dual appeal as an investment and a consumer good means it can generate positive returns in good times too. This dynamic is likely to continue, reflecting ongoing political and economic uncertainty, persistently low interest rates and economic concerns surrounding equity and bond markets.

Our analysis suggests that **adding between 4% and 15% of gold to average hypothetical portfolios depending on the on the composition and the region** can make a tangible improvement to performance and boost risk-adjusted returns on a sustainable, long-term basis.[27]

Extensive analysis suggests that adding between 4% and 15%



of gold to an average hypothetical portfolio, depending on the region, can make a tangible improvement to performance and boost risk-adjusted returns on a sustainable, long-term basis[27]

Gold's position as an investment and a luxury good has allowed it to deliver average returns of nearly 11% over the past 50 years[25,26]

25 Average annualised returns in US dollars from January 1971to December 2021.

26 See **Chart 22,** p17.

27 See **Chart 1,** p2.

Focus 1: Gold – Not your average commodity

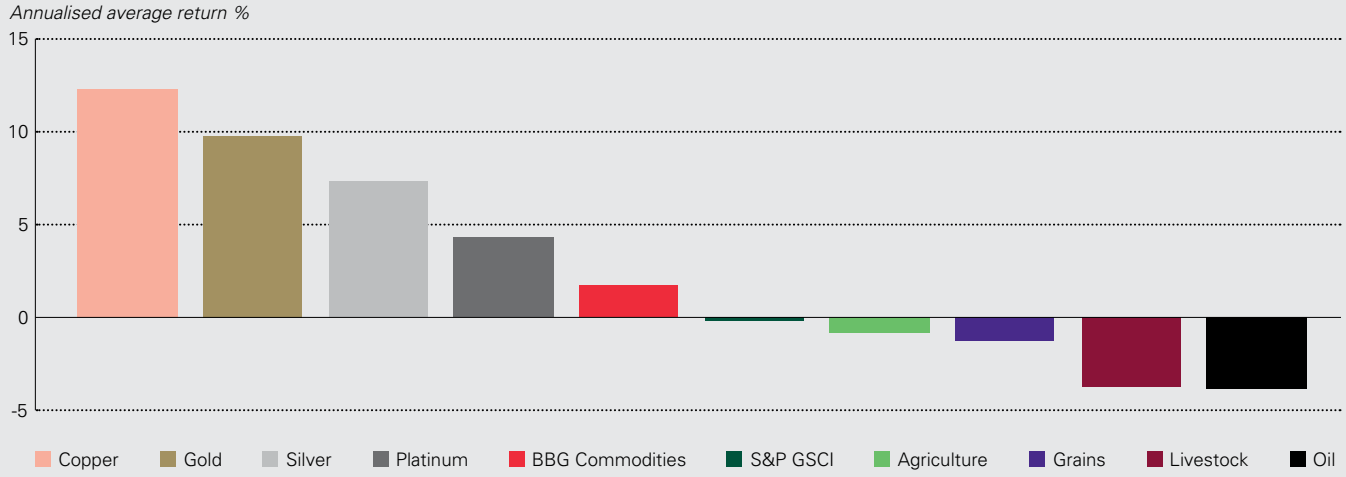
Gold is often part of the broad commodity complex: as a component of a commodity index, a holding in an ETF, or a future trading on a commodity exchange. While gold shares some similarities with commodities, there are several important differences:

- gold is traditionally seen as a safe-haven asset
- gold is both an investment and a consumer good
- the supply of gold is balanced, deep and broad
- gold does not degrade over time, unlike most traditional commodities.

These attributes set gold apart from the commodity complex. And our research suggests that a distinct allocation to gold could enhance the performance of portfolios with passive commodity exposures.[25]

Two major commodity indices increased their weighting of gold over recent years.[28] In 2021, gold had the largest individual commodity weight increase in the S&P GSCI and in 2022, gold will maintain the largest individual weight in the S&P GSCI. It will have its highest weight ever (15%) in the Bloomberg Commodity Index for a second year in a row, a maximum amount for an individual commodity. Yet, our analysis suggests that allocations to gold in these commodity indices remain below their optimal weight.[29]

Chart 15: Gold has outperformed all broad-based indices and their individual commodity components
Average annual returns of commodity indices and key individual commodities over the past 20 years*



*Annualised average returns from 31 December 2001 to 31 December 2021. Computations in US dollars of total return indices for S&P GSCI Agriculture Close Index, Bloomberg Commodity Index, S&P GSCI Copper Official Close Index, S&P GSCI Grains Official Close Index, LBMA Silver Price, S&P GSCI Livestock, S&P GSCI Platinum Index, S&P GSCI Total Return CME, S&P Oil Index, LBMA Gold Price PM.

