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About the World Gold Council

The World Gold Council is the market development organisation for the gold industry. Working within the investment, jewellery and technology sectors, as well as engaging with governments and central banks, our purpose is to provide industry leadership, whilst stimulating and sustaining demand for gold.

We develop gold-backed solutions, services and markets based on true market insight. As a result we create structural shifts in demand for gold across key market sectors.

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

Based in the UK, with operations in India, the Far East, Europe and the US, the World Gold Council is an association whose members comprise the world s leading gold mining companies.

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Foreword

Marcus Grubb

Managing Director,

Investment Strategy

Welcome to the seventh edition of *Gold Investor*. For the past two years, *Gold Investor* has included a comprehensive collection of articles covering many relevant topics for investors. We have previously examined subjects such as how gold can reduce portfolio risk in a rising rates environment (*Can gold replace bonds in balancing equity risk?*),[1] the benefits of holding gold as a key portfolio component (Why invest in gold?),[2] and the true relationship between gold and real rates (Gold and US interest rates: a reality check)[3] among others. Yet, we are particularly excited about the articles in this current issue.

In the years that followed the 2008-2009 financial crisis, many investors turned to gold as a store of wealth amid challenging economic conditions and heightened uncertainty. Today, particularly in the US, the economic recovery is gaining momentum and common wisdom suggests that a better economic environment would be bad for gold. Higher interest rates increase the opportunity cost of holding gold and drive away investors. However, this oversimplification misses four key points:

- The long-term performance of the gold market is not solely linked to investment demand in developed markets or the US alone
- There is a strong correlation between economic growth and gold consumption (as a luxury good and as integral component in high-end electronics)
- Maintaining a proper portfolio risk management strategy is as important in good times as it is in bad
- The gold market has undergone several structural shifts that have increased the demand base.

In *Gold Investor*, Volume 7, we explore these issues in greater detail.

Not all gold demand is counter-cyclical

Juan Carlos Artigas

Director,

Investment Research

First, we explore the connection between economic growth and gold through our analysis and third-party research in *The growth dividend: how rising GDP lifts gold consumer demand.*

Investors understand that in times of economic duress high-quality, liquid assets such as gold are in high demand. What is less understood is that the majority of gold demand is linked to consumption and long-term savings and not to speculative investment. As an economy expands, incomes grow and gold demand increases counter short-term investment flows. In turn, this pro-cyclical nature of consumer demand and counter-cyclical nature of investment demand make gold an effective diversifier and valuable portfolio component.

Tail-risk hedging should be a multi-environment affair

In *A practical hedge: less exotic, multipurpose, lower cost,* we make the case for gold as a valuable component of any portfolio risk-hedging strategy.

The current low volatility environment has made many portfolio hedges cheap to buy, but that doesn t mean that they are inexpensive to hold. We analyse and compare multiple investment vehicles commonly used as tail-risk hedges. Our research finds a compelling case for gold as a valuable hedge. It is cost-effective, easy to implement, and has a wide range of applications even if its return during tail events is often lower than bespoke (and often derivative-based) tail risk-mitigating strategies.

The market has changed and more investors can gain access to gold more easily

Finally, we look at one of the most revolutionary structural shifts the gold market has experienced in *Ten years of gold ETFs: a wider and more efficient market.*

Over the past decade, gold-backed ETFs have become a US$70 billion dollar market with holders of all sizes and types spread across various geographies. Yet, the advent of ETFs has benefitted other gold investors as well: they have increased demand, democratised access, increased competition for new and existing gold vehicles, and contrary to popular belief they have responded to rather than driven gold volatility higher.

We hope you enjoy this edition of *Gold Investor* as much as we enjoyed writing it. If you have comments or questions on any of the articles you may reach us at **investmentresearch@gold.org**.

1 Gold Investor, Volume 5, July 2013.
2 Gold Investor, Volume 4, October 2013.
3 Gold Investor, Volume 3, July 2013.

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I: The growth dividend: how rising GDP lifts gold consumer demand

Current data on the world s economies is mixed. There is both positive and negative news about developed and emerging markets but many investors particularly in the US are optimistic about a return to growth.

Conventional wisdom says this will be bad news for gold.

