



## Central bank foreign currency reserves management

### Revival of gold as a reserve asset

This document is intended only for Professional Clients and Financial Advisers in Continental Europe (as defined in the important information); for Qualified Investors in Switzerland; for Professional Clients in Dubai, Jersey, Guernsey, Isle of Man, Ireland and the UK, for Institutional Investors in the United States and Australia, for Institutional Investors and/or Accredited Investors in Singapore, for Professional Investors only in Hong Kong, for Qualified Institutional Investors, pension funds and distributing companies in Japan; for Wholesale Investors (as defined in the Financial Markets Conduct Act) in New Zealand, for accredited investors as defined under National Instrument 45-106 in Canada, for certain specific Qualified Institutions/Sophisticated Investors only in Taiwan and for one-on-one use with Institutional Investors in Bermuda, Chile, Panama and Peru.

# 06

In our sixth whitepaper, we examine gold as a reserve asset. Looking back over the modern era, gold has delivered positive returns under various macroeconomic regimes including high inflation, deflationary financial collapses, balanced growth and “garden-variety” recessions - suggesting that gold can and does perform an important diversifier role in reserve portfolios. Financial innovation - notably gold ETFs - and new technologies under the so-called “Fourth Industrial Revolution” - notably crypto-currencies - are also important considerations.



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**Arnab Das**

Global Market Strategist, EMEA

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**Jennifer Johnson-Calari**

JJC Advisory

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**Adam Kobor**

Director of Investments,  
New York University Endowment Fund

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**Abstract**

The role of gold in central bank reserve management has undergone a sea change over the last decade. Before 2008, developed market (DM) central banks were divesting gold stocks and emerging market central banks were largely indifferent to gold, instead building up or using dollar reserves to defend mainly dollar currency pegs. But the last decade encompassed severe turbulence in the international system - the Global Financial Crisis of 2008, the Eurozone Financial Crisis of 2010-12 and a significant rise in geopolitical and geo-economic tensions since Russia's annexation of Crimea and US use of dollar financial sanctions. Since these serial geopolitical and geo-economic crises, developed market (DM) central banks have stopped selling down gold reserves, and emerging market central banks have been actively accumulating gold.

The time is clearly ripe for a rethink about the role of gold as a reserve asset. Looking back over the modern era, we show that gold has delivered positive returns under various macroeconomic regimes including high inflation, deflationary financial collapses, balanced growth and "garden-variety" recessions - suggesting that gold can and does perform an important diversifier role in reserve portfolios. Financial innovation - notably gold ETFs - and new technologies under the so-called "Fourth Industrial Revolution" - notably crypto-currencies - are also important considerations. We expect ETFs to play an increasingly important role in tactical portfolio management as they can provide liquidity, discretion and less political exposure. We also expect geopolitical tensions, and the persistence of a geo-economic backdrop of low growth accompanied by a prolonged period of low interest rates and easy monetary conditions. This would reduce the opportunity cost of holding gold, supporting the use of gold as a diversifier in official reserves.

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- I. **Gold's role in the international monetary system and reserves**
- II. **Safety and liquidity objectives**
- III. **Capital preservation, portfolio impact and market dynamics**
- IV. **Looking ahead: financial technology, currency diversification and de-dollarization**

## I. Gold's evolving role in the international monetary system

Gold was the centre of the international monetary system for millennia and the advent of international acceptance of a fiat currency, untethered to gold or silver, is a fairly recent phenomenon, dating back only to 1973 and the break-down of the Bretton Woods system.<sup>1</sup> Under the Gold Standard, from the 19<sup>th</sup> through the first half of the 20<sup>th</sup> century, major countries' national currencies were accepted for settlement and reserves but only when backed by the issuing government's commitment to convert its notes into gold at a predetermined price.<sup>2</sup> With the depletion of gold stocks in the UK and Europe after two World Wars, the USD, backed by the government's gold stock, emerged as the global hub of the international monetary system. Under the Bretton Woods system of 1944 the US government fixed the USD to gold at the set price of \$35/oz and other governments fixed their currencies to the USD.

The US had emerged from WWII as the political, economic and military leader of the democratic world. Its global leadership, characterized as "benign hegemony", was generally - though not always - marked by a multi-lateral approach of consultation and commitment to economic and political stability. Hence, when President Nixon de-linked the USD from gold in 1973, most other countries continued to anchor their

currencies and monetary policy to the US and accept US government securities as the main component of their international reserves—partly because there was no real alternative, and partly because occasional US macroeconomic excesses or policy errors were usually reversed in due course.<sup>3</sup> Moreover, US Treasuries generated strong investment returns from 1981 onwards as the Federal Reserve (Fed) wrung inflation from the system and the government bond market rallied with high real interest rates and price appreciation. Relative to the income generated from bonds, gold appeared a poor alternative and was dubbed a historic relic. Developed market (DM) central banks began to sell gold in the 1990's. To minimize potential market disruption, 21 central banks signed the Gold Accord to manage their divestment through coordinated sales.

The Great Financial Crisis (2007-2008), emanating from the US financial system, was the first crack in the sanctity of the USD as the centre of the international monetary system and classification of US government and agency securities as "risk-free" assets. In 2008, DM central banks ceased divestment and the Gold Accord was allowed to expire in 2019, an indication that future sales were not anticipated. At the same time, EM central banks began to invest substantially in gold to reduce their exposure to the US financial system and, somewhat later, to US political risk.