Source: Bloomberg, World Gold Council

28 See: *Gold: the most effective commodity investment – 2021 edition,* August 2021.and *Gold: metal by design, currency by nature,* Gold Investor, Volume 6, June 2014.

29 For more information on the gold weight increases see: *Major commodity indices will increase gold weightings for a second year in a row.*

Focus 2: Gold as an ESG investment

We believe that gold should be viewed as an asset that is responsibly sourced, delivered from a supply chain that adheres to high environmental, social and governance (ESG) standards. Gold also has a potential role to play in reducing investor exposure to climate-related risks.

While gold mining is, by definition, an extractive industry, responsible gold miners mitigate environmental and social risks and contribute heavily to the communities and host countries in which they operate. They do so through the payment of wages and taxes, support of local economic development, improvements to infrastructure, and access to healthcare and schooling, and much more. The majority of this expenditure remains in the local economies of host nations and communities, as documented recently in our measurement of the social and economic contribution of gold mining. The industry is also committed to contributing to the advancement of the *UN Sustainable Development Goals.*

Our members, as industry leaders, are committed to the *Responsible Gold Mining Principles (RGMPs),* launched by the World Gold Council in 2019. These principles cover all material aspects of ESG related to gold mining and set clear expectations as to what constitutes responsible gold mining. Conformance with these Principles needs to be publicly disclosed and assured by independent experts.

In addition, we believe gold miners can contribute to the decarbonisation of the global economy and gold, as an asset, can play an important role in mitigating climate-related risks within an investment portfolio.

On a global level, gold's overall carbon footprint is relatively small but not insignificant (under 0.4% of global emissions). However, the opportunity for the gold supply chain to reduce its total greenhouse gas emissions is well within reach. Research suggests that, unlike many other commodities and sectors, this opportunity is clear and concentrated. Most emissions associated with gold are created during its production, particularly from mining's generation and consumption of electricity, and significant progress is already being made to reduce these power emissions.

Gold's lack of downstream emissions has important implications for gold investors, as gold holdings can reduce the carbon intensity of the portfolio value. And the positive outlook for future decarbonisation of the gold value chain has potential benefits for the projected carbon profile, 'implied temperature' and climate target alignment of portfolio holdings.

Our analysis suggests that gold has the potential to perform better than many mainstream asset classes under various long-term climate scenarios, particularly if climate impacts create or exacerbate market volatility or we experience a disruptive transition to a net zero carbon economy. Furthermore, gold's value is less likely to be negatively impacted by a rising carbon price, also offering investors a degree of insulation from the likely policy responses needed to accelerate the move to a decarbonised economy.

Appendix I: Composition and trends of gold demand and supply

A large yet scarce market

The gold market has two attractive features for investors. Gold's scarcity supports its long-term appeal. But gold's market size is large enough to make it relevant for a wide variety of institutional investors – including central banks.

There are approximately 205,238t of gold above ground, worth more than US$11.9trn (**Chart 16**).[30]

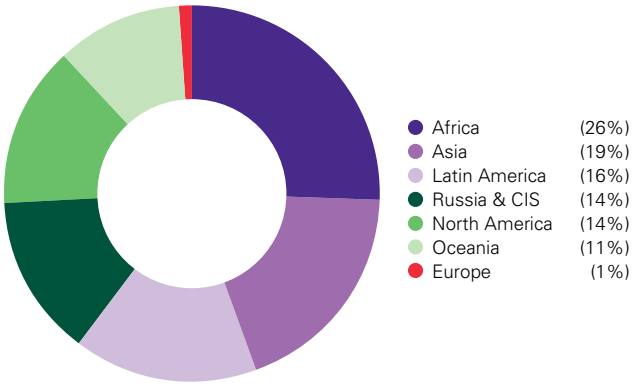
Mine production has added approximately 3,400t per year over the past decade, equivalent to an annual 2.0% increment of above-ground stocks.[31] Mine production is also well diversified across regions (**Chart 17**).

