de Pury Pictet Turrettini & Co. Ltd

Gold

The rebirth of a forgotten alternative

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de Pury Pictet Turrettini & Co. Ltd
12, rue de la Corraterie
P.O. Box 5335
CH-1211 Geneva 11
T. +41 22 317 00 30
Fax +41 22 317 00 33
www.ppt.ch

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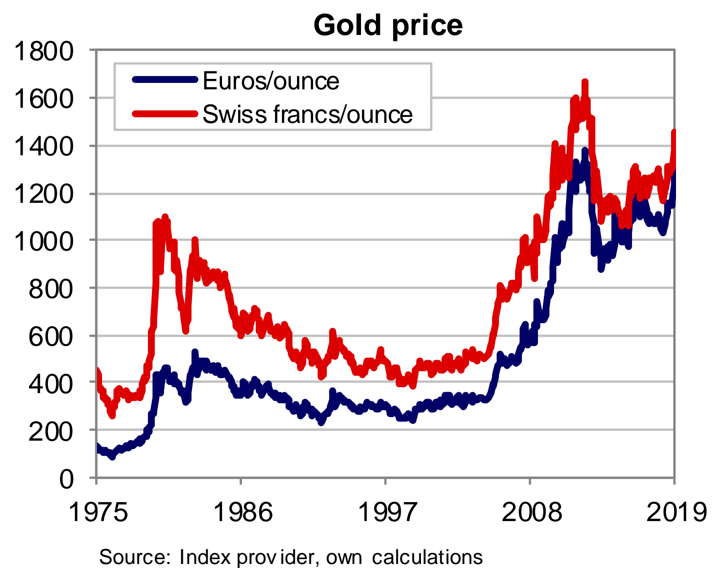
Introduction: Gold in uncertain times

Gold has accompanied humankind since ancient times as a symbol of royalty and glamour and eventually as a means of payment, given its beauty, rarity and resistance to tarnish.

> "Gold has been a trusted currency for over 2500 years."

Source: Index provider

Ancient Mesopotamians forged gold jewellery around 2600 BC, and in ancient Egypt gold was smelted down even earlier. The famed King Croesus of Lydia established gold as an international currency in the sixth century BC, and ever since, gold has been a widely accepted and trusted means of payment and storage of value.



Source: Index provider, own calculations

Modern gold cycles

In modern history, gold had a very strong run in the turbulent 1970s, marked by the end of the gold standard in 1971 (the dollar ceased to be convertible into gold), the end of the Bretton Woods currency system (1973), oil price shocks and a strong rise in inflation.

A number of factors, notably the Great Moderation – a drop in inflation and broad-based improvement in economic stability – drove the gold price lower in the 1980s and 1990s.

The downward trend in the gold price in the 1990s sowed the seeds of the next upward cycle. Mining companies depleted reserves and invested little in new production sites, given the low gold price and apparently bleak outlook. Only a much higher gold price in the early 2000s would subsequently secured the cash flows necessary to invest in much needed production capacity.

The rally of the 2000s continued after the financial crisis of 2008, with the euro area's debt crisis driving the gold price to an all-time high in 2011.

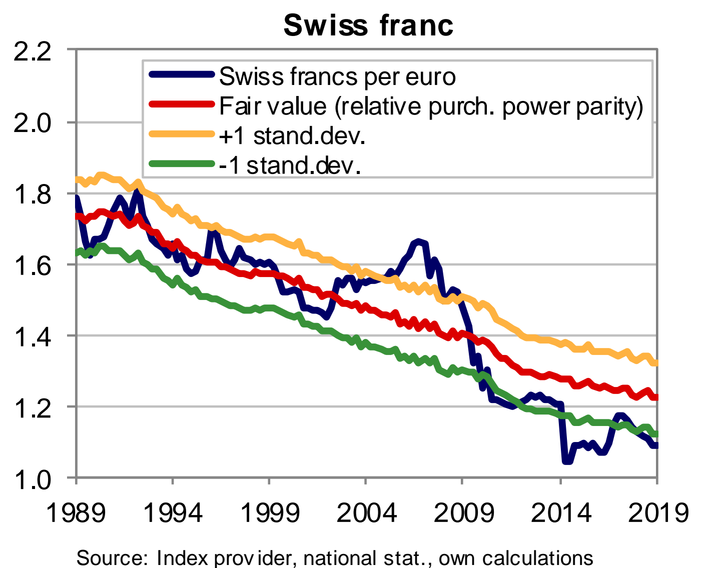
Uncertainties on the rise

Uncertainties have been on the rise in recent years, even though a repeat of the 1970s certainly is not in the cards.

The current economic expansion in both in Europe and the USA is the longest in modern history. This naturally raises the odds of a recession in the coming two to three years.

Source: Index provider, own calculations

> “Uncertainties have been a key driver of gold price rallies in modern history – and uncertainties are now higher than usual.”



Source: Index provider, national stat., own calculations

While there are always political uncertainties, several phenomena stand out at present. Most notably, the U.S. president aims to create a new world trade order, with uncertain outcomes for the world economy. In addition, populist governments are spreading, notably in Europe. Italy’s government is facing financial market backlash over its budget policy, showing that governments’ room for manoeuvring finally appears to hit a limit after decades of high budget deficits and rising debt.

Finally, a number of central banks have to deal with the zero-rates boundary which makes it increasingly difficult to provide monetary stimulus in case of recession.

Demand for safe investments

That demand for safe investments is on the rise is evident not only in the recovery of the gold price but the strengthening of the

Swiss franc and the Japanese yen since last year (see the table).

The Swiss franc, ever since the financial crisis, has been stronger than what most fair-value estimates (which are almost all higher than 1.20 francs per euro) would suggest (see the bottom chart on the previous page).

Moreover, German government bond yields are inexplicably low based on economic fundamentals alone. This fact indicates the presence of safety-buying from investors concerned about the single-currency experiment.

Trade weighted currencies

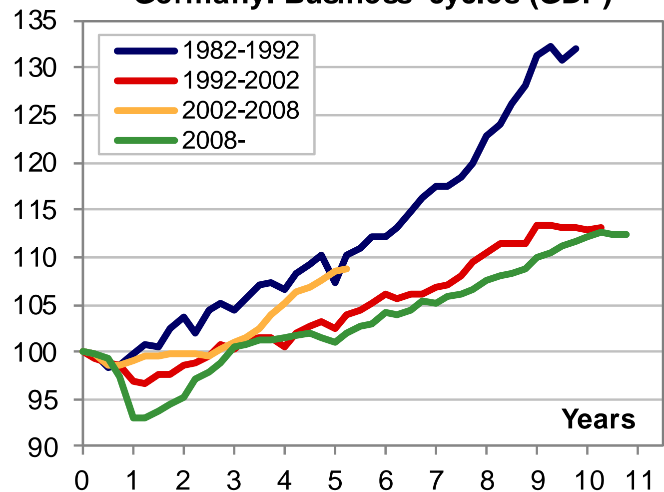
	Performance	
	2019*	**2018**
Euro	-0.5%	0.6%
U.S. dollar	1.0%	4.9%
Swiss franc	**2.7%**	**3.6%**
Pound sterling	-3.5%	-0.5%
Japanese yen	**5.3%**	**7.0%**
Chinese renminbi	-0.8%	-1.9%
Indian rupee	-0.2%	-4.3%
Brazilian real	0.4%	-5.6%
Russian ruble	8.5%	-13.2%

*Data as per 7-Aug-19. Source: Index provider

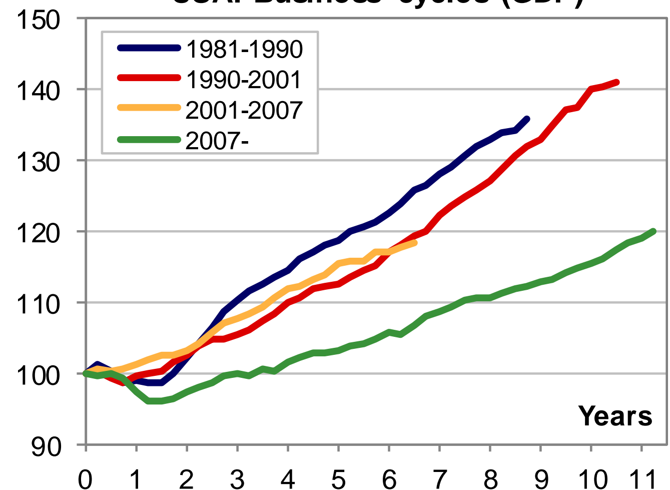
Recession risks after a record-long economic upswing

Economic activity fell strongly during the financial crisis of 2008, and the world economy has experienced an extraordinarily long expansion ever since. In many countries the current expansion has become the longest in modern history (see the graphs comparing the current economic cycle to previous cycles since the 1980s).

Obviously, there is no rule governing the length of business cycles, and business cycles do not die of old age alone. Nevertheless, as history tends to repeat itself, the odds of a recession in the coming two to three years are fairly high, notably in the USA.



Source: Bundesbank/GFSO, own calculations



Source: BEA, own calculations

Negative bond yields abound

Ever lower interest rates

It is a well-documented phenomenon that interest rates and bond yields have been on a downward trend globally for nearly four decades.

This trend is evident in a structural drop in central bank rates in Europe and the USA (top chart). In Japan, the official interest rate has never been higher than 1% since 1995.

It goes without saying that interest rates are now at or near historic lows in many parts of the world. For example, the yield on 10-year U.S. government bonds is currently lower than it was during the Great Depression in the 1930s (middle chart), with yields similarly low only during the Second World War.

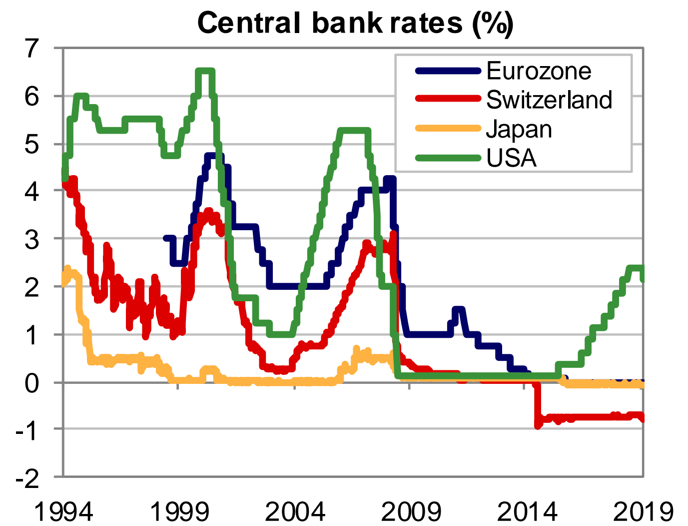
Why are interest rates so low?

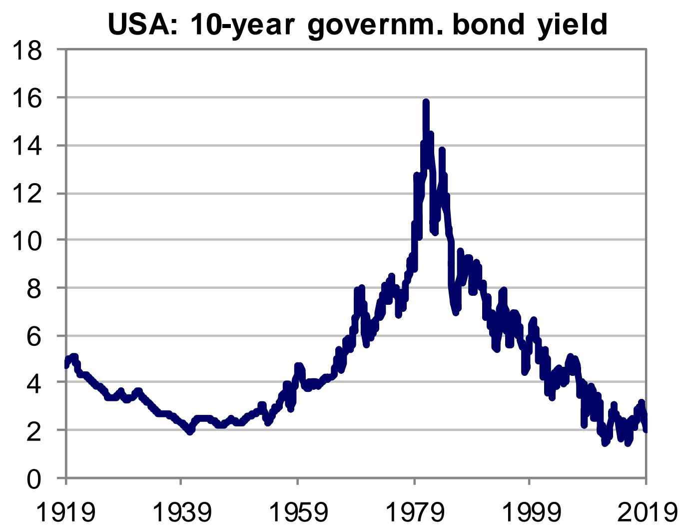
There is good evidence that interest rates are now structurally lower than in the past decades. Nominal interest rates have two components, inflation and real interest rates. Not only is inflation now very low in many parts of the world but real interest rates also appear to have fallen to a multi-decade low.

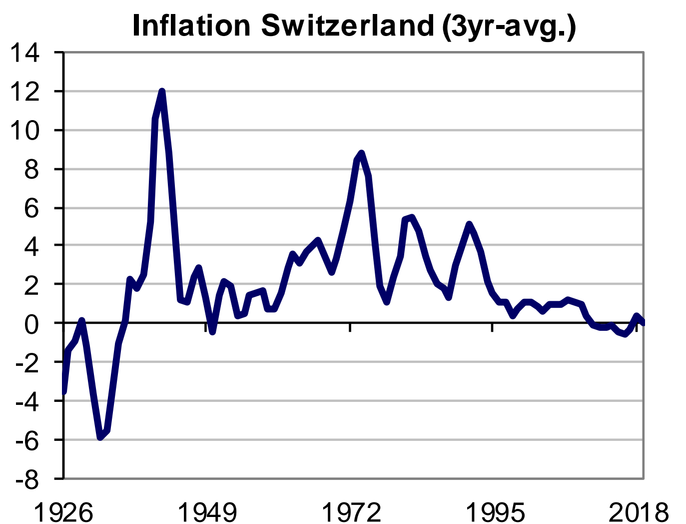
Persistently low inflation

Extreme inflation readings, such as hyperinflation in the Weimar Republic, deflation during the Great Depression or inflation during the second world war or the 1970s are highly disruptive events, though fortunately not the historic norm.