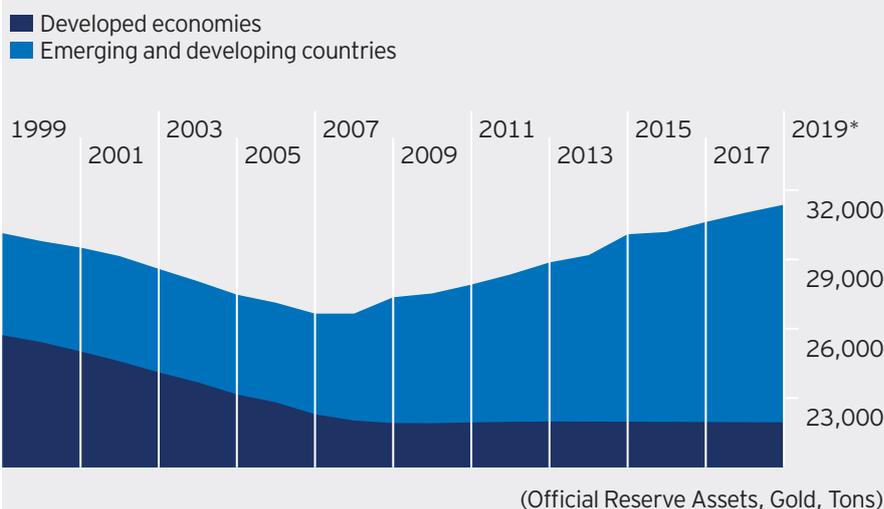
EM central banks generally held little gold as part of their reserves for historic reasons. When the GFC hit, however, many were better positioned to be able to diversify into gold because of two shifts in the international monetary system that had occurred during the previous decade. First, EM countries built foreign currency reserves both in outright terms and relative to reserve adequacy benchmarks to reduce financial vulnerability. Second, many EM countries abandoned fixed exchange rate pegs for either a floating or managed floating exchange rate regime. Consequently, such central banks were no longer required to stand ready to defend a fixed rate peg at all time. With higher and more stable levels of reserves, EM central banks had the space to invest in long-term assets such as gold.

While the gap has been closing, gold holdings as a share of total reserves differ sharply between DM and EM central banks. DM central banks still hold, on average, 24% of foreign currency reserves in gold, reflecting gold's historic role in the international monetary system. This contrasts with EM central banks that hold on average 8% of reserves in gold, although the average masks a wide range from zero to 50% (calculation internal, as at 30 September 2019).

Figure 1

### Central bank gold purchases/sales (2000-2019)

EM central banks begin accumulating gold in 2008 as DM banks ceased selling

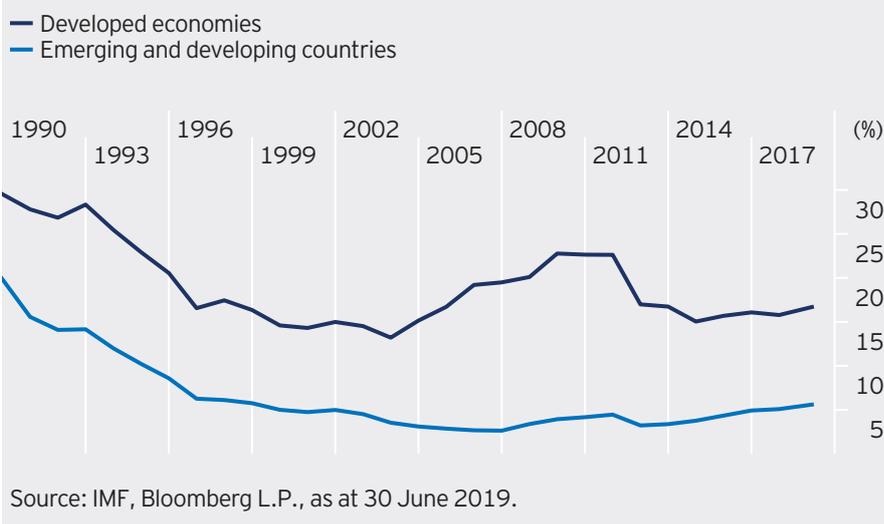


Source: IMF, Bloomberg L.P., as at 30 June 2019. \* Q2 2019.

Figure 2

### Gold as a share of total foreign currency reserves (1990-2019)

DM central banks still hold substantial gold reserves relative to EM countries

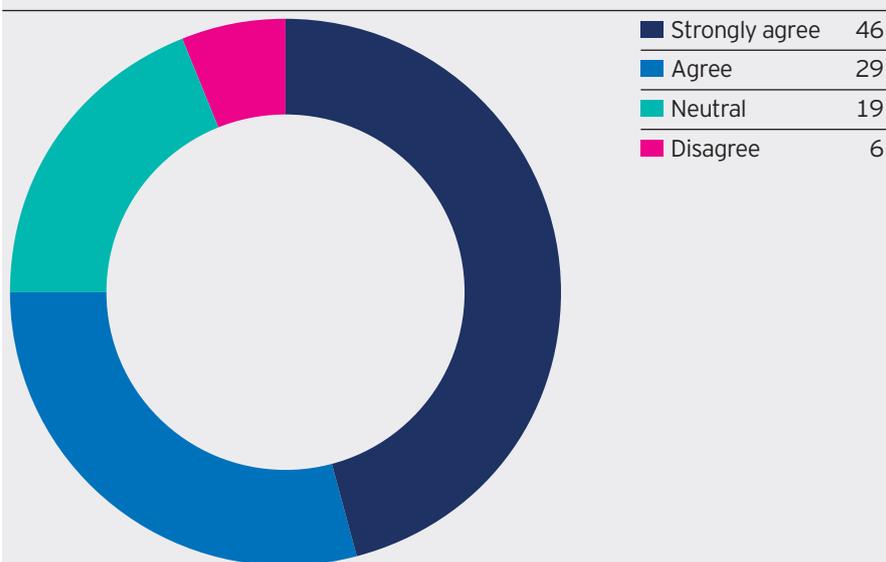


Source: IMF, Bloomberg L.P., as at 30 June 2019.