The approximate breakdown of above-ground stocks of physical gold,[32] based on its use, is:

- Jewellery: 94,464t (US$5.5trn) 46%
- Official sector: 34,592t (US$2.0trn) 17%
- Bars and coins: 41,885t (US$2.4trn) 20%
- ETFs and similar: 3,570t (US$0.2trn) 2%
- Other and unaccounted: 30,726t (US$1.8trn) 15%

The financial gold market is made up of bars, coins, gold-backed ETFs and central bank reserves. This segment of the gold market compares favourably to the size of major financial markets (**Chart 16**).

Chart 17: Fewer supply shocks reduce gold's volatility
Gold supply is a mix of mined (72%) and recycled gold (28%); mine production is spread across continents, contributing to gold's low volatility relative to commodities

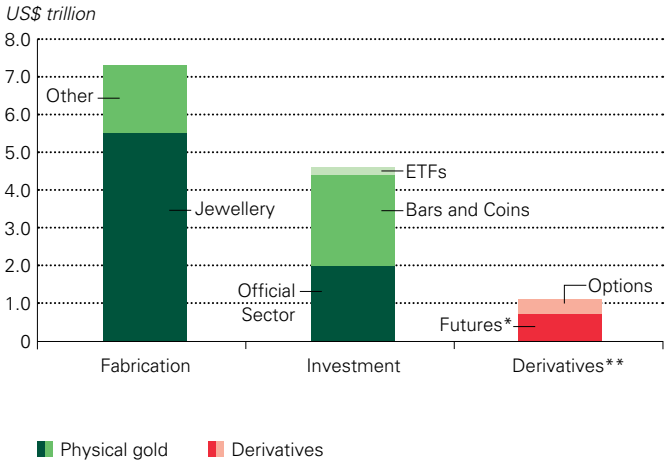


*Computed using average annual supply from 2010 to 2020. Regional breakdown excludes central bank demand due to data availability.

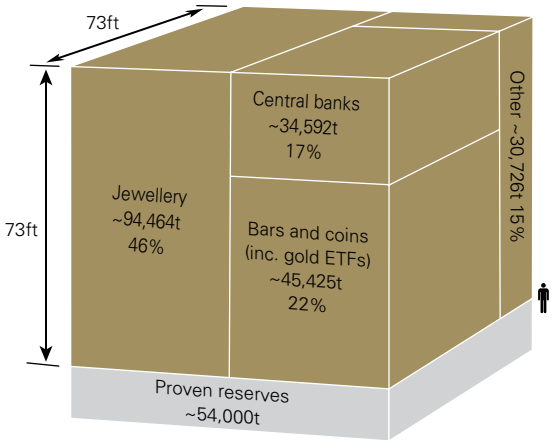
Source: On Goldhub.com: **Gold mine production**

Chart 16: The size of the financial gold market is large compared to many global assets, and dwarfs known open interest in gold derivatives*

(a) Value of above-ground gold and gold derivatives



(b) Total gold supply can fit in just under three Olympic size swimming pools***



* As of 31 December 2021.
** Represents open interest in COMEX, TOCOM and OTC transactions.
*** Based on 2021 above ground estimates and the standard Olympic swimming pool dimensions of (length = 164ft, width = 82ft, depth = 9ft).
1Includes "other fabrication" (13%) and "unaccounted for" (2%).

On Goldhub.com see: **Financial market size**.

Source: Bank for International Settlements, Bloomberg, ETF company filings, ICE Benchmark Administration, Metals Focus, Refinitiv GFMS, US Geological Survey, World Gold Council

30 Based on the 31 December 2021 LBMA Gold Price and 2021 above-ground estimates by Metals Focus, Refinitiv GFMS and the World Gold Council.

31 Based on Metals Focus and Refinitiv GFMS 10-year mine production average as a percentage of above ground stocks, as of 31 December 2020.