Despite fears to the contrary, deflation has not widely spread after the financial crisis. On the other hand, inflation has remained tame, being barely positive in







Switzerland and only about 1% in the euro area in recent years.

In the USA, despite a robust economic expansion in the past ten years, inflation is currently less than 2%. In Japan, not even Abenomics' massive economic stimulus was able to reignite inflation in a meaningful way.

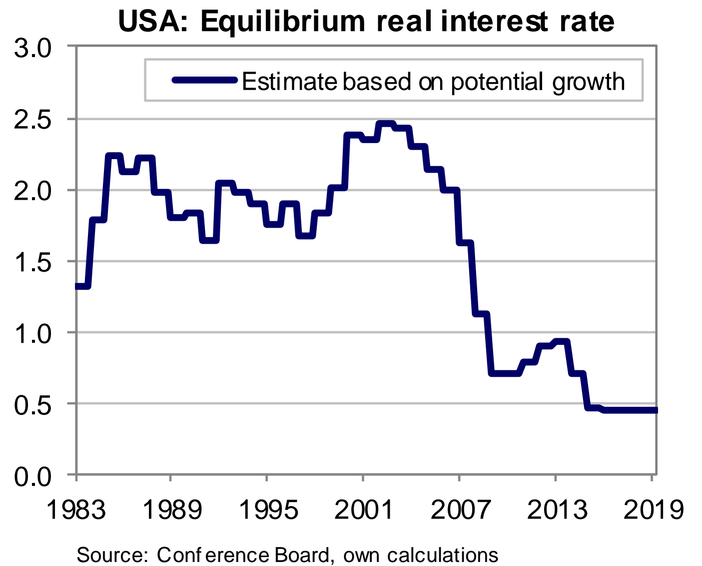
Structurally low real yields

Our analysis, based on work done by the San Francisco Fed, shows that the level of real short-term interest rates compatible with current economic fundamentals, notably the growth potential, has fallen from over 2% to nearly zero, in both the eurozone and the USA (see the top chart).

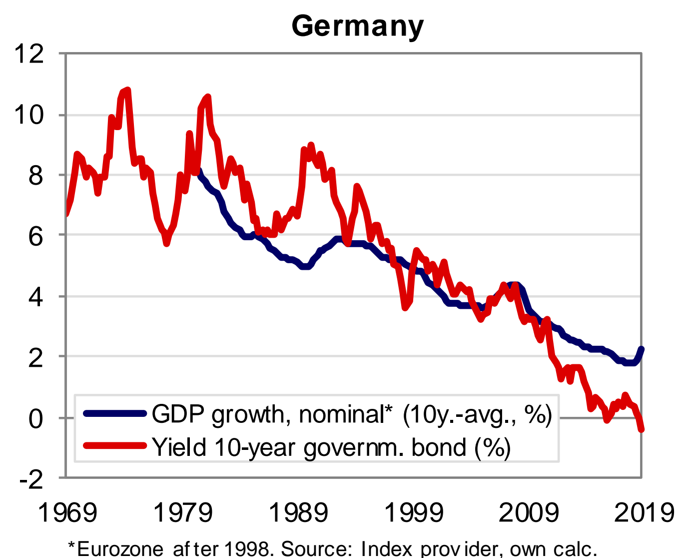
The reason why real interest rates have fallen is, next to a globally high level of savings (e.g. in China, the world's second largest economy), a structural drop in productivity growth that started around 2005. Weakening demographics play a role as well.

Bond yields and GDP growth

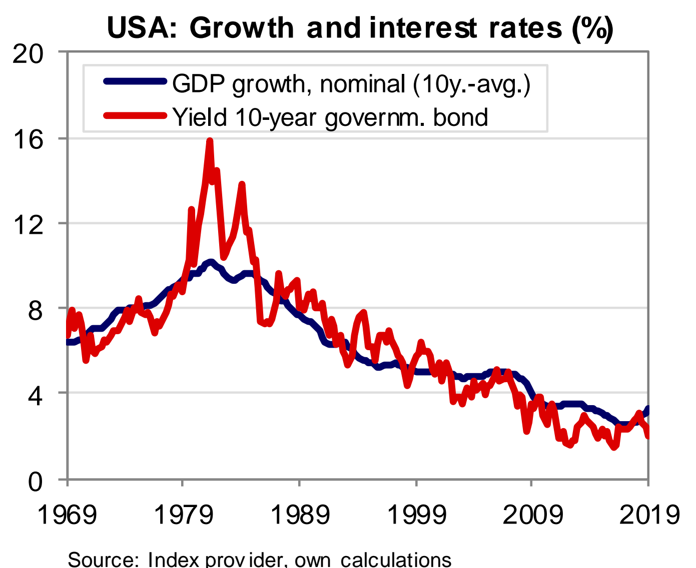
Nominal economic growth (GDP growth) – real economic growth plus inflation – is a good proxy for the level of bond yields, in both Europe (chart "Germany") and the USA (bottom chart).



Source: Conference Board, own calculations



*Eurozone after 1998. Source: Index provider, own calc.

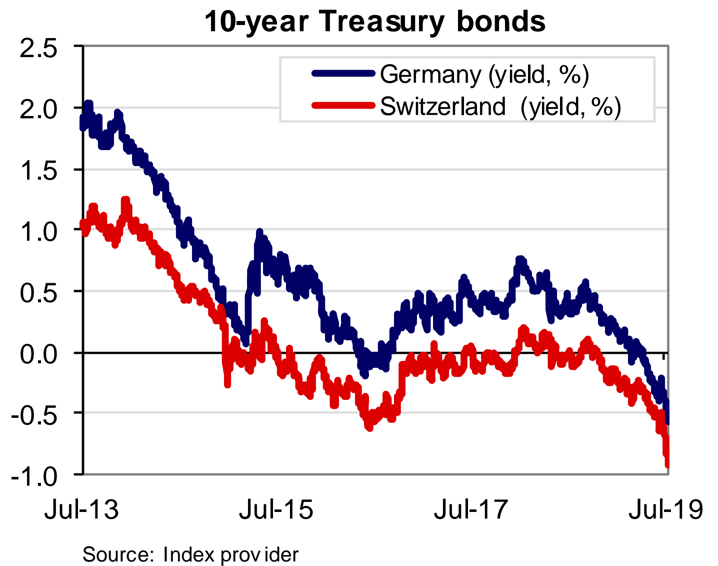


Source: Index provider, own calculations

A novelty: Negative bond yields

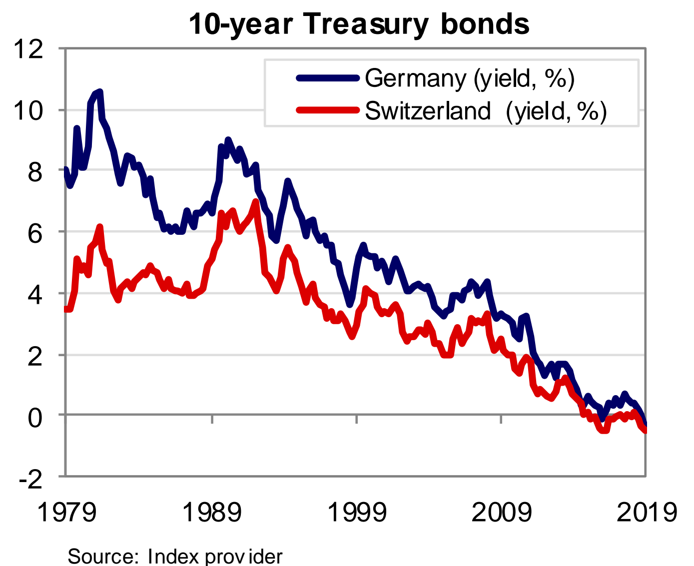
In recent years, the ECB has continued to postpone hiking interest rates and has even started to purchase bonds on a broad scale. The Swiss National Bank moved its key rate into negative territory in late 2014, and the Bank of Japan has maintained its zero-rates policy (and also bought large amounts of government bonds).

No wonder that an ever larger part of the global bond market carries negative yields.



Source: Index provider

"Bonds worth 15 trillion U.S. dollars – every fourth bond worldwide – have negative yields."



Source: Index provider

Investors are now "paid" to hold gold

With the forces explaining the low level of interest rates unlikely to change in the coming years, central bank interest rates and bond yields will remain at historically very low levels – possibly for an extended period.

The opportunity cost of a gold investment, i.e. the yield foregone from holding gold instead of a bond, is high when interest rates (notably real rates) are high. With a number of safe bonds, notably those of the governments of Switzerland and Germany, offering negative yields, gold (with its zero yield) is now the most attractive it ever has been in modern history as far as opportunity costs are concerned.

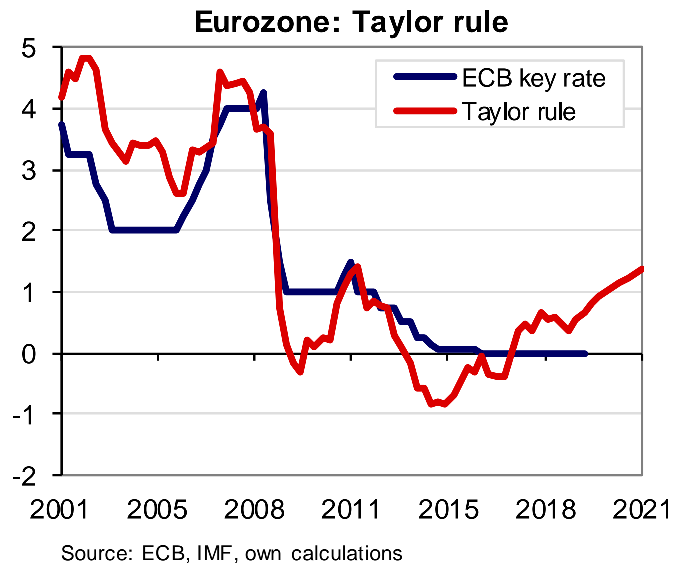
Yield curves (government bonds)

	3m	2 yrs.	5 yrs.	10 yrs.
Germany	-0.68	-0.86	-0.82	-0.58
U.K.	0.78	0.46	0.34	0.49
Switzerland	-0.94	-1.06	-1.06	-0.92
USA	2.01	1.54	1.47	1.64
Japan	-0.20	-0.23	-0.28	-0.19

*Data as per 7-Aug-19. Source: Index provider

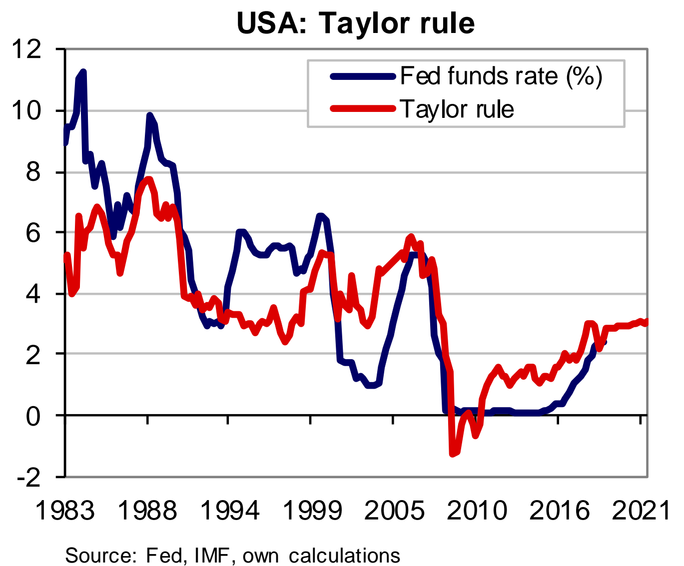
Central banks: The zero-rates boundary

That central bank rates in the euro area and the USA are lower than the historic norm is consistent with the fundamental factors (see the "Taylor rule" chart for the eurozone, with the Taylor rule using fundamental factors such as economic growth and inflation to determine the correct level of interest rates).



The zero rates boundary

"Zero" is still widely considered to constitute an approximate lower boundary for central bank rates, even though in practice rates may be lowered to around -1% (even lower rates might become counterproductive, according to some research).



Unorthodox monetary policy tools: Now widely accepted ...