## II. Meeting safety and liquidity objectives

A country holds foreign currency reserves as a war chest against future uncertainties. Unlike financial assets, the safety of gold is very much tied to its physical location—the country, impregnability of the vaults and transportation risk. Following the period of the two World Wars, central bankers tended to safeguard their gold holdings in vaults abroad—mainly with the Federal Reserve Bank of New York (FRBNY) and the Bank of England (BOE). Over the last few years, several central banks have begun to repatriate their gold. Specifically, over the three years ending in 2020, the central banks of Germany, Austria, Hungary, Poland and the Netherlands will have repatriated half or more of their gold stocks from their foreign central bank custodians. In the case of Hungary and Poland, this has been accompanied by an increase in gold holdings of 26 tonnes and 126 tonnes, respectively. Such actions are virtually unprecedented since WWII and may be part of the broader global trend away from multilateralism towards more nationalist policies. In the context of safety and liquidity, repatriating physical gold to local vaults might improve perceived credit risk but decreases fungibility and liquidity.

Figure 3  
**2019 Invesco Central Bank Survey**  
 Most central bankers considered gold sales to bear political risk



Source: Invesco Global Sovereign Asset Management Study 2019, 31 March 2019.

Physical gold is nobody's liability and thus bears no credit risk. When deposited in an unallocated account at a bullion bank, however, the central bank would be exposed to the credit risk of the financial institution. In an allocated account – whether with a central bank or bullion bank – the custodian acts in a fiduciary role and the central bank owns specific, numbered bars with no credit exposure. In an unallocated account, however, the central bank owns a deposit bearing the same credit risk as a current account or other bank liability.

Physical gold is quite liquid. In 2019, average daily trading volumes for physical gold in the London OTC market were \$79 bn – a multiple of German Bund, JGB and UK Gilt average daily turnover.<sup>4</sup> Nevertheless, central bankers on the whole do not consider physical gold as part of their liquidity because of the political sensitivity around the sale of a country's gold. Invesco's 2019 survey of sovereign investors revealed that three-quarters of central banks surveyed considered the sale of gold to be politically sensitive.<sup>5</sup>

While the outright sale of gold is perceived to incur political risk, central banks can and do mobilize gold liquidity through the swap market. Bullion banks arrange gold swaps versus USD or other currencies for various terms based on standard ISDA contracts and provided the gold meets specific

location, physical and quality standards. Generally, the gold must be in the form of London Good Delivery Bars and deposited with a bullion bank. As an example, the Sveriges Riksbank swapped its gold during the GFC to provide short-term USD liquidity to the domestic banking sector in lieu of selling assets during a financial crisis.

### Box 1 **Gold swaps and standard conditions**

Central banks can swap gold for USD for various terms either for liquidity management, whereby the central bank "sells" gold for USD with an agreement to "repurchase" at a future date; or as a collateralized deposit, whereby the central bank invests USD and receives gold collateral. Gold swaps are governed by the conditions set out in standard ISDA gold swap agreements and agreed margining requirements.

Under the standard ISDA swap agreement, gold must be held in the form of London Good Delivery Bars (LGB) and in an unallocated account. The gold "repurchased" under the swap agreement is identical in value and fineness to the gold sold but may not be the identical numbered gold bars sold under the swap. Regulations under some central bank jurisdictions would preclude swaps because of the possibility of substitution of bars.

### III. Capital preservation, portfolio impact and market dynamics

When assessing capital preservation, we considered the return on gold over discrete economic cycles from 1973 onwards. Over each of these economic cycles, we found that gold's annualised returns were positive both in real and nominal terms. During periods of balanced economic growth, gold generated positive returns although relatively lower than risk assets. During periods of inflation—whether due to overheating economic conditions or stagflation—gold performed relatively better than both government bonds and credit due to inflation's erosion of the real value of bonds. From a relative perspective, gold performed best under periods of stagflation, reflecting investors' risk aversion as well as the impact of inflation on bond values. And, during recessionary periods, gold generated relatively high real returns alongside fixed income—whether investment grade credit or government—due to declining bond yields.

While gold achieved positive annualised returns since 1973, when the price of gold was allowed to float, this has come with considerable short-term price volatility. Over the past ten years, annualised price volatility of 17% was more comparable to equities than to bonds. Since 1973, gold delivered a negative return during 41% of calendar years with an average loss during negative years of -10.7%, and had an annual Value at Risk, (95% confidence level) of -23.6% during this period<sup>6</sup>. For this reason, gold tends to be considered a long-term asset and strategic component of international reserves.

As depicted in Figure 4, gold generated positive returns over both expansionary and recessionary cycles—unlike other financial assets that tended to be pro or counter-cyclical. This rather unique behaviour can be understood by examining the drivers of demand. As can be seen below, demand is split fairly evenly between consumption – as represented by the jewellery and technology sectors—and savings/investment—as represented by central bank purchases, ETFs and physical gold. During expansionary periods, consumption demand for gold increases. And during periods of financial shock or recession, demand is driven by its status as a 'safe haven' asset.