32 Ibid footnote 31.

Demand diversity underpins gold's low correlations

Chart 18(a): Gold is bought around the world for multiple purposes – as a luxury good, a component in high-end electronics, a safe-haven investment, or a portfolio diversifier*

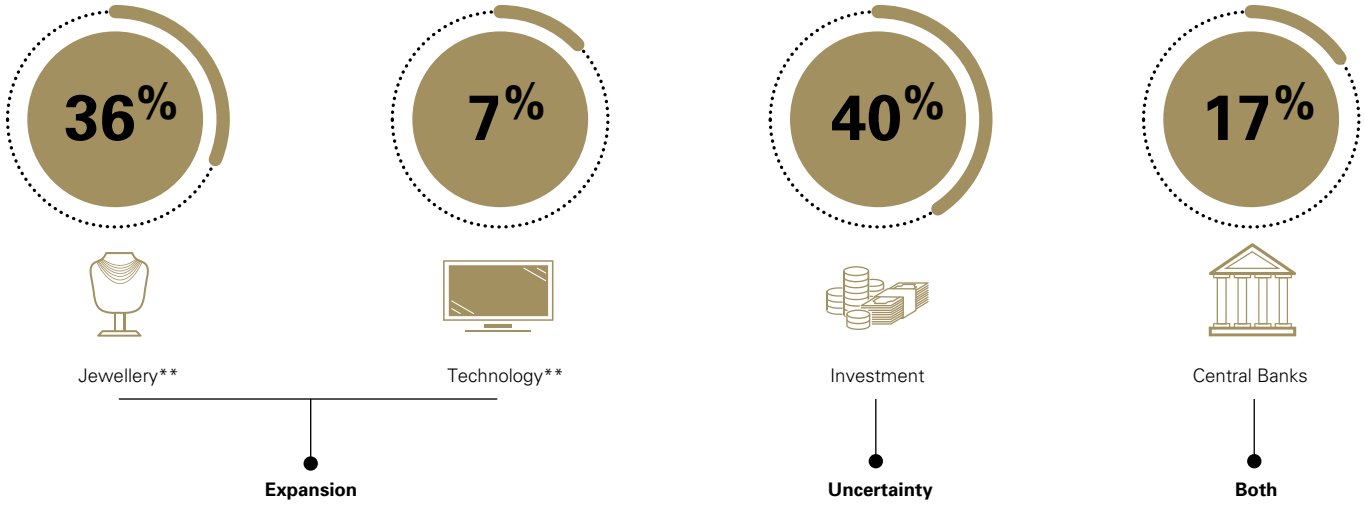
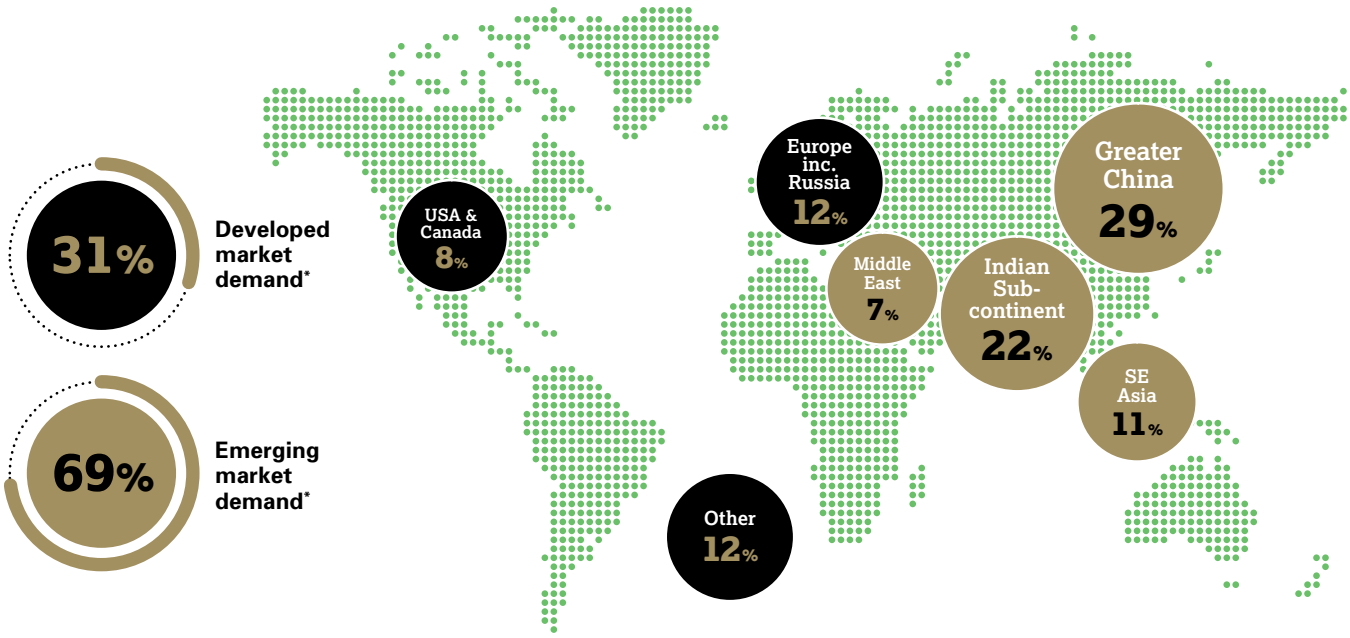