With the zero-rates boundary limiting monetary easing via the interest rate channel at present in the euro area and in Switzerland, unorthodox policies, in particular the purchase of bonds, have become a widely accepted tool among central banks since the financial crisis of 2008.

... but not necessarily effective

The effectiveness of these policies may be questioned, however. The massive growth of the Bank of Japan's balance sheet in recent years (chart on the next page) has neither invigorated growth nor led to a lasting increase in inflation (even though inflation is currently positive in Japan). The conclusion is not much different for the balance sheet expansion of the European Central Bank (ECB) and the Swiss National Bank.

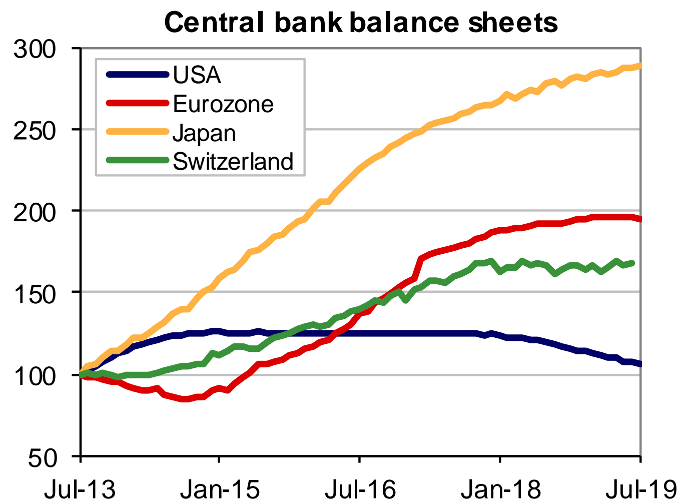
MMT – more risk than solution

Whether rising government outlays and tax cuts to support economies (as claimed by advocates of Modern Monetary Theory, MMT) are reasonable answers to structurally low growth is doubtful as rising government debt first and foremost imposes an ever higher debt burden on future generations.

Central bank policy: Incrementally higher risks

We have shown that nominal interest rates are structurally lower than in the past and that some form of lower boundary for these nominal interest rates effectively limits monetary easing via lowering interest rates. In addition, unorthodox monetary policy tools (notably bond purchases) appear to be incomplete substitutes for interest rate cuts.

With monetary policy increasingly constrained and in uncharted territories, the risk is that future recessions may turn out to be longer and deeper than in the past.

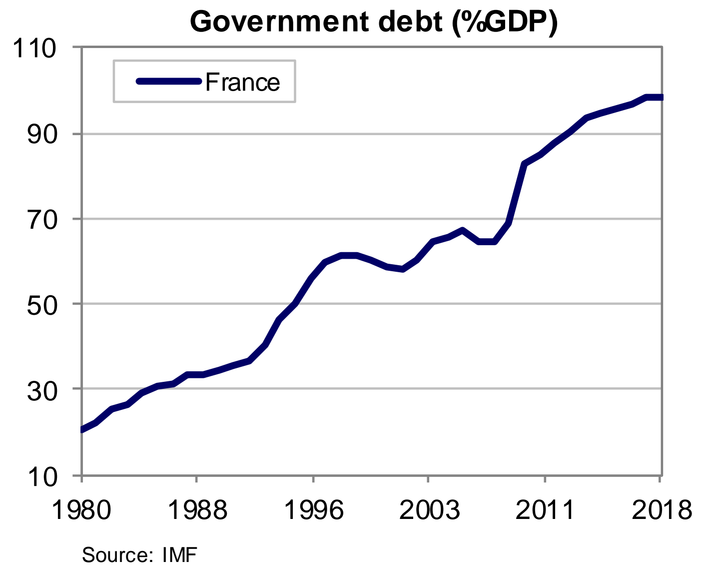


Source: Central banks

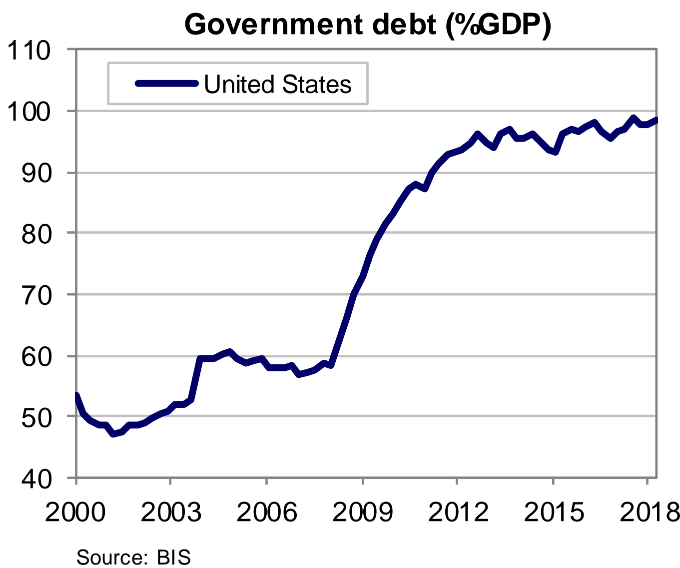
Government debt: Financial market backlash

Government debt has risen strongly in recent decades in the majority of developed countries, not only in absolute levels but importantly also in relation to the size of the economy (i.e. gross domestic product, or GDP, which measures the net output of an economy in any given period). France is a prime example of this decade-long trend (see the top graph).

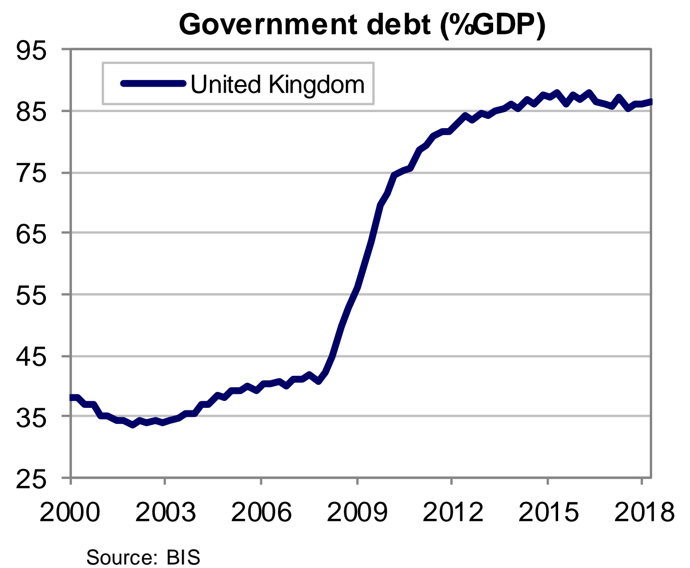
Debt rose markedly during the financial crisis of 2008, with the debt



Source: IMF



Source: BIS



Source: BIS

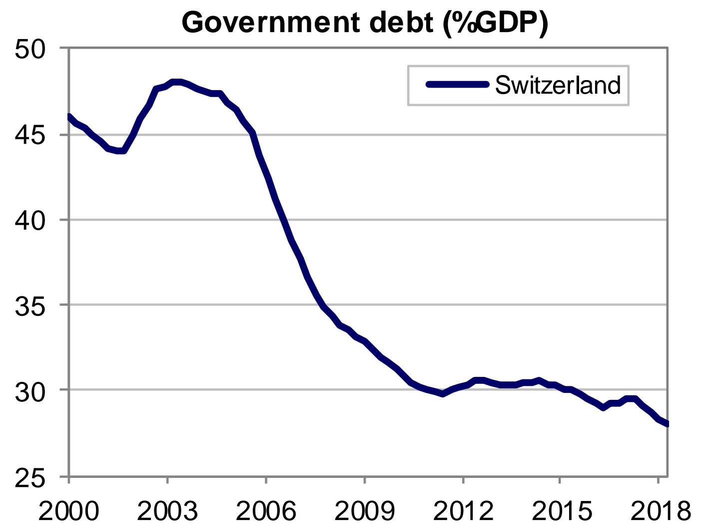
Government debt (% of GDP)

	Year				Change		
	2003	**2008**	**2013**	**2018**	**15 yrs.**	**10 yrs.**	**5 yrs.**
Eurozone	68.1	68.8	91.7	85.1	17.0	16.3	-6.6
Germany	63.0	65.2	78.1	60.8	-2.2	-4.4	-17.3
France	64.4	68.8	93.4	98.5	34.1	29.7	5.1
Italy	100.4	102.4	129.1	132.2	31.8	29.8	3.1
Spain	47.6	39.5	95.5	97.1	49.5	57.6	1.6
United Kingdom	35.6	49.7	85.2	86.7	51.1	37.0	1.5
Switzerland	47.9	33.6	30.3	28.0	-19.9	-5.6	-2.3
United States	52.7	66.3	96.4	98.7	46.0	32.4	2.3
Japan	139.2	147.6	197.0	202.5	63.3	54.9	5.5

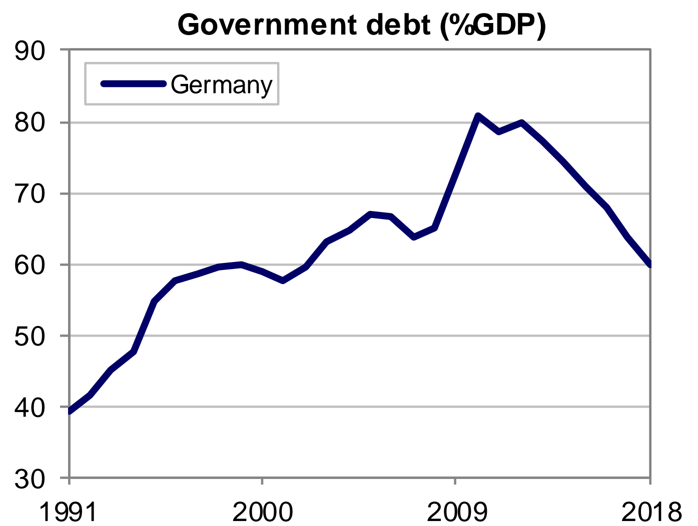
Source: BIS

crisis in the eurozone (which started in 2010) adding another layer, particularly strong in those countries that had to rescue their banking systems (Spain and Ireland).

In the USA, despite the fact that the country's economy has been solid in recent years, debt in relation to GDP has been growing, with tax cuts and higher defence spending enacted in 2018 further adding to the country's debt burden.



"There are countries demonstrating that it is possible to buck the trend towards ever rising debt – while prospering at the same time."



The notable exceptions: Switzerland and Germany

When looking for countries showing falling debt to GDP ratios, Switzerland and Germany stick out. No wonder these countries are benefiting from inflows from investors seeking safety.

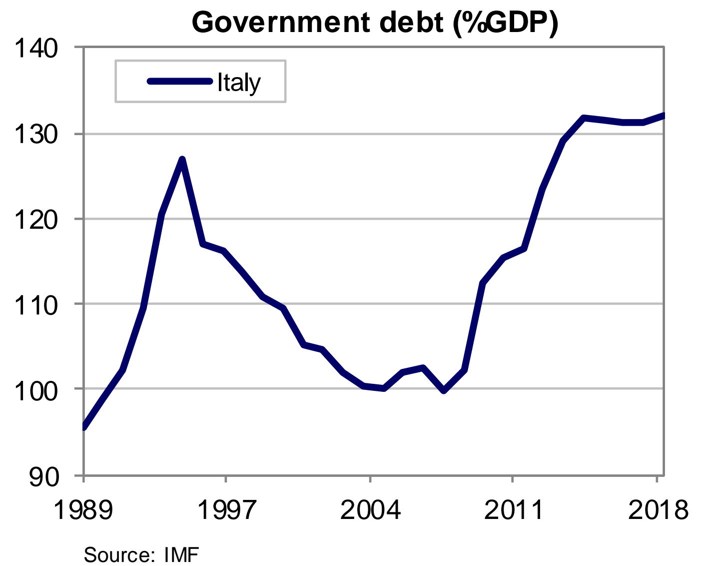
Populist politics and financial market backlash

At the other end of the spectre is Italy. Its populist government, made up of the Lega and the Five Star Movement, has focused on enacting costly election promises, notably tax cuts and a guaranteed minimum income.