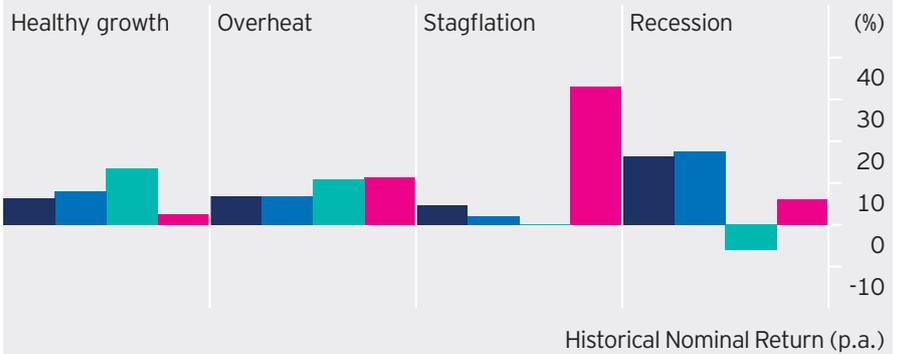
Figure 4\*

#### Annualised asset class returns during discrete economic cycles (USD)

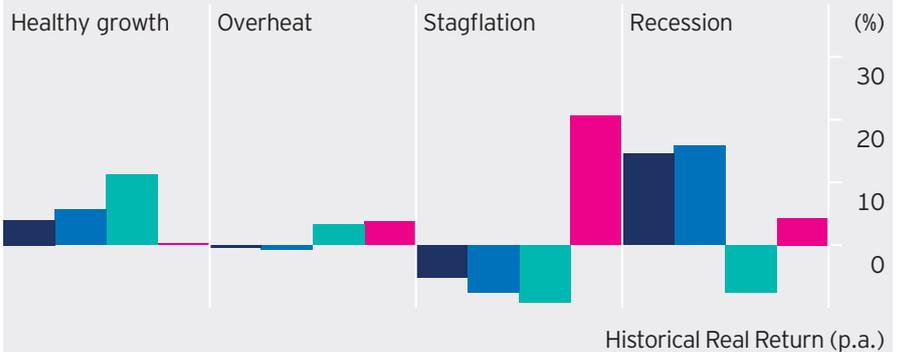
Gold preserves capital in both expansionary and contractionary cycles (1973-2019)

■ US Treasuries ■ US Equities  
■ US IG Credit ■ Gold

#### Nominal returns (USD)



#### Annualised real returns (USD)



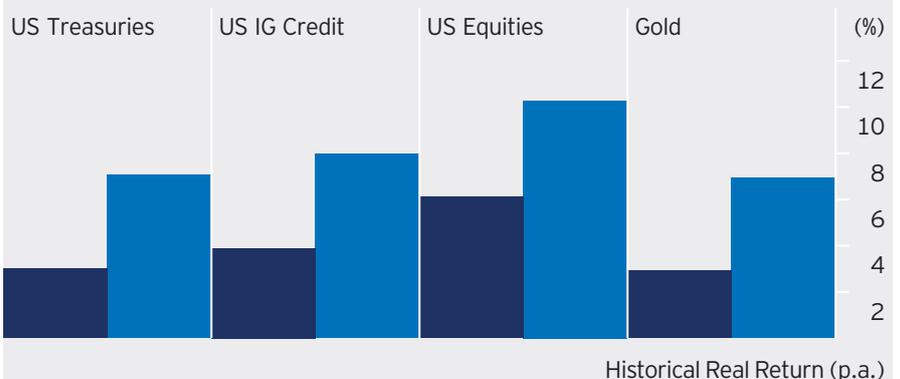
Source: Bloomberg L.P., internal calculations. 31 December 1972 - 30 September 2019.

**Past performance, actual or back-tested, is not a guarantee of future results.**

Figure 5\*

#### Long term annualised asset class returns (USD)

■ Real; 1973 to 2019Q3  
■ Nominal; 1973 to 2019Q3



Source: Bloomberg L.P., internal calculations. US Treasuries: Bloomberg Barclays (BBG BARC) US Treasury Index; IG Credit: BBG BARC US Credit Index; US Equities: S&P500 Index and Gold: Bloomberg "GOLDS Comdty". **Past performance, actual or back-tested, is not a guarantee of future results.** 31 December 1972 - 30 September 2019.

Figure 6

**Gold demand by sector: 2019<sup>7</sup>**

Demand is fairly evenly divided between savings and consumption motives



Jewellery	42
ETFs	23
Central Bank	14
Bar and Coin	14
Technology	7

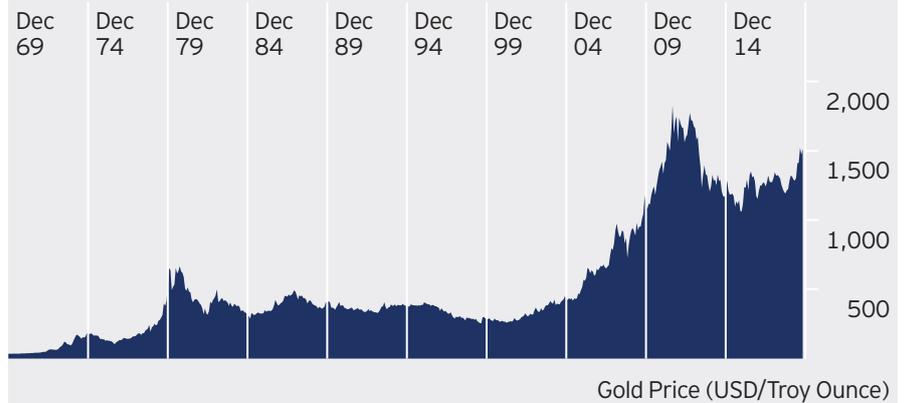
Sources: Metal Focus, World Gold Council. As at 30 September 2019.