We believe the true picture is more complex. Gold benefits from both the growth and contraction phases of the business cycle, and our analysis, based on new third-party research, highlights the positive link between economic growth and consumer demand for gold.

Consumer demand for gold closely tracks growth

The gold market has three main market segments: consumers (jewellery and technology), investors (bars, coins and gold-backed financial products) and central banks. The issues of their relative weightings, effects and influence on gold are complex and will, we expect, be subject to discussion for a long time.

A lot has been said about the link between recessions and gold, generally that investors look for a store of wealth and thereby lift demand for gold. Much less has been written about the effect that positive economic growth has on consumer demand, despite the fact that this makes up the lion s share of physical gold demand (**Chart 1**).

We have turned to our own research as well as a third-party econometric study to form our view on this topic. The research has provided a striking reminder of what we see as gold s positive duality: its ability to benefit from both the contraction and expansion phases of the business cycle.

Chart 1: Consumer demand provides long-term support to the gold market

Five-year average consumer and investment demand ending 2013

Reference notes are listed at the end of this article.

Source: GFMS-Thomson Reuters, respective ETF and ETP providers, World Gold Council

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The key findings, set out in this article, are that:

During an expansionary period, a good portion of investment demand for gold falls. However, the gold market does not collapse. Part of gold investment demand increases alongside long-term savings rates. These, in turn, benefit from positive economic growth.

We recognise that changes in investment demand affect gold, but we believe that the effects of a good portion of this demand are short- to medium-term variances within a longer-term trend. As the third party research points out, investment demand is much smaller than jewellery [and electronics] demand, but shifts in investment demand can be large and play a critical swing role in the market.

Rising incomes boost jewellery demand. In the last five years, jewellery demand averaged 58% compared to 35% for investment demand. The new analysis shows that a 1% increase in GDP lifted jewellery consumption by an average of 5% all else equal.

Technology demand is significant and poised to rise. If technology demand for gold (a five-year average of 10%) were a country, it would come third, after India and China. Technology is also closely correlated to growth: every 1% increase in global GDP, all else equal, raised electronics demand for gold by 5.1%. This demand also responds little (is inelastic) to the gold price once the effect of economic growth is taken into account.

The health of the economy has come a long way since the financial crisis but the outlook across regions varies

Before we consider the link between economic growth and gold, it is important to note that not all economies appear to be set for an upturn in growth.

There are mixed views about the robustness of the US recovery, but the economy is in better shape than it has been for a while

The US economy appears to be gaining momentum after several flat years, but opinion is divided on whether the improvement is structural or transient (see *A practical hedge: less exotic, multipurpose, lower cost* for a discussion about signs that suggest that now may be a good time for portfolio protection). Some observers see the start of a recovery, while naysayers see a feeble by-product of the Federal Reserve s aggressive policy. Others suggest that the US economy may never return to pre-2008-2009 levels and will have to adjust to a lower normal and more spare capacity.

Despite the debate, two things are clear: mid-2014 economic conditions are better than they have been for years, and many experts if not all believe that the US economy is in a brighter trend.

Europe s outlook is less rosy

The UK has managed to avoid the major sovereign debt problems of continental Europe but is now overheating in some sectors, particularly housing. At the same

time, inflation is showing signs of slowing down.

unlike Europe where the spectre of deflation looms large.

Elsewhere in Europe deflation is a real threat, and the EU s austerity measures have been criticised by, among others, IMF economists, who suggest that austerity will not promote economic recovery. Tensions with Russia are not helping Europe s growth prospects, either. Even so, markets are functioning better, and borrowing costs have fallen from the worrying highs of the 2011 sovereign debt crisis.

Emerging markets still have plenty of room to grow

Geopolitical tensions will dampen the economic prospects of countries like Ukraine and regions like the Middle East, but there are brighter prospects elsewhere.

India has decelerated sharply in recent years, but the change in government has renewed public confidence: the markets suggest that economic growth will return soon. Meanwhile China, the poster child for emerging market expansion, has adopted policies that have lifted growth. The credit market still faces difficulties, and there is the risk that a disorderly collapse would spill over to other sectors.

Current views on EM are mixed, but their future is brighter.

Despite this rather mixed news the consensus among economists is that emerging markets will make up more than half of global GDP growth and account for more than half of economic output by 2020.[1]

1 Ernst & Young, *Tracking global trends: How six key developments are shaping the business world*, 2011. McKinsey & Co., *Winning the $30tn decathlon: Going for gold in emerging markets*, 2012.