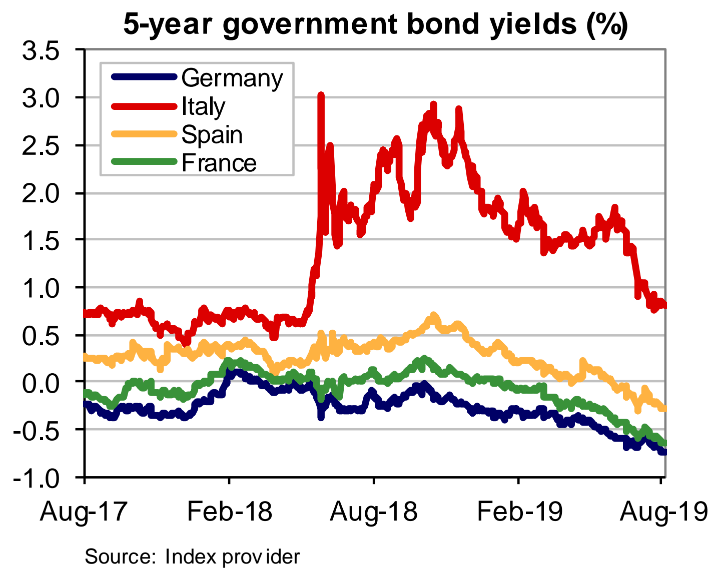
Bond investors have sent a strong signal that further increase in Italy's government debt will be associated with rising borrowing costs, however. The difference in yields to German government bonds rose sharply when the new government came into power and has remained stubbornly high until the government agreed to curtail the deficit in July 2019.

Events in Italy show that financial markets are no longer prepared to finance governments' rising debt burdens which is a constraint for politicians used to appeasing voters with spending programs.

The combination of slow economic growth, a tendency towards higher income inequalities and an inability to solve problems with government spending programs partly explains voter unease and the ascent of protest parties – another element in the global risk equation.



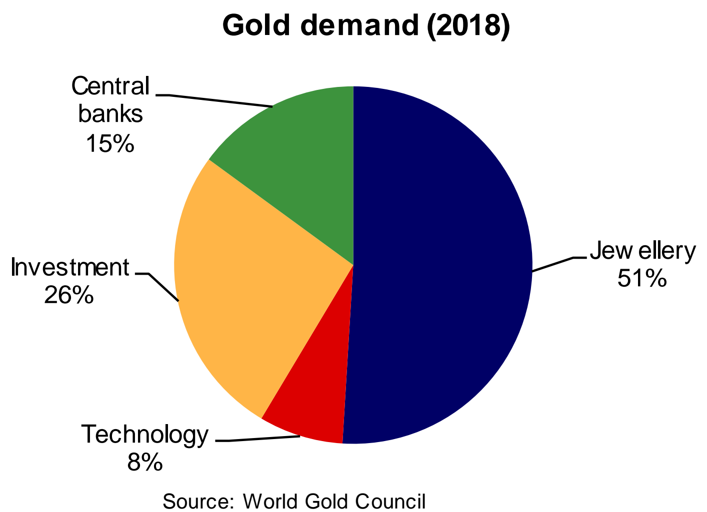
Source: IMF



Source: Index provider

Who buys gold and why?

About half of the physical gold demand is bought in the form of jewellery. The other half consists of central bank purchases, physical demand (bars and coins), financial investments (exchange traded funds, ETFs) and demand from manufacturers (notably for electronics goods).



Source: World Gold Council

"Annual gold demand was 4'400 tonnes in 2018, with about a quarter of the supply recycled metal."

Positive investment demand

The demand for gold has grown by an average of 0.5% per year since 2010 (see the table). The most volatile demand component is that of financial investors (ETFs). These were net sellers in the years 2013 to 2015 but net buyers in all of the past three years.

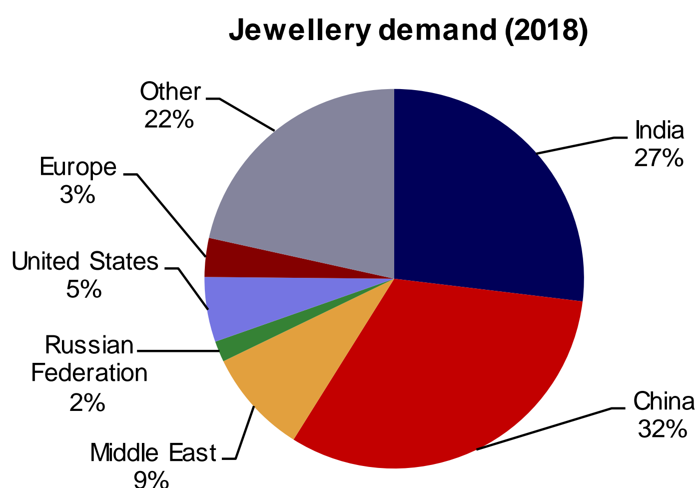
Gold demand (tonnes)

Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2018 vs. 2010 (p.a.)
Jewellery	**2'057**	**2'104**	**2'157**	**2'726**	**2'531**	**2'459**	**2'101**	**2'237**	**2'242**	**1.1%**
Technology	**460**	**429**	**381**	**356**	**348**	**332**	**323**	**333**	**335**	**-3.9%**
Electronics	327	316	288	279	278	262	256	266	268	-2.4%
Other industrial	88	76	65	54	51	51	50	51	51	-6.6%
Dentistry	46	36	28	23	20	19	18	16	15	-12.8%
Investment	**1'634**	**1'735**	**1'618**	**824**	**894**	**968**	**1'647**	**1'252**	**1'165**	**-4.1%**
Total bar and coins	1'204	1'503	1'312	1'730	1'066	1'091	1'072	1'046	1'096	-1.2%
Physical bar	921	1'190	1'015	1'358	780	790	797	782	782	-2.0%
Official coin	196	228	186	271	205	224	207	188	241	2.6%
Other coin	87	84	111	101	81	76	68	76	73	-2.2%
ETFs	430	232	306	-906	-173	-122	575	206	69	-20.4%
Central banks	**79**	**481**	**569**	**624**	**584**	**577**	**390**	**377**	**657**	**30.3%**
Total	**4'231**	**4'748**	**4'726**	**4'530**	**4'357**	**4'335**	**4'461**	**4'199**	**4'399**	**0.5%**

Note: ETFs are Exchange Traded Funds. Source: World Gold Council, ow n calculations

Gold jewellery: China and India dominate

China and India together account for almost 60% of worldwide gold jewellery demand (see the chart).



"China is the most important buyer of gold jewellery worldwide, having overtaken India in 2012."

China accounts for about a third of global gold jewellery demand. Demand has been growing by 5.3% per year since 2010 on average, though by no means steadily. India – overtaken by China as the top buyer in 2012 – is now the second largest buyer of gold jewellery. While gold in India is still held in high esteem, jewellery demand has modestly fallen since 2010 (by 1.3% p.a. on average, see the table).

Jewellery demand (tonnes)

Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2018 vs. 2010 (p.a.)
India	662	619	595	617	628	662	505	602	598	-1.3%
China	493	607	654	1'031	875	826	693	716	743	5.3%
Indonesia	33	33	35	41	37	39	38	39	42	2.9%
Middle East	254	213	210	278	254	238	199	200	173	-4.7%
Turkey	68	74	66	80	68	49	41	41	36	-7.5%
Russian Fed.	60	64	68	80	68	43	38	40	43	-4.0%
United States	122	116	107	113	117	120	119	124	128	0.6%
Europe	106	88	77	75	78	77	76	74	73	-4.5%
Other	258	290	345	411	408	404	392	402	405	5.8%
World total	**2'057**	**2'104**	**2'157**	**2'726**	**2'532**	**2'459**	**2'101**	**2'237**	**2'242**	**1.1%**

Source: World Gold Council, own calculations

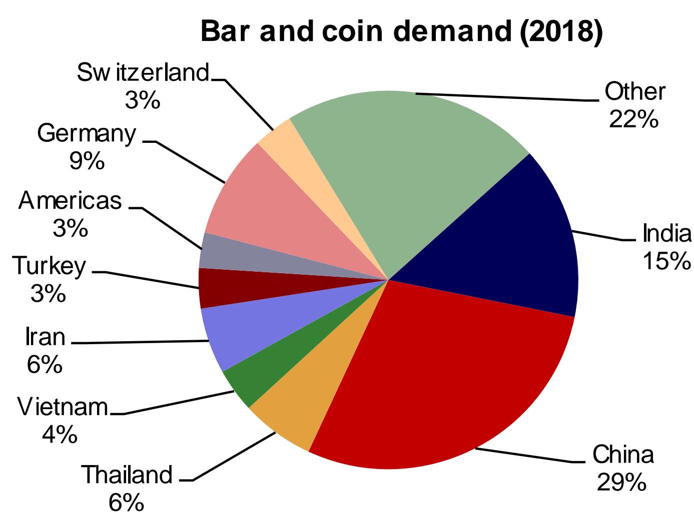
Physical gold: Bars and coins

China and India also account for a large part of gold bar and coin demand (together 44% of the world total in 2018, see the chart).

The demand for physical gold holdings has been growing strongly but somewhat erratically in China in recent years, while demand in India has been falling.

In Iran, demand for physical gold holdings is high and has been growing since 2010.

Overall physical gold demand has modestly fallen since 2010 (at about the same rate as gold jewellery demand has risen).



Gold bar and coin demand (tonnes)

Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2018 vs. 2010 (p.a.)
India	340	355	319	341	206	195	162	169	162	-8.8%
China	184	266	264	418	208	236	292	314	315	7.0%
Thailand	64	107	101	139	96	78	70	64	68	0.8%
Vietnam	68	91	74	88	54	48	43	37	41	-6.1%
Middle East	29	35	34	47	39	35	25	24	25	-2.0%
Iran	43	53	57	64	36	30	5	19	62	4.5%
Americas	113	92	62	86	56	78	99	42	33	-14.2%
Germany	123	142	108	133	101	116	111	107	97	-2.9%
Switzerland	87	97	62	62	48	50	46	42	37	-10.1%
Other Europe	49	56	41	40	29	34	27	23	20	-10.6%
Other	104	208	190	312	193	191	194	204	235	10.7%
World total	**1'204**	**1'503**	**1'312**	**1'730**	**1'066**	**1'091**	**1'072**	**1'046**	**1'096**	**-1.2%**

Note: Middle East total excludes Iran. Source: World Gold Council, ow n calculations

De-dollarization: Central banks buy gold

The U.S. dollar is still the world's most important transaction and reserve currency, accounting for over 60% of central banks' foreign currency reserves.

The dollar's ascent in the 20th century

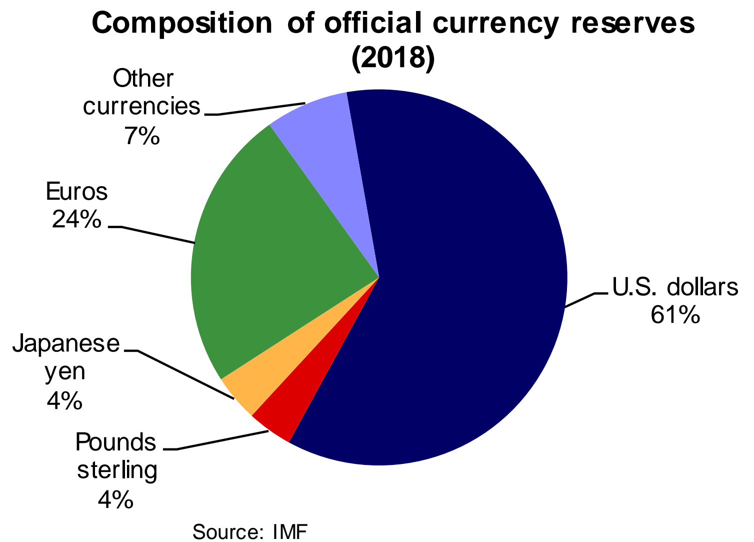
The dollar attained its current status as the world's most important currency in the 20th century, a position previously held by Britain's sterling. World War II consolidated the role of the United States as the leading global economic and military power, with the post-war currency system created in 1944 in Bretton Woods, New Hampshire (USA).

Alternatives to the U.S. dollar?

While the dollar as been the leading reserve currency, there are a number of reasons for central banks to diversify.

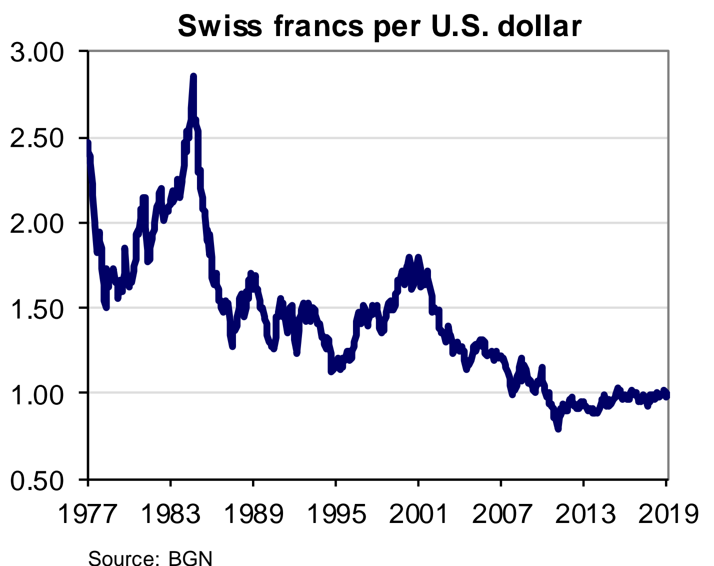
The dollar is, over the long run, a weakening currency (see the charts). In the long run, central banks lose money by holding dollar reserves.