Historically, one can see both forces at play in Figure 7 depicting gold price changes over the last fifty years. From 2000 through 2019Q3, gold prices increased four-fold-driven by strong economic growth in China and India, both constituting a major share of the gold jewellery market. One can also observe twin peaks where gold acted as a hedge against financial uncertainty and tail risks. The first spike occurred in 1979 when demand for gold increased in the face of rampant inflation, following poor macro-economic policies in the US and the second oil shock. The second spike occurred in 2008, when investors again bought gold amidst the collapse of financial institutions and deflationary fears of the Great Financial Crisis.

Figure 7

**Gold price**

Gold demand is driven by both consumption and hedging against tail events



Source: Bloomberg L.P. 31 December 1969 - 30 September 2019.

As a financial asset, the direction, level of, and changes in real interest rates can affect the price of gold. During declining and low levels of real interest rates, gold prices tend to be well supported for two reasons. Declining interest rates are typically associated with recessionary conditions and higher risk aversion, which can increase the demand for gold as a safe haven. Secondly, when interest rates are low, the relative difference in carrying cost between gold and government bonds diminishes. When interest rates on government bonds turn negative, as is currently the case for most Eurozone, Swiss and JPY government bonds, the traditional relationship may invert with government bonds actually incurring a higher carrying cost than gold custodian fees.

A study of the historical relationship between real interest rates and gold prices supports the contention that gold prices are negatively correlated with real interest rates and are well supported when real rates are low. This relationship is illustrated in Figure 8 where the 10-year real rate implied by Treasury Inflation Protected bonds (TIPs) is inverted on the right hand scale and the price of gold is charted on the left hand scale. Over the entire period, the correlation between the change in real interest rates and gold prices was negative 0.42.

Figure 8

**Gold price and real interest rates**

Gold price tends to rise with falling and low real interest rates

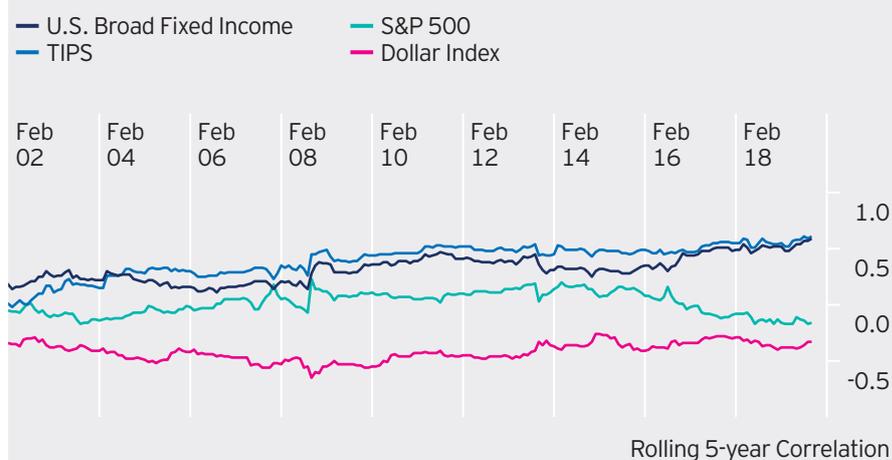


Source: Bloomberg L.P., internal calculations. 31 January 1999 - 30 September 2019; Bloomberg "GOLDS Comdty".

While central banks typically view gold as a long-term asset, rather than as part of the strategic asset allocation, it is nevertheless instructive to assess the impact of gold on the reserves portfolio as a whole. From the perspective of currency composition, the price of gold is negatively correlated (-0.43) to the value of the USD and so diversifies exposure to the USD when measured in terms of a trade-weighted basket of international currencies<sup>8</sup>. For those central banks investing in equities, the addition of gold improved portfolio outcomes because of the negative correlation between equities and gold. Gold is less of a diversifier for broad fixed income (as illustrated in Figure 9). Managers of more conservative reserves portfolios might want to pay particular attention to whether the diversification benefits of increased gold holdings outweigh the increased downside risk resulting from higher gold volatility, especially when core short duration bond holdings may already have very low or negative yields.

For those central banks investing in equities, the addition of gold improved portfolio outcomes because of the negative correlation between equities and gold, as shown in the Table I of the Endnotes.

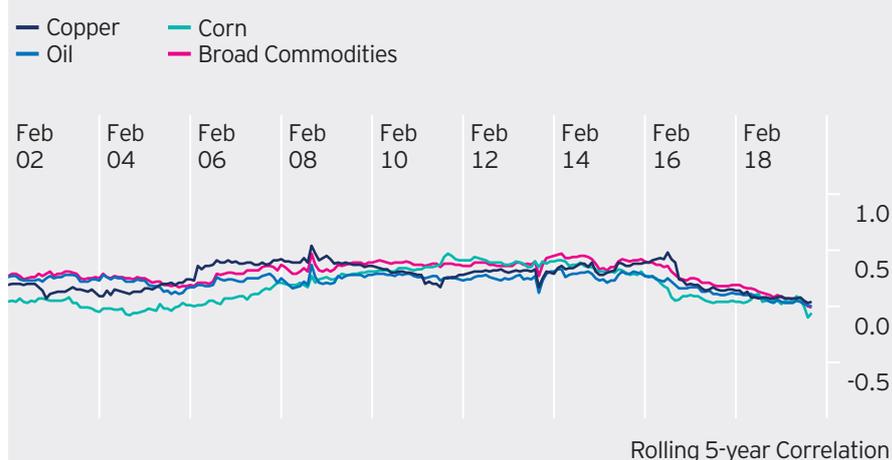
Figure 9  
**Historical correlation across reserve assets**  
Gold diversifies USD and equity risk