Chart 18(b): Gold demand is geographically diverse, but 72% comes from emerging markets, with China and India representing 50% of all demand.*



*Computed using 10-year average annual demand from 2012 to 2021. Regional breakdown excludes central bank demand due to data availability. Includes: jewellery and technology net of recycling, in addition to bars and coins, ETFs and central bank demand which are historically reported on a net basis. It excludes OTC demand. Figures may not add up to 100% due to rounding.

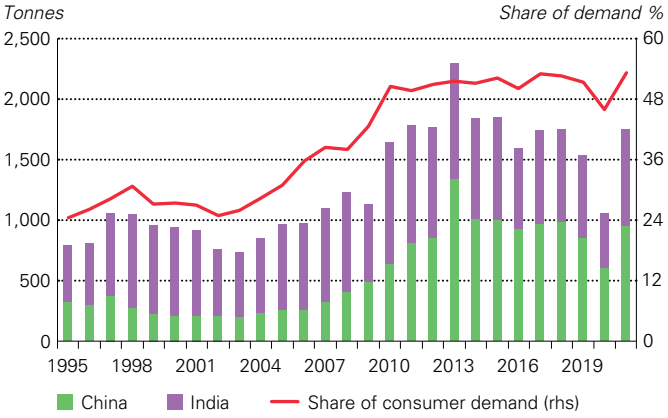
**Net jewellery and technology demand computed assuming 90% of annual recycling comes from jewellery and 10% from technology.

Source: Bloomberg, Company Filings, ICE Benchmark Administration, Metals Focus, Refinitiv GFMS, World Gold Council

Major trends have reshaped gold demand

Consumer demand is fuelled by transformational economic growth in China and India. In the early 1990s China and India accounted for 25% of global gold demand. Today, increased wealth has boosted their joint share to 54% (**Chart 19**).[33] Expansion of wealth is one of the most important drivers of gold demand over the long run, fuelling jewellery consumption, investment in technology and the acquisition of gold bars and coins.[34]

Chart 19: India and China have doubled their gold market share in less than two decades
Emerging market economic development has created consumer demand and increased market share in India and China*



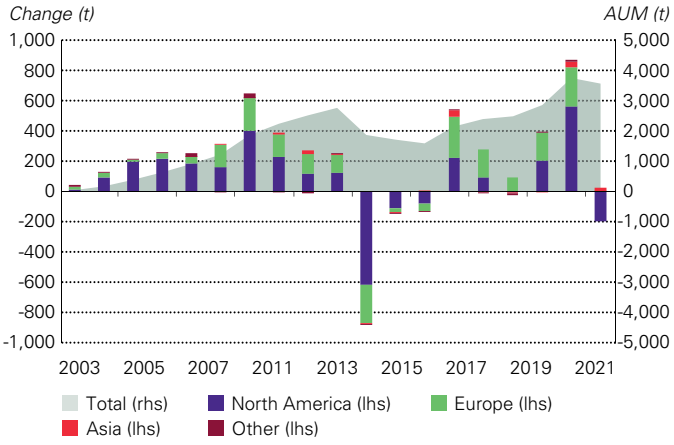
*As of 31 December 2021. Consumer demand is defined as the sum of jewellery, bar and coin demand.