There are also growing fears that in the future the U.S. will increasingly use the dollar as a tool when imposing sanctions on foreign powers. This can be fairly easily achieved by denying foreign powers (and thus banks dealing with these powers) access to U.S. dollar transactions. That the United States is prepared to rigorously enforce sanctions is evident. In 2014, BNP Paribas pleaded guilty and agreed to pay almost 9 billion U.S. dollars to resolve accusations that it violated U.S. sanctions against Sudan, Cuba and Iran (concealing transactions worth nearly 200 billion dollars in the period 2002 to 2012).



Source: IMF

Source: Federal Reserve



Source: BGN

Alternative currencies to the dollar are not fully convincing. The euro's future has only recently, during the eurozone's debt crisis, put to question. China's renminbi, the currency of the world's second largest economy, cannot be freely accessed. With crypto currencies not fully established either, gold is an appealing alternative for central banks wishing to diversify reserves.

Source: World Gold Council

Gold: A classic central bank reserve

Gold traditionally has played an important role as a central bank reserve. The largest gold holders are the central banks of the euro area (including the ECB) and the U.S. Federal Reserve System.

The U.S. stores all of its gold domestically (indeed, much of it in the legendary Fort Knox in Kentucky). Other nations store their gold within or outside their borders, much of it in the USA. Despite repatriating gold held in the U.S. in recent years, the Bundesbank will keep some of its gold in New York. The Swiss National Bank does not officially say where its gold is stored, though it is no secret that some of it rests deep in a tunnel in the Alps.

Official gold holdings (tonnes)

						Change 2018 vs.	
Year	**2002**	**2009**	**2014**	**2017**	**2018**	**2017**	**2009**
International Monetary Fund (IMF)	3'217	3'005	2'814	2'814	2'814	0	-191
Euro area (incl. ECB)	12'482	10'812	10'790	10'782	10'778	-4	-34
United States	8'149	8'133	8'133	8'133	8'133	0	0
Switzerland	1'917	1'040	1'040	1'040	1'040	0	0
Japan	765	765	765	765	765	0	0
United Kingdom	314	310	310	310	310	0	0
Total: IMF/industrial. countries	**26'844**	**24'067**	**23'853**	**23'845**	**23'841**	**-4**	**-225**
Russian Federation	388	649	1'208	1'839	2'113	274	1'464
China	600	1'054	1'054	1'843	1'853	10	798
India	358	558	558	558	600	42	43
Uzbekistan	-	-	275	337	355	19	-
Kazakhstan	53	70	192	300	350	51	280
Saudi Arabia	143	323	323	323	323	0	0
Other	4'136	3'763	4'534	4'607	4'423	-184	1'015
Total: Emerging countries/other	**5'677**	**6'418**	**8'143**	**9'806**	**10'018**	**212**	**3'600**
World total	**32'521**	**30'484**	**31'996**	**33'651**	**33'859**	**208**	**3'375**

Source: World Gold Council, ow n calculations

Net buyers of gold in recent years

After a period of divesting gold reserves, central banks have been continuously increasing their gold holdings since 2009 (top chart on the previous page).

“Central bank gold is a reserve of safety, providing risk diversification and fairly good protection against fluctuations of the dollar.”

Mario Draghi, president of the European Central Bank

In 2018, central banks globally bought the most gold since 2010, and we expect 2019 to be another year of solid central bank buying.

China and Russia at the forefront

In industrialized countries, gold reserves have been largely unchanged in recent years. This is different from the 2000s when a number of central banks (including the Swiss National Bank) reduced their gold holdings.

In recent years, emerging countries’ central banks have accounted for almost all the official gold buying. Among the top buyers have been Russia (as a result of U.S. sanctions and Russia’s easy access to gold as an important gold producer) and China, where economic growth requires higher central bank reserves (note that in the past, China has only sporadically reported gold purchases made in preceding years).

Gold as percentage of foreign reserves

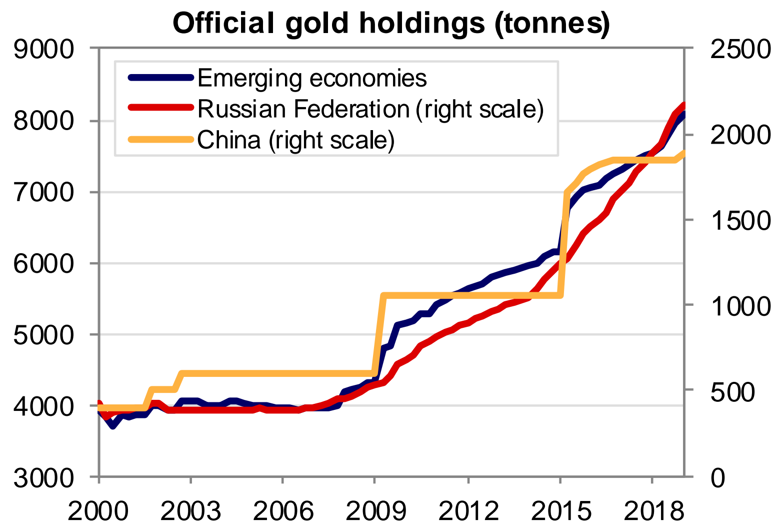
						Change 2018 vs.	
Year	**2002**	**2009**	**2014**	**2017**	**2018**	**2017**	**2009**
Euro area (incl. ECB)	34%	56%	55%	56%	54%	-2%	-2%
United States	57%	70%	73%	75%	74%	-1%	4%
Switzerland	35%	27%	7%	5%	5%	0%	-22%
Japan	2%	3%	2%	3%	2%	0%	0%
United Kingdom	6%	14%	10%	9%	7%	-1%	-6%
Russian Federation	9%	5%	12%	18%	19%	1%	13%
China	2%	2%	1%	2%	2%	0%	1%
India	6%	7%	7%	6%	6%	1%	-1%
Uzbekistan	30%	37%	65%	69%	77%	9%	41%
Kazakhstan	19%	11%	25%	41%	47%	6%	36%
Saudi Arabia	7%	3%	2%	3%	3%	0%	0%
Total: Emerging countries/other	**10%**	**7%**	**10%**	**14%**	**15%**	**1%**	**9%**
World total	**13%**	**11%**	**9%**	**11%**	**11%**	**0%**	**-1%**

Source: World Gold Council, ow n calculations

A new Plaza Accord?

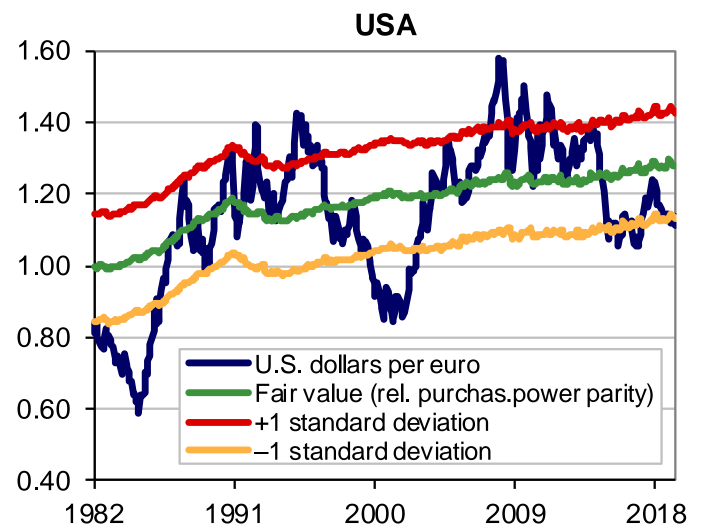
In 1985, the leading economic powers agreed to devalue the dollar which was markedly overvalued at the time (see the bottom chart). In recent years, a new version of the Plaza Accord has been proposed.

The proponents of a Plaza Accord 2.0 point to the appreciation of the U.S. dollar by almost 40% (particularly during the years 2011 to 2016) and to the large differences in the current account balances among leading economies.



Source: World Gold Council

> "While a new dollar accord is improbable, any such agreement would undoubtedly drive the dollar lower and the gold price markedly higher in dollar terms, though not necessarily in Swiss francs or euros."



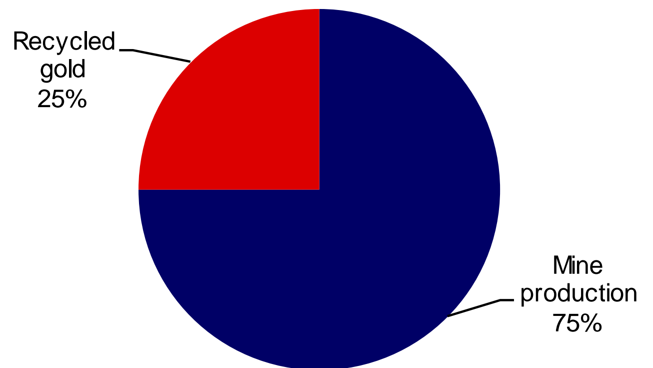
Source: BGN, national stat., own calculations

Such an agreement would represent a turning point in international currency policy, however, as in 2013, the G8 agreed to refrain from foreign exchange interventions. Another argument against dollar intervention is that the dollar is now, quite different from 1985, only modestly overvalued (bottom chart).

Worldwide gold production

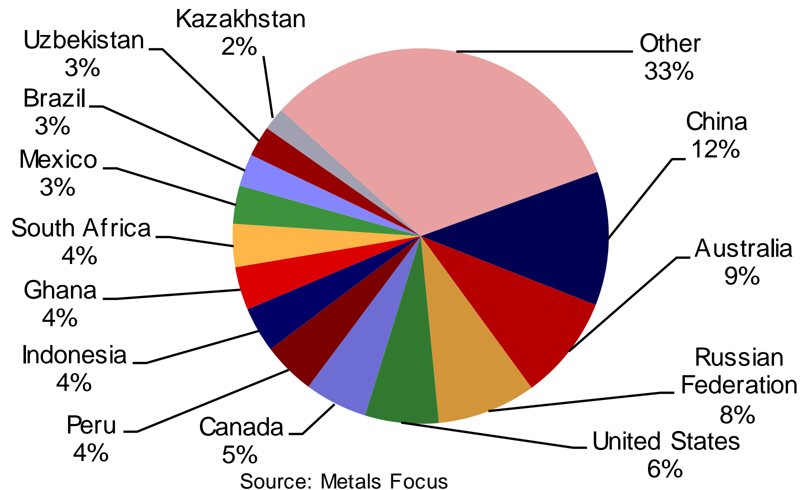
Global gold production has risen at an annual rate of about 1% since 2010. Excess supply (see the table) was positive in most years, signalling that supply was sufficient to satisfy demand.

In 2018, 4'659 tonnes of gold were available for sale, of which 3'503 tonnes (or 75% of total production) came from mines and 1'168 tonnes (25% of the total) were recycled gold.



Source: World Gold Council

"South Africa, once the world's most important gold producer, lost the top spot to China in 2007."



Source: Metals Focus

China: The largest producer

The largest gold producing countries are China, Australia and Russia, with Canada taking the number five spot after the United States.

Gold supply (tonnes)

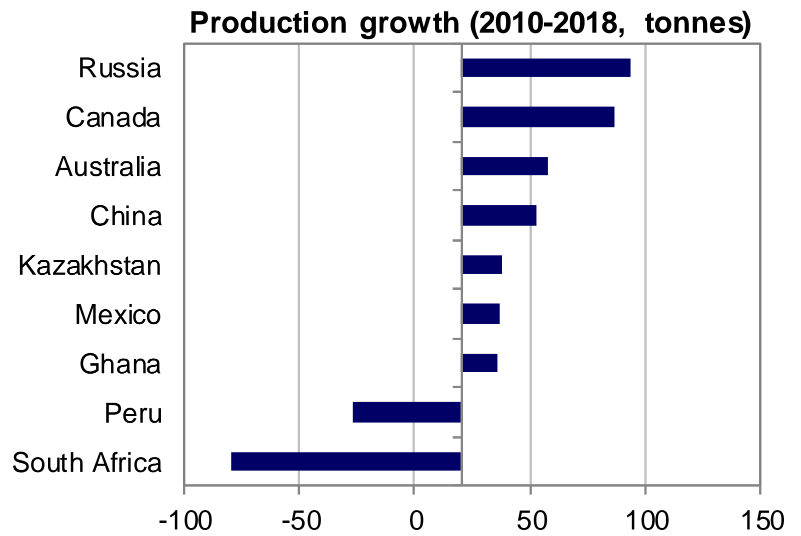
Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2018 vs. 2010 (p.a.)
Mine production	2'749	2'858	2'928	3'110	3'203	3'290	3'397	3'442	3'503	3.1%
Producer hedging	-109	23	-45	-28	105	13	33	-24	-12	n.a.
Recycled gold	1'679	1'651	1'671	1'248	1'188	1'121	1'282	1'156	1'168	-4.4%
Total	**4'319**	**4'531**	**4'554**	**4'330**	**4'496**	**4'424**	**4'712**	**4'574**	**4'659**	**1.0%**
Excess supply	102	-205	-156	-209	127	69	335	357	220	n.a.