Source: Bloomberg L.P., Internal calculations. U.S. Broad Fixed Income: Bloomberg Barclays U.S. Aggregate Index; S&P 500: S&P 500 Index; TIPS: Bloomberg Barclays U.S. Government Inflation-Linked All Maturities Index; Dollar Index: ICE USDX U.S. Dollar Index. 31 January 2002 - 30 September 2019.

Countries hold reserves to provide a buffer against domestic weakness or crises as well as global instability. Such weakness may emanate from the global commodity market for both importers and exporters of commodities—whether metals or agricultural goods. As illustrated below, the correlation between gold and commodities—whether hard or soft—ranged from zero to about positive 0.5 over the past two decades. For countries dependent on commodity exports, the correlation between gold and commodities is salient to avoid “doubling up” on economic risk and financial risk in the reserves portfolio. On the other hand, an allocation to gold could benefit countries dependent on commodity imports to the extent that there is a positive correlation in price changes between gold and key imports.

Figure 10  
**Historical correlation with commodity prices**  
Gold has a relatively low correlation with other commodities



Copper: S&P GSCI Copper Spot Index; Oil: US Crude Oil WTI Cushing OK Spot; Corn: USDA Illinois North Central No. 2 Yellow Corn Spot Price; Broad Commodities: S&P GSCI Index Spot. S&P GSCI Index Spot CME. The S&P GSCI is widely recognized as a leading measure of general commodity price movements; the index is calculated primarily on a world production weighted basis, comprised of the principal physical commodities futures contracts. 31 January 2002 - 30 September 2019

## IV. Trends: financial technology and dollar diversification

Central banks have traditionally invested in physical gold and held it as a structural reserve rather than managing it as part of the broader portfolio because of the potential “headline” risk associated with selling a country’s gold. With changes in financial technology, however, reserve managers can tactically manage gold exposure through gold exchange-traded funds (ETFs). In most cases, owning gold ETFs is equivalent to holding physical gold as nearly all gold ETFs are backed by numbered gold bars and held in allocated accounts with central banks or other custodians. When backed, there would thus be no credit exposure to financial instruments or institutions, unlike gold deposits or futures. Liquidity, however, would currently be an impediment for large positions. Daily aggregate ETF flows averaged \$2.5 bn for gold ETFs<sup>9</sup> in September 2019 across multiple products, compared to \$79 bn in the physical gold OTC market. The trend, however, is up. Since their introduction in 2003, gold ETFs have been steadily increasing their size and share of the gold investment market.

Financial technology is likely also to affect market dynamics going forward. Savers in countries experiencing financial repression or high inflation, such as India and China, have bought jewellery in the past for both investment and consumption motives. With financial technology, individual and smaller institutional investors can purchase gold through ETFs and even over mobile apps. In China, a popular mobile app, WeGold, allows millions of individuals to buy, sell, save or gift gold shares backed by physical gold in amounts as small as a fraction of a gram.

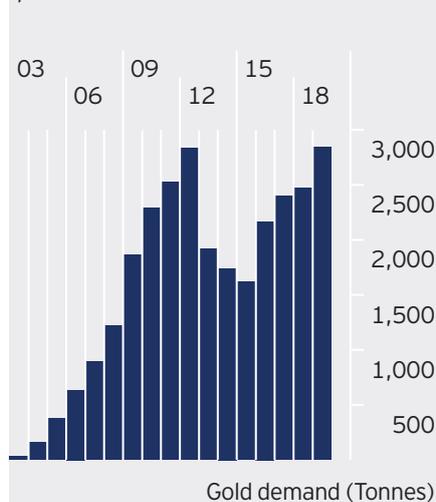
Another trend that may be affecting current market dynamics is currency diversification—whether for economic or political reasons. From an economic perspective, the currency composition of international reserves broadly reflects the relative importance of country contributions to the global economy and trade over long periods. While the US share of the global economy has diminished since 2000, foreign currency reserves have remained predominantly invested in USD due mainly to the quality and depth of US capital markets. Potential alternative reserve currencies, including EUR, GBP and RMB, all have substantially lower levels of daily liquidity as well as other challenges, which have for now stymied any significant diversification of reserves away from the USD.<sup>10</sup> The accumulation of gold stocks since 2008 may thus in part reflect a diversification away from the USD in a world of limited alternatives as both the USD and gold act as ‘safe haven’ assets, rallying during periods of financial stress.

From a geo-political perspective, countries targeted by US economic or financial weaponization through sanctions and tariffs have taken aggressive actions to “de-dollarize”—reducing holdings of US government securities and increasing central bank investment in gold as well as other currencies. Specifically, Russia, China and Turkey, all of which have been targeted by either sanctions or tariffs, together represented 70% of central bank net gold

purchases from 2016 to 2019. From a regional perspective, most of the countries adding to gold stocks over the last three years are from Eastern Europe, Central and East Asia and are either economically integrated or politically allied with Russia or China. As depicted in Figure 12, the three countries targeted by sanctions have represented the largest share of central bank buying of gold but at a diminishing rate as 26 other countries added to gold stocks over the last two years<sup>11</sup>.