On Goldhub.com see: **Gold Demand Trends**

Source: Metals Focus, Refinitiv GFMS, World Gold Council

Among institutional and retail investors the **introduction of gold-backed ETFs** and similar products has had a material impact on the demand for and exposure to gold. By the end of 2021, gold ETFs had amassed approximately 3,570t of gold, worth US$209bn, since they were first launched in 2003 (**Chart 20**).[35] The recent growth is particularly pronounced in Europe, where market share has neared levels on par with North America, a sign of global acceptance. Additionally, gold ETFs have become a larger component of overall investment demand in China and India (see: Global gold ETFs: A popular gateway to the gold market).

Chart 20: Gold-backed ETFs have introduced new investors to gold across the world
Annual ETF gold demand and cumulative holdings*



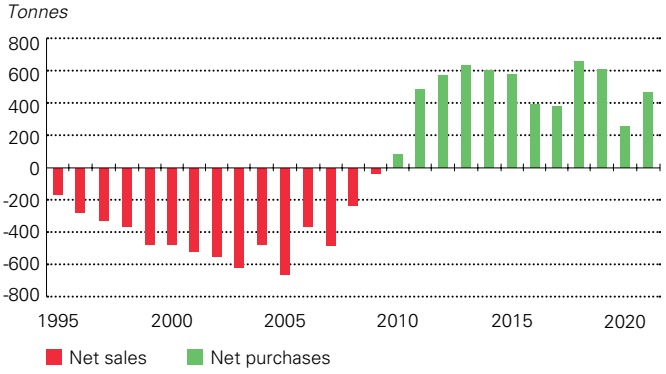
*As of 31 December 2021. Includes gold-backed ETFs and similar products.

On Goldhub.com see: **Global gold-backed ETF holdings and flows**.

Source: Bloomberg, Company Filings, World Gold Council

Central bank demand transformed in recent years. Reserve managers have been net buyers of gold since 2010 and, more recently, have bought multi-decade record amounts of gold, using the asset to diversify their foreign reserves (**Chart 21**).

Chart 21: Central banks have been a steady net source of demand since 2010, led by emerging markets
Net global central bank gold demand*



*As of 31 December 2021.

On Goldhub.com see: **Monthly central bank statistics**

Source: Metals Focus, Refinitiv GFMS, World Gold Council

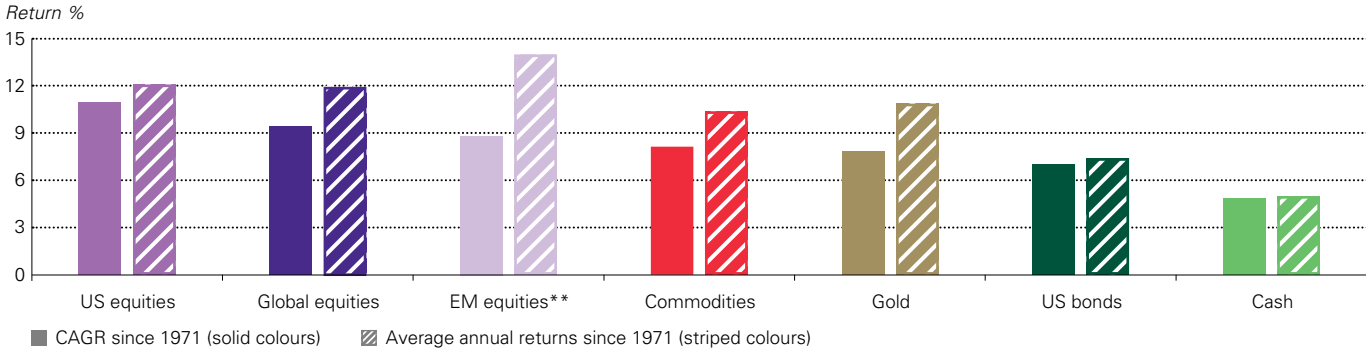
33 As of 31 December 2021.

34 Ibid.

35 As of 31 December 2021.

Appendix II: Long-term gold performance

Chart 22: Gold returns have been on par with equities and above bonds since the end of the gold standard
Compounded annual growth rate (CAGR) and average annual returns for major asset classes*



* Data from 1 January 1971 to 31 December 2021. Return computations in US dollars for 'cash': ICE 3-month Treasury; 'US bonds': Bloomberg Barclays US Bond Aggregate, 'US equities': MSCI Daily TR Gross USA USD; 'Global equities': MSCI World Net Total Return; 'EM equities': MSCI Daily TR Gross EM USD; 'commodities': Bloomberg Commodity Index; 'gold': LBMA Gold Price PM. CAGR is defined by the price of the asset at the ending period, divided by the beginning price value raised to the (1/n) years minus 1. Average annual returns are calculated as the arithmetic mean of y-o-y returns over the time horizon.