Source: World Gold Council, own calculations

Russia: Strong output dynamics

Russia is the country with the highest production growth from 2010 to 2018, followed by Canada, Australia and China. Kazakhstan, Mexico and Ghana have also experienced a strong expansion in production.

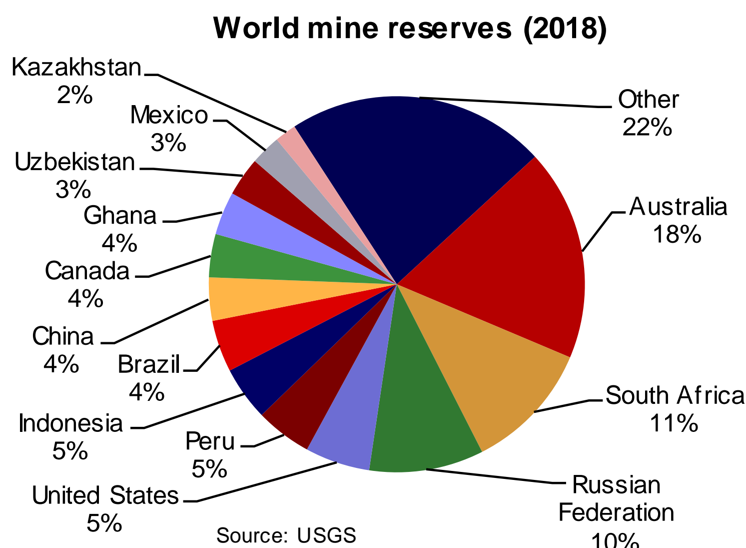
That South Africa has continued to lose global share has been well documented in sharply declining production in recent years.



World mine reserves: Australia leads

The countries with the highest mine reserves are Australia, South Africa and Russia.

Reserves are well spread around the globe, and no country has a dominant position (see the graph).



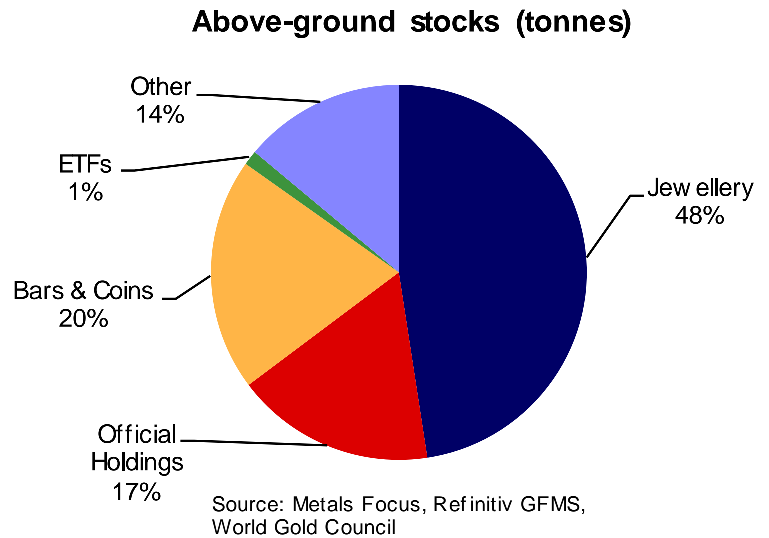
All the gold of the world

Counting above-ground stocks is arguably not possible. Therefore, assumptions have to be made about historic production (also that in ancient history). The amount of worldwide gold holdings, unsurprisingly, is subject to debate.

Taking a widely used estimate of 193'000 tonnes at face value and accounting for the fact that gold is about 19 times heavier than water, all the gold of the world would fit into a relatively small storage building of a little more than 21 meters in length, width and height.

"Above-ground stocks – all the gold ever mined – were 193'000 tonnes in 2018. "

Above-ground stocks (tonnes)

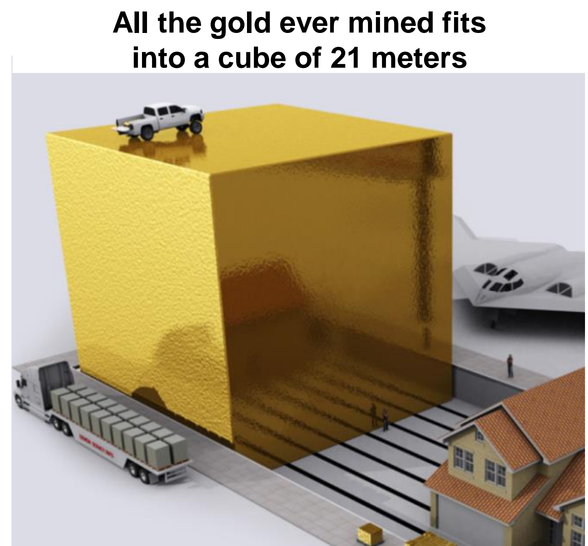


Source: Metals Focus, Refinitiv GFMS, World Gold Council

Gold is most often held in the from of jewellery

Nearly half of the world's physical gold is held as jewellery. Bar and coins make up 20% and gold stored in central bank vaults 17%.

All the gold ever mined fits into a cube of 21 meters



Source: Visual Capitalist

Above-ground stocks (thousand tonnes)

Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2018 vs. 2010 (p.a.)
Jewellery	84.1	84.5	85.0	86.4	87.8	89.1	89.9	90.9	92.0	1.1%
Official Holdings	29.0	29.5	30.0	30.7	31.2	31.8	32.2	32.6	33.2	1.7%
Private Investment	31.2	32.9	34.5	35.4	36.3	37.2	38.9	40.1	41.3	3.6%
Bars & Coins	28.9	30.4	31.7	33.5	34.5	35.6	36.7	37.7	38.8	3.7%
ETFs	2.3	2.5	2.8	1.9	1.7	1.6	2.2	2.4	2.4	0.8%
Other	24.1	24.3	24.6	24.7	25.0	25.4	25.9	26.5	26.9	1.4%
Total	**168.3**	**171.2**	**174.1**	**177.2**	**180.3**	**183.5**	**186.8**	**190.1**	**193.5**	**1.8%**

Source: Metals Focus, Refinitiv GFMS, World Gold Council

The gold mining industry

"The gold industry finds itself at an inflection point between the recent era of cost out initiatives and balance sheet deleveraging, and an increasing need to focus on growth and the replenishment of depleting gold reserves" (McKinsey & Company, "Can the gold industry return to the golden age?", April 2019).

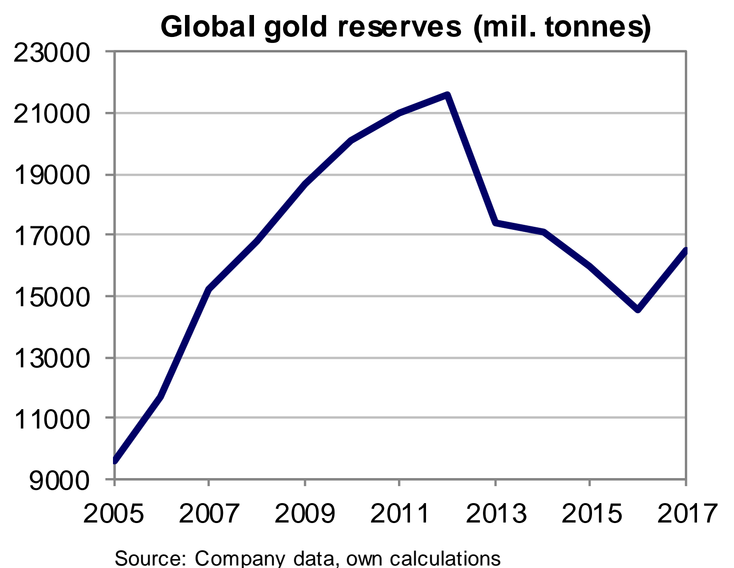
Downsizing

The gold industry has gone through a number of difficult years since prices peaked at over 1'900 U.S. dollars per ounce in 2011. Companies have since undergone a rapid transition from debt-fuelled, acquisition-driven expansion and a mindset of gaining market share at all costs. Most companies have downsized, reduced bloated cost structures and deleveraged balance sheets. After five years of restructuring, impairments, and write-downs, the industry is recovering, and cash flows and profit margins are improving.

These difficulties are well mirrored in the Gold Miners Index (see the top chart). The index has fallen since 2011 and has also markedly underperformed the gold price in this period (bottom chart).

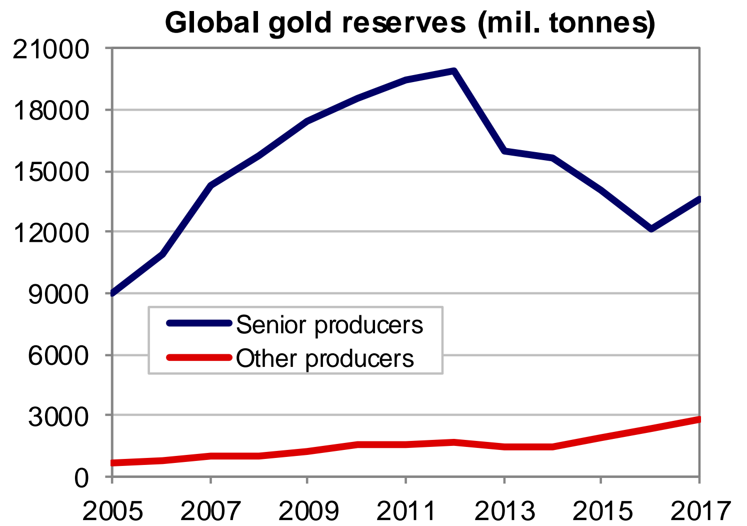
Falling reserves

The restructuring in recent years has come at a cost as gold reserves – notably those of senior producers, which account for the bulk of reserves (see the charts and the table on the next page) – have declined due in part to a marked reduction in exploration expenditures as companies have sought to preserve cash.



A lack of new gold findings

The reserve challenge is exacerbated as greenfield exploration programs have failed to deliver more than a handful of significant gold discoveries since 2006, in sharp contrast to the abundant gold findings in the 1990s. It is also worth noting that there are often long lead times (of up to 20 years) from discovery to first production. A lack of recent findings thus may have consequences for gold supplies in the coming 10 to 20 years.

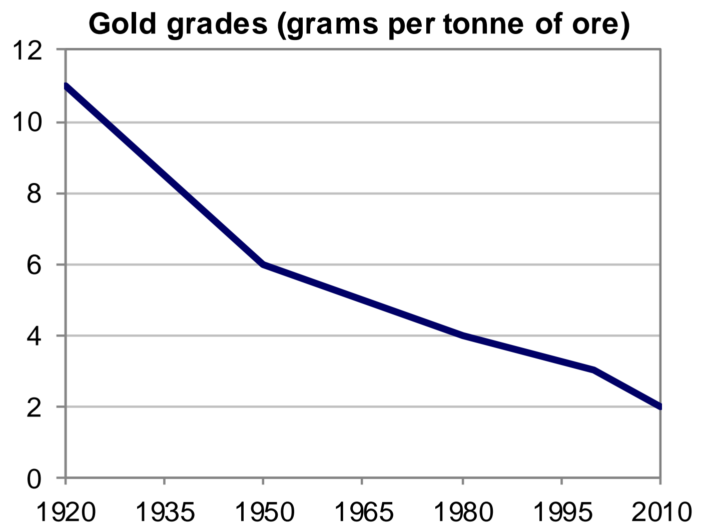


Source: Company data, own calculations

"To produce two grams of gold, one tonne of ore is required."

Falling grades

One tonne of gold ore contains less than two grams of gold. Gold grades have been higher in the past, however. On average, one tonne of ore contained more than ten grams of gold on average in 1920, six grams in 1950 and four grams in 1980.



Source: Prior et al., Global Environmental Change (2011)

Global gold mining companies' reserves (million tonnes)

Year	2005	2008	2011	2014	2017
Senior producers	8'951	15'742	19'470	15'626	13'647
Mid-tier producers	561	851	1'377	1'101	2'388
Junior producers	39	151	95	380	152
Emerging producers	15	22	75	3	282
Total	**9'566**	**16'766**	**21'016**	**17'110**	**16'469**

Note: Data aggregated from companies providing data from 2005 through 2017. Source: Company data, own calculations

Reserve dynamics: Gold price risks on the upside

History shows that periods of under-investment tend to be followed by increased investment spending which in turn happens only when gold prices are high enough for companies to generate high cash flows.