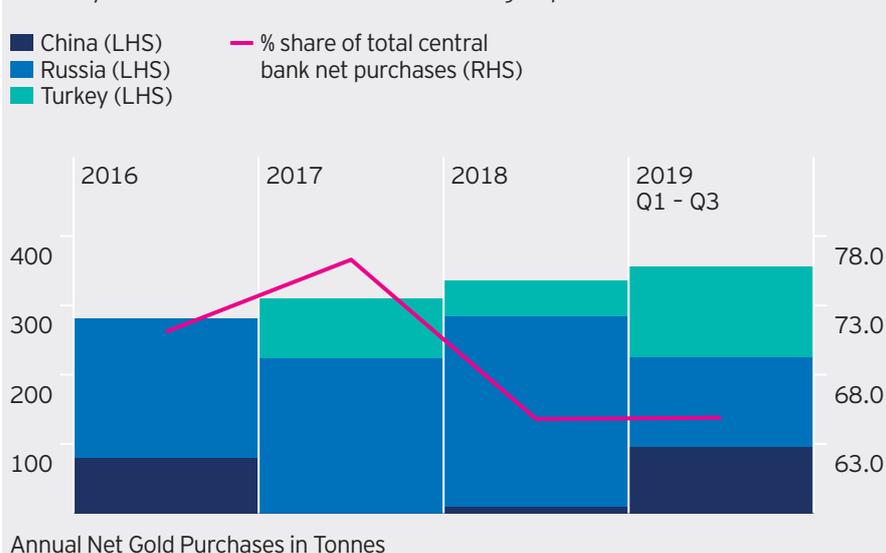
Crypto-currencies have been suggested as a possible new reserve asset in place of gold. Indeed, some leading crypto currencies have adopted the language of mining in describing its functioning. Like gold, crypto-currencies do not represent national liabilities and are thus not vulnerable to sovereign risk—whether from geopolitics, inflation or devaluation due to public debt or deficits or central bank policies. They are, however, subject to hacking and well-publicized incidents have occurred where money in “digital wallets” simply disappeared with no ability to trace the incident because of the very decentralized and anonymous structure that makes crypto-currencies so attractive to many. Because of this lack of oversight, it is unlikely that central banks will hold international reserves in crypto currencies. We would instead expect central bank digital currencies to play a rising role in domestic monetary and financial systems but these differ from paper currency in form rather than substance.

**Figure 11**  
**Gold held by ETFs (Tonnes)**  
Gold ETFs are an increasingly important part of the investment market



Source: World Gold Council, as at 30 September 2019.

**Figure 12**  
**Central bank gold purchases: China, Russia, and Turkey<sup>12</sup>**  
Currency diversification has led to an increase in gold purchases



Source: IMF, Bloomberg L.P. 1 January 2016 - 30 September 2019.

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## V. In Conclusion

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Gold is making a come-back as an international reserve asset, with a growing number of central banks adding gold over the past decade at an accelerating rate, alongside increased demand by private investors. The phenomenon of central bank reserve diversification into gold has so far been led by EM central banks, which have long been overweight US dollar reserve assets relative to global trade flows and underweight gold relative to developed economies. The desire to reduce USD exposure has also been driven by geopolitical tensions and the increasing use of US dollar sanctions by the US Administration. Global macroeconomic and financial factors have also played a major role, especially the persistence of low growth, low inflation and accordingly, ultra-low real interest rates or even negative nominal rates on many reserve assets. These factors reduce the opportunity cost of carrying gold, a zero-yielding asset with management costs.

Despite concerted selling by DM central banks up to 2008, gold appreciated in value in real terms due to diversified sources of demand across savings and consumption. Our analysis shows that gold delivered positive annualised real returns across different macroeconomic regimes, including during: (i) the Great Inflation following the break-down of the Bretton Woods system in 1973; (ii) the Great Moderation thereafter and (iii) periods of more balanced growth. Gold also provided protection against tail risks especially during high inflation episodes and deflationary financial collapses, as well as ordinary recessions and periods of geopolitical stress. We attribute this performance to the unusual, multi-faceted nature of the demand for gold for consumption, production and savings.

The role of new financial technologies in driving the use of alternative currencies is an important consideration in the diversification of reserves from traditional fiat reserve currencies. Financial innovations like gold ETFs mitigate the political constraints around central bank gold sales and allow central banks to manage gold exposure more tactically as part of the broader strategic asset allocation. We would expect this shift to become an increasingly important part of the central bank reserve management toolkit, based on our expectations that gold will continue to play a rising diversifier role in international reserves.

Looking forward, we expect the global political and economic environment to continue to support the gold price as well as demand for central bank reserve diversification. The current movement towards a reprieve in US-China trade friction notwithstanding, the threats of higher trade and investment barriers, the weaponization of the dollar through sanctions, Mid-East tensions and economic, technological and geo-strategic rivalry among great powers seem likely to persist well beyond the current US administration. The global financial environment should also remain supportive of the gold price, because accommodative monetary policy and low market interest rates seem very likely to persist, based on a combination of the deceleration in the current global cyclical expansion and a structural decline in potential global growth.