** Emerging market returns based on available data beginning in January 1988.

On Goldhub.com see: **Gold returns**.

Source: Bloomberg, ICE Benchmark Administration, World Gold Council

Additional reading

We include below a list of publications by the World Gold Council that discuss relevant aspects of gold for investors:

Market and Investment Updates

- *Gold 2021 outlook,* January 2022
- *Global gold-backed ETF holdings and flows,* January 2022
- *Increased appetite for less liquid investments strengthens the case for gold,* December 2021
- *Stagflation rears its ugly head,* October 2021
- *Gold: the most effective commodity investment,* August 2021
- *Time to realise gold's true volatility,* May 2021
- *Beyond CPI: Gold as a strategic inflation hedge,* April 2021
- *Rates pose risks but also unlock opportunities for gold,* April 2021
- *Gold and cryptocurrencies: How gold's role in a portfolio differs from cryptos',* February 2021
- *Gold and central bank reserve management during the COVID-19 pandemic,* May 2020
- *Gold supply chains show resilience amid disruption,* May 2020
- *Gold, an efficient hedge,* April 2020
- *It may be time to replace bonds with gold,* October 2019

Gold Demand Trends

- *Full year and Q4 2021,* January 2022
- *Third quarter 2021,* October 2021
- *Second quarter 2021,* July 2021
- *First quarter 2021,* April 2021

In-depth reports

- *Gold and climate change: Decarbonising investment portfolios,* September 2021
- *Gold and climate change: The energy transition,* December 2020
- *Global gold ETFs: A popular gateway to the gold market,* November 2020
- *Gold and climate change: Current and future impacts,* October 2019
- *A Central Banker's Guide to Gold as a Reserve Asset – 2019 edition,* September 2019
- *Gold 2048: the next 30 years for gold,* May 2018
- *Enhancing the performance of alternatives with gold,* February 2018

Gold Investor

- *The role of gold in a volatile world,* August 2020
- *Lombard Odier CIO Viewpoint: The case for holding gold,* August 2020
- *Cash down, gold up: Ken Rogoff on the value of gold on a cashless society, Gold Investor,* February 2019
- *The curse of cash and the allure of gold,* February 2019

Primers

- *Central banks,* March 2020
- *China's gold market,* March 2020
- *Gold prices,* May 2018
- *Mine production,* May 2018
- *Gold-backed ETFs,* May 2018
- *Recycling,* May 2018

About the World Gold Council

The World Gold Council is the market development organisation for the gold industry. Our purpose is to stimulate and sustain demand for gold, provide industry leadership, and be the global authority on the gold market.

We develop gold-backed solutions, services and products, based on authoritative market insight and we work with a range of partners to put our ideas into action. As a result, we create structural shifts in demand for gold across key market sectors.

We provide insights into the international gold markets, helping people to understand the wealth preservation qualities of gold and its role in meeting the social and environmental needs of society.

Based in the UK, with operations in India, China, Singapore and the USA, the World Gold Council is an association whose members comprise the world's leading and most forward thinking gold mining companies.

For more information

Research and Strategy

Adam Perlaky
adam.perlaky@gold.org
+1 212 317 3824

Bharat Iyer
bharat.iyer@gold.org
+1 212 317 3823

Krishan Gopaul
krishan.gopaul@gold.org
+44 20 7826 4704

Johan Palmberg
johan.palmberg@gold.org
+44 20 7826 4786

Juan Carlos Artigas
Head of Research
juancarlos.artigas@gold.org
+1 212 317 3826

Louise Street
louise.street@gold.org
+44 20 7826 4765

Mukesh Kumar
mukesh.kumar@gold.org
+91 22 317 3826

Ray Jia
ray.jia@gold.org
+86 21 2226 1107

John Reade
Chief Market Strategist
john.reade@gold.org
+44 20 7826 4760

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World Gold Council
7th Floor, 15 Fetter Lane
London EC4A 1BW
United Kingdom

T +44 20 7826 4700
F +44 20 7826 4799
W www.gold.org

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