To this end, gold mining companies' free cash flows have been solid in recent years – the 3-year average of 2016-2018 was the highest in over a decade – which forms a good base for increased investment spending. Nevertheless, there remains a risk that reserves and thus gold supply will be insufficient to meet demand over the medium term.

This reserve constellation suggests that gold prices likely will remain well supported in the coming years, with risks on the upside.

Technology to the rescue?

Technology-enabled transformations will be a priority on the agenda of mining companies.

To take advantage of future cost and productivity opportunities, innovations in automation, machine learning, mobile and digital technologies, the Industrial Internet of Things (IIoT) and blockchain should prove to be helpful.

Areas where technology will have an impact will cover the entire value chain, i.e. stochastic geological modelling, autonomous trucks and drillers, optimised mine logistics and scheduling, predictive maintenance strategies and yield optimisation at processing plants.

There is the hope that new technologies will help replenish reserves (e.g. by using drones and artificial intelligence) and transform uneconomical into economically viable reserves. That such hopes are justified is due to the fact that the mining industry has much to learn from the oil industry, in which horizontal drilling, fracturing and 3D seismic analysis have fundamentally changed the way in which exploration is done.

Example: Barrick Gold

Barrick has been a pioneer in the use of new technologies – such as drones – that dramatically cut costs and improve safety.

Barrick first began using drones in 2012 and now uses drones at most of its mines.

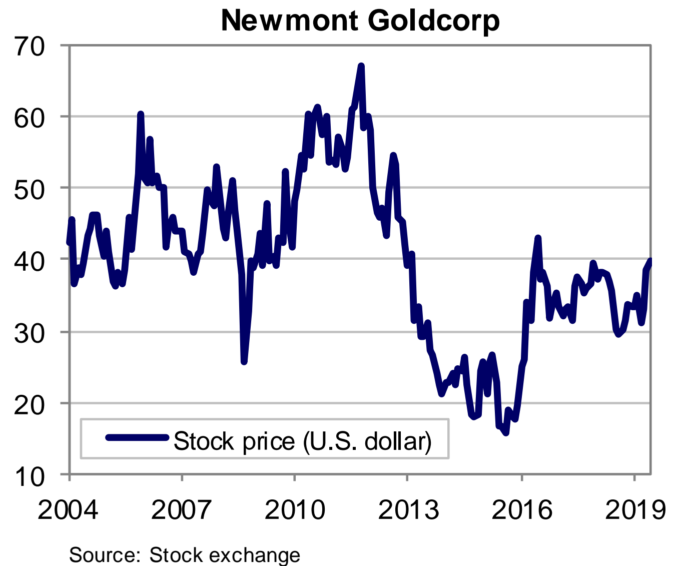
“Everyone in the industry is realizing the value of drones. They'll soon become a standard practice,” Iain Allen, Barrick Gold's senior manager for mining information technology, said in late 2016 (quoted in roboticsandautomationnews.com).

Barrick first used drones to measure stockpiles, which was once a labour-intensive process using surveyors and GPS equipment that wasn't all that accurate. Drones now eliminate several weeks of work in one pass.

The largest gold mining companies

The gold mining industry has recently seen a flurry of mergers and acquisitions, with the combinations of Newmont with Goldcorp and Barrick with Randgold grabbing the headlines. Unlike expensive acquisitions earlier in the decade, which were often motivated by a desire to increase market share, recent combinations have focused more on capital efficiency and operational improvements.

The three largest gold producers in 2018 were Newmont Goldcorp (7.4 million ounces combined), Barrick (5.8m including Randgold) and AngloGold Ashanti (3.4m). Gold production at Newmont and Barrick's joint venture in Nevada (the world's largest production site) worked out 4.1m ounces in 2018. The next largest group of producers includes Kinross Gold, Freeport McMoran (primarily a copper producer), Polyus (Russia) and Newcrest, which all produced around 2.4m ounces in 2018.



Source: Stock exchange

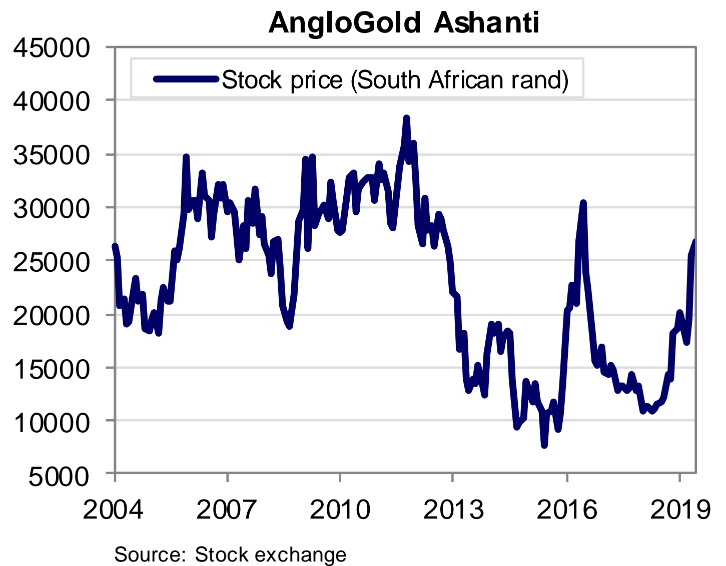
Source: Stock exchange

Newmont Goldcorp: The world's number one gold producer

In April 2019, Newmont Goldcorp was formed after Newmont acquired fellow senior gold producer Goldcorp. The merged company is the world's largest gold miner. On a pro forma basis 2018, the combined entity also produced over 3000 tonnes of copper. In the long run, the company targets around 200 tonnes of annual gold production through its mine portfolio that spans four continents.

Barrick Gold

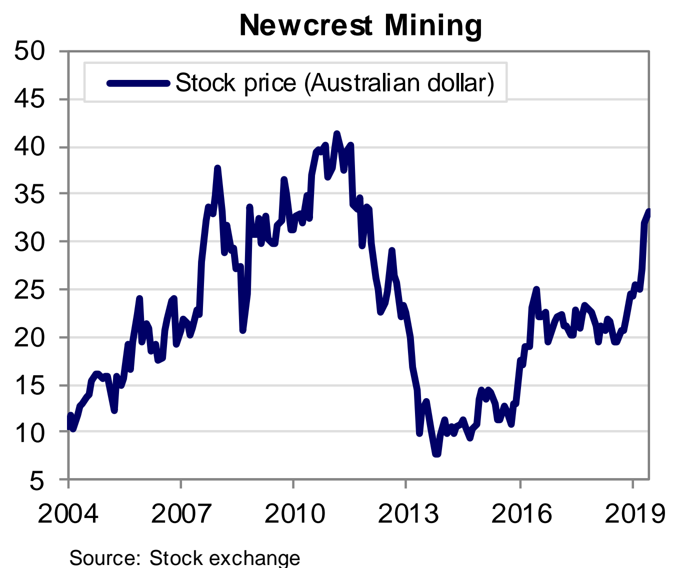
Based in Toronto, Canada, Barrick Gold is one of the world's largest gold producers. The company operates mines in North America, South America, Australia and Africa. In 2018, the firm produced roughly 140 tonnes of gold. Gold production is expected to rise after the acquisition of Randgold at the end of 2018. Barrick Gold has significant proven and probable gold and copper reserves.



Source: Stock exchange

AngloGold Ashanti

Based in Johannesburg, South Africa, AngloGold Ashanti is one of the largest gold miners in the world, with operations in nine countries on three continents. The company was originally formed with Anglo American's gold assets in 1998 and subsequently merged with Ashanti Goldfields in 2004.



Source: Stock exchange

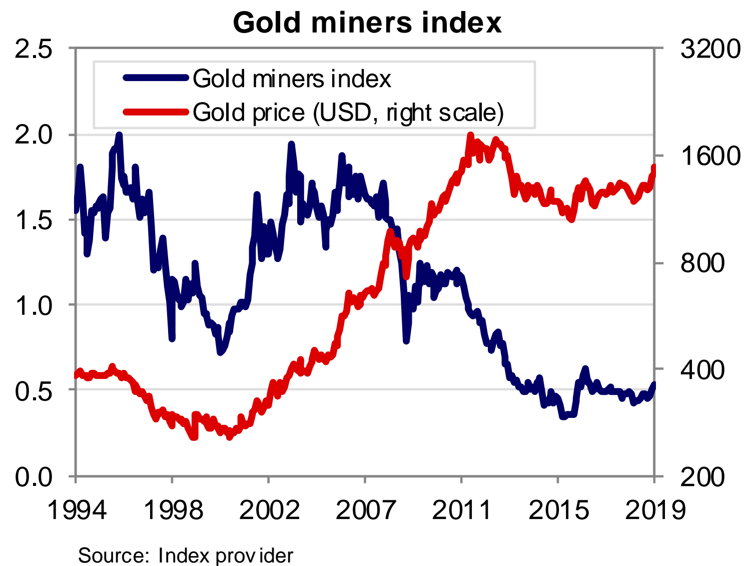
Newcrest Mining

Newcrest is an Australia-based gold and, to a lesser extent, copper miner. Its operations are predominantly in Australia and Papua New Guinea, with a smaller mine in Indonesia. Newcrest is one of the larger global gold producers in a fragmented market.

Gold investments: ETFs vs. physical

There are several ways to invest in gold. ETFs (exchange traded funds) provide an easy way to track the price of gold, with ETFs bought and sold at a stock exchange similar to stocks. Some funds offer investors the option to get physical delivery of gold, though reading the fine print is advised in case investors wish to be sure that physical delivery is possible also in case of a crisis and in the desired quantities.

If the holding of physical gold is a primary concern, investors may prefer to hold gold (bar or coins) in a vault.



Source: Index provider

Gold-backed crypto currencies?

A new form of investing in gold combines the characteristics of crypto currencies (with transaction records kept in a blockchain) and an underlying asset. These so called Stablecoins are pegged to a physical underlying, such as gold. Liquidity of these instruments is small, however, and physical gold delivery is not possible.

Source: Index provider

Gold mining companies: Leveraged investments

Next to gold, investors may consider gold mining companies (the VanEck Vectors Gold Miners ETF tracks the Gold Miners Index of the New York Stock Exchange). The advantage over gold is that mining companies often pay a dividend. Since mining companies have a fixed cost base (consisting of capital and labour), their earnings rise disproportionately when the gold price rises – and vice versa. This is also reflected in miners' share prices which tend to outperform gold only when the gold price rises (see the top chart).

Gold is not expensive

Establishing a fair value of gold is more art than science. History, however, has shown that the gold price has a tendency to revert to a multiple of production costs. Taking just cash production costs (its level and trend are displayed in the middle chart), gold, in the past 15 years, has traded most mostly in a range of two to three times cash production costs (top chart).

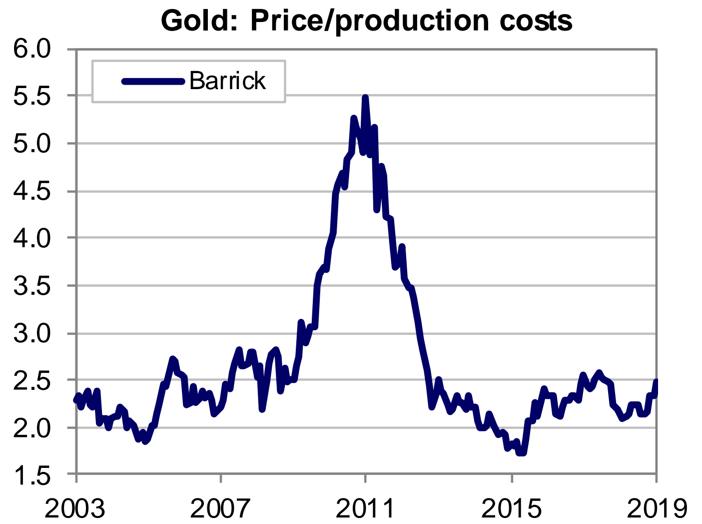
During the eurozone debt crisis, which began in 2010, the gold price rose sharply and peaked at nearly 5.5 times cash production costs in the summer of 2011. The price–cost ratio subsequently collapsed, and it has been trading in a normal range ever since.

At present, the gold price appears to be about fair value but clearly not overvalued. The current level of the gold price, therefore, does not signal that investors' fears are unusually high.