For all of these reasons, we expect gold to maintain its role as an important official reserves diversifier and expect central banks to continue to accumulate gold stocks as an alternative to excessive concentration in fiat currency reserves, sovereign risk and financial counter-party credit risks. In addition, the policy debate among major central banks and governments about excessive reliance of the international financial system on a single currency is likely to spur the desire for alternatives to the dollar. All that said, however, we would not expect the return of an international or major domestic monetary system centred on gold or a single, international currency because of the large sizes of financial systems in all major economies and the associated, clear need for discretionary monetary policies. A more diversified international monetary system seems more likely than the direct replacement of the dollar by another single national currency. Gold is thus likely to continue to play an important role in the international financial system as a 'safe haven', reversing earlier expectations for its demise.

## Endnote

Table 1  
**Impact of adding 10% gold to a diversified portfolio**  
 Risk and Return: 1999-2019

<b>USD</b>	<b>Gold</b>	<b>Broad FI</b>	<b>S&amp;P 500</b>	<b>Volatility</b>	<b>Return</b>	<b>Sharpe Ratio</b>
Portfolio 1		70%	30%	4.77%	5.45%	0.76
Portfolio 1b	10%	70%	20%	4.29%	5.71%	0.91

<b>EUR</b>	<b>Gold</b>	<b>Broad FI (ex US)</b>	<b>Global Equities (ex US)</b>	<b>Volatility</b>	<b>Return</b>	<b>Sharpe Ratio</b>
Portfolio 2	-	70%	30%	4.24%	4.33%	0.60
Portfolio 2b	10%	70%	20%	3.52%	4.80%	0.86

Sources: Bloomberg L.P. Indices (USD): Broad Fixed Income: Bloomberg/Barclays U.S. Aggregate, S&P 500. Indices (EUR): Broad Fixed Income (ex US): Bloomberg Barclays Global Agg ex-U.S. EUR Hedged; Global Equities (ex US): MSCI EAFE Total Return Net EUR Unhedged. Gold is represented by Bloomberg "GOLDS Comdty". Historical period: Jan, 1999-Sep, 2019. Past performance is not a guarantee of future results.

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## Investment Risks

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The value of investments and any income will fluctuate (this may partly be the result of exchange rate fluctuations) and investors may not get back the full amount invested.

Currencies generally are volatile and are not suitable for all investors.

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## Notes

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- <sup>1</sup> The dollar is not the first major fiat-money international reserve currency: For example, the Dutch guilder was a fiat reserve currency in the 16th century and played a major role in world trade and payments. However, gold-linked reserve currencies have been the norm throughout most of recorded economic history.
- <sup>2</sup> Currencies based on gold and silver also existed based on a fixed exchange ratio between the two metals.
- <sup>3</sup> Some major economies in the Bretton Woods system, notably Japan, France and Germany blamed the United States for irresponsible macroeconomic policies in the 1960s-70s, which they believed contributed to rising global and domestic inflation pressures: President Johnson's bond-financed Great Society program and Vietnam War spending; and political pressure on the Fed not to raise interest rates under both President Johnson and Nixon. These US excesses were addressed by Chairman Volcker, who restored price stability and US policy credibility by tightening monetary policy sharply to crack rising inflation expectations. The outsized Reagan-era fiscal deficits were offset by the tightness of monetary policy and strength of the dollar - effectively reversing the legacy of the Burns Fed's prior misjudgment in cutting rates into accelerating inflation and slowing growth. Meanwhile, other reserve currencies were not doing well - sterling gave way to the USD, even as the dollar-gold link was broken, because of the UK's own policy errors, culminating in a series of maxi-devaluations and an external balance of payments crisis.  
These shifts in US interest rate policy - negative real rates in the 1960s-70s as a result of excessively expansionary policies and resulting inflation, and strongly positive real interest rates in the 1980s as a result of a very tight monetary policy - help account for the ups and downs of both the dollar and gold, as reflected in Figure 8 and Figure 9.
- <sup>4</sup> Sources: Gold: avg trading volume 30 September 2019, World Gold Council;
- <sup>5</sup> 2019 Invesco Global Sovereign Asset Management Survey, 31 March 2019.
- <sup>6</sup> Source: <https://datahub.io/core/gold-prices#resource-annual>, internal calculations, as at 31 December 2018.
- <sup>7</sup> Does not include investment and hedging demand from OTC derivative and futures markets.
- <sup>8</sup> Based Jan/1999-Sep/2019 monthly time series, the correlation between the change in gold price and USD value is -0.43. USD value is proxied by "USDX U.S. Dollar Index." The U.S. Dollar Index indicates the international value of the USD by averaging the exchange rates between the USD and major world currencies (EUR 57.6% weight, JPY 13.6%, GBP 11.9%, CAD 9.1%, SEK 4.2%, CHF 3.6%). The ICE US computes this by using the rates supplied by some 500 banks.
- <sup>9</sup> World Gold Council, GoldHub: Average daily liquidity for September 2019.
- <sup>10</sup> For a more in depth discussion, see Invesco White Paper #5: Central Bank Currency Reserves and Currency Composition, April 2019.
- <sup>11</sup> Gold buyers 2017-19, Greater than 1 tonne: Argentina, Belarus, China, P.R.: Mainland, Colombia, Ecuador, Egypt, Guinea, Hungary, India, Indonesia, Iraq, Jordan, Kazakhstan, Kenya, Kyrgyz Republic, Malaysia, Mongolia, Philippines, Poland, Qatar, Russian Federation, Serbia, Republic of, Slovakia, Tajikistan, Thailand, Turkey, United Arab Emirates and Uzbekistan.
- <sup>12</sup> Does not include Central Bank of Turkey gold deposited as part of bank reserve requirements.



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