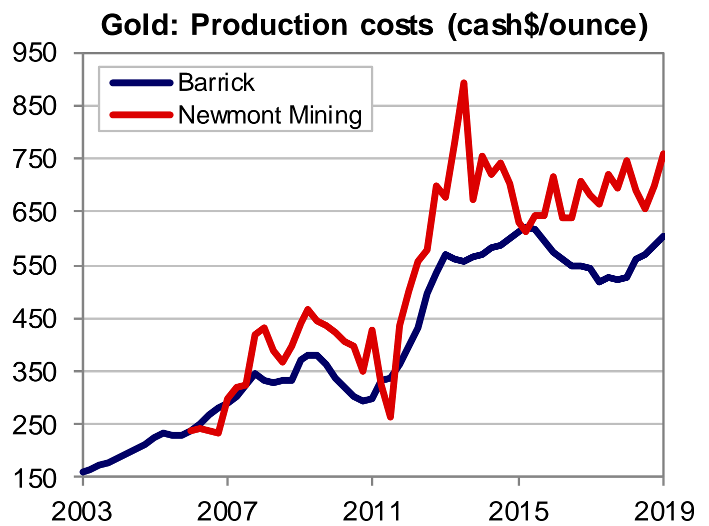
Production costs increase long term

In the long run, production costs tend to rise, in part due to rising labour costs. In recent years, however, mining companies have made great strides in containing costs (see the middle and bottom charts – the bottom chart shows all-in sustainable costs that include, in addition to cash costs, the cost of capital).

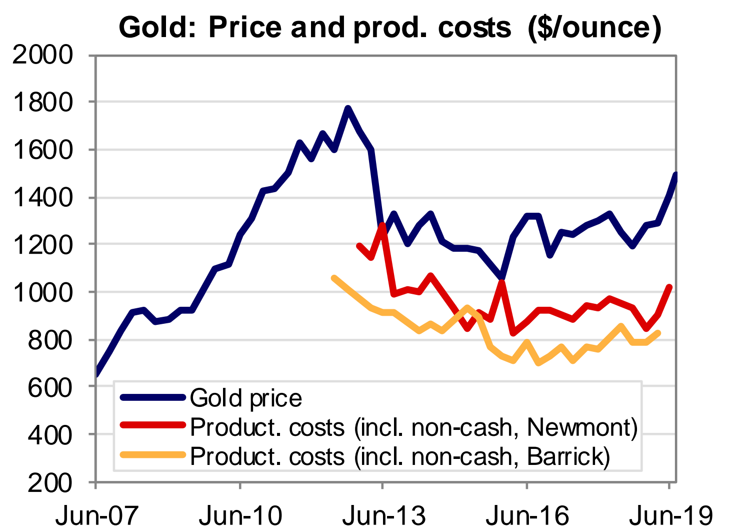
Over the medium to long term, it is likely that production costs will rise, supporting somewhat higher gold prices.



Source: Companies, index provider, own calculations



Source: Companies, index provider



Source: Companies, index provider

Gold helps diversify portfolios

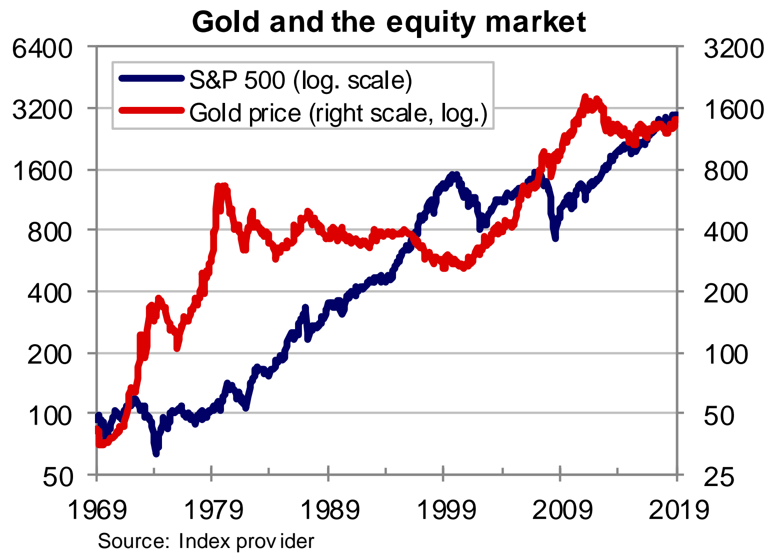
Gold is an asset class that helps diversify investment portfolios consisting of equities and bonds.

This feature of gold is due to the fact that the returns of gold are essentially uncorrelated with those of stocks and bonds (see the table, last row). It is also worth noting that the correlation between gold and equity returns is close to zero in both equity bull and bear markets.

Portfolio diversifier, not a hedge

As the chart shows, gold does not necessarily provide positive returns in equity bear markets. While gold rallied in the 1970s when inflation rose (and prices of bonds and equities fell), gold lost ground (though clearly less than stocks) in the equity bear market of 2000 to 2003 and in the fall of 2008 (at the peak of the financial crisis).

Over the long run, equity and bond returns are negatively correlated. Long-dated government bonds are indeed the best asset class to diversify equity risk. Gold, in contrast, is the asset class that helps diversify inflation risks – the event that drives both stock and bond prices lower.



Bond yields are negative in Switzerland and Germany, so bonds are likely less a good hedge of equities than in the past as there is a limit on how much already negative bond yields can fall, even in a recession. This strengthens the case for gold in a portfolio context for European investors. (The same argument does not hold for the USA, where government bond yields are positive across the maturity spectre.)

It is worth noting that there are distinct multi-year periods during which gold outperforms equities, despite gold underperforming in the long run (top chart on the next page).

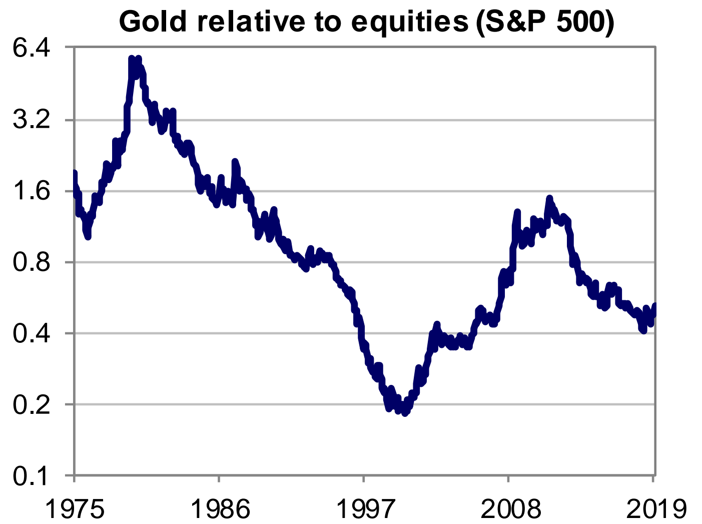
Returns and risks

	Gold		Comm.	Equities			Bonds	
Return and risk	**Gold**	**Miners**	**index**	**World**	**Switz.**	**Europe**	**CHF**	**EUR**
Return p.a.	6.6%	0.0%	-3.9%	5.4%	6.2%	4.0%	2.4%	2.0%
Volatility	13.0%	28.9%	26.9%	19.1%	17.3%	20.3%	2.8%	5.6%
Best quarter	15.0%	35.3%	28.7%	22.1%	20.5%	22.6%	4.8%	8.2%
Worst quarter	-27.0%	-44.4%	-67.6%	-29.0%	-28.5%	-30.7%	-3.0%	-13.8%
Correlation*	1.00	0.78	0.18	0.06	0.01	0.00	0.15	0.12

Note: Reference currency CHF. Quarterly data 1996-2019. * Correlation with Gold. Equities: Total return indices (gross). Source: Index provider, own calculations

Gold and interest rates

The bottom chart shows the yield of 10-year U.S. government bonds and the gold price. The correlation between the two was very high in the 1970s (i.e. both bond yields and the gold price rose and fell in tandem). As bond yields fell for much of the 1980s and 1990s, the gold price also fell. This changed in the 2000s, when the gold price rallied strongly (in response to rising production costs and scarce production capacities), amid a continued drop in bond yields.



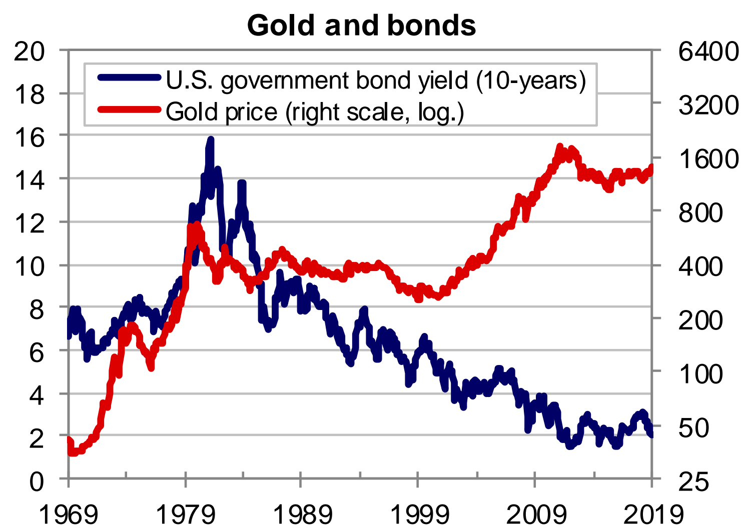
Source: Index provider, own calculations

Gold returns are quite volatile

As far as gold's risk profile (the volatility of returns) is concerned, gold is closer to equities than bonds (see the table on the previous page). This finding argues against a very high allocation of gold in an investment portfolio, except for periods when an investor has a distinctly bullish view on gold.

When looking at the risk profile of gold mining stocks (both the volatility and the worst quarter), it is obvious that gold is preferred over mining companies as a portfolio diversifier.

Our portfolio optimisations concur with the considerations in this section. We find that gold has, using 25 years of data, been helpful in diversifying portfolio risks (while the results do not suggest a gold allocation in excess of 10%-15% in a portfolio consisting of equities and bonds).



Source: Index provider

Conclusion: Risk-reward argues for gold

Since ancient times, gold has been a trusted means of payment and value storage. This makes gold the money with the far longest history – which bodes well for its status in the future, also in the event of a crisis.

Our analyses presented in this document suggests that investor interest in the yellow metal likely will increase in the years ahead.

Europe in uncharted monetary territory

The current monetary era is different from all we know from history. Government bond yields in Switzerland and Germany are negative even for 10-year maturities. Worldwide, nearly 25% of all bonds, i.e. bonds worth over 12 trillion U.S. dollars, have a negative yield. This phenomenon and banks in Switzerland (and to some extent in the euro area) increasingly charging interest on client deposits make the holding of the zero-yield asset gold attractive – quite different from the past when gold holders forewent often-high yields on bonds or bank deposits.

Another aspect of the low-yield environment is that central banks need to deal with the zero-rates boundary, clearly constraining the impact of monetary policy in the event of a marked economic downturn.

Governments: Limited room for fiscal manoeuvre

Similar to central banks, governments are increasingly constrained when aiming to prop up economies via spending programs in a recession as financial markets, after decades of rising government debt, are now less likely to finance such projects (witness the financial market backlash to Italy's budget plans in 2018).

Increased economic risks

In such a fiscal and monetary policy constellation, macro economic risks are structurally higher than in the past. In addition, after the already longest upswing in history in the USA and many parts of Europe, the risk of a recession in the coming years is rising.

Supportive demand and supply dynamics

Among the many buyers of gold, central banks have been the most steady contributors to demand since 2010, and we expect this trend to continue in the years ahead.

Overall, supply has been sufficient to meet demand in recent years. As mining companies have been depleting reserves

and greenfield gold findings have been limited in the past 10 years, the risk of supply disruptions over the medium term has clearly risen. Overall, supply and reserve dynamics argue in favour of gold.

“The gold price is driven by uncertainties and the investment cycle of gold mining companies. We believe that both factors currently work in favour of gold.”

Not expensive

In recent years, the gold price has risen modestly despite a strong dollar (which is often a factor negatively affecting gold).

The gold price is now about in line with historic multiples of production costs. Gold thus IS not expensively valued, quite different from when the gold price peaked at over 1’900 U.S. dollars per ounce at the height of the eurozone’s debt crisis in 2011.

Gold: An increasingly attractive portfolio diversifier

As gold returns are not correlated with the returns of the major asset classes (i.e. equities and bonds), gold helps to improve the risk-return characteristics of investment portfolios. This is all the more true in a world of negative yields from the safest European government bonds (Switzerland and Germany) as bonds are losing some of their diversification benefits in this environment.

The risk and return characteristics of gold – long up and down cycles, with gold’s return volatility markedly higher than that of bonds – argue for adding gold as a portfolio diversifier in a moderate manner, though our conviction in doing so is currently high. An exposure of 5%-10% in a well-diversified portfolio perfectly aligns with this view.

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de Pury Pictet Turrettini & Co. Ltd
12, rue de la Corraterie
P.O. Box 5335
CH-1211 Geneva 11
T. +41 22 317 00 30
Fax +41 22 317 00 33
www.ppt.ch