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The positive duality of gold demand: counter-cyclical investment and pro-cyclical consumption

Investors can benefit from modest, long-term holdings of gold instead of solely tactical short-term positions.

Many investors view gold as a safe haven, one that is only relevant when there is potential for high inflation, economic uncertainty, or currency depreciation (see **Focus 1**). Still we consider that gold s role in an investment portfolio should be more strategic. Investors can benefit from modest, long-term holdings of gold instead of solely tactical short-term positions (see *Why invest in gold?*).[2]

Our research and analysis shows that gold is:

A valuable portfolio diversifier. Gold has little correlation to all the major components of a typical investment portfolio in both good and bad economic environments in stark contrast to other so-called diversifiers[3]. In that sense, gold is a true diversifier.

A cost-effective hedge. Gold is less (and often negatively) correlated to equities and other risk assets during periods of systemic risk and usually less costly to maintain as a consistent component of a portfolio. This makes gold particularly relevant for investors looking to buy portfolio protection (see *A practical hedge: less exotic, good performance, lower cost*).

Positively linked to economic growth. Economic growth lifts consumers incomes which, in turn, raise demand for luxury goods as well as money devoted to savings. Both of these trends have a positive effect on gold demand.

Focus 1: A decade of structural changes has shaped the gold market

Gold has been one of the best performing assets for more than a decade. Despite the substantial price pullback gold experienced last year, the gold price, on average, rose by 12% per year between January 2001 and December of 2013 and it is up so far this year at the time of writing.

Many market participants link gold s stellar performance to the financial crisis and the increase in investment demand that followed. No doubt the financial crisis brought additional demand that supported higher prices and the part of this demand coming from ETFs receded in 2013 (**Chart 2**). However, the factors that influenced gold s bull run over the past decade are more complex and interesting.

The gold market experienced various structural shifts during the past decade that were equally relevant for gold s performance.

On the demand side:

Economic growth in emerging markets, especially in Asia and the Middle East, brought with it a bigger set of consumers with increasingly higher incomes.

The liberalisation of the Chinese gold market cemented China as a powerhouse in the gold market, both as a producer and as a consumer.

The advent of exchange-traded funds increased the investor base for gold, many of whom are longer-term holders (see *Ten years of gold ETFs: a wider and more efficient market*).

Central banks which had been net sellers of gold for two decades slowly but surely turned into net buyers by the second quarter of 2009, led by emerging markets.

On the supply side:

Mine production has only gradually increased relative to the levels seen at the beginning of the century, and many analysts suggest mine production could start falling again over the next few years.

In addition, mining companies have substantially reduced their hedge book, limiting additional demand from future production.

Chart 2: Investment demand through ETFs and similar products increased during the financial crisis and came down in 2013

Cumulative ETF (and similar) demand since 2003

Reference notes are listed at the end of this article.

Source: Respective ETF providers, World Gold Council

2 World Gold Council, *Why invest in gold?,* Gold Investor, Volume 4, October 2013.

3 World Gold Council, *How gold improves alternative asset performance,* Gold Investor, Volume 6, June 2014.

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A recap of gold s consumer, investment, and geographic demand factors

As we see it, gold is a good diversifier as a by-product of its sources of demand and supply, their interactions, and the factors that influence them. In fact, while investment demand often gets a lot of attention especially in the West consumer demand is greater by some margin. In the last five years average demand breaks down as follows (**Chart 3a**):

Consumer demand (58%). The jewellery industry accounts for nearly half of annual gold demand (48%), and 10% ends up in electronic products (to make high-conductivity connections in smartphones and computers). This part of demand is pro-cyclical and is positively linked to GDP.

Investment demand (35%). It is divided between 32% for bars and coins and 3% for exchange-traded funds and similar products. The 5-year average ending in 2012 which excludes the strong ETF outflows of 2013 still puts investment at 37% (28% bars and coins, 9% ETFs). A good portion of investment demand is counter-cyclical and typically increases when GDP falls and vice-versa.

Central bank demand (7%). Formerly a source of supply, central banks have become a source of demand fairly consistently since the second quarter of 2009, and we expect this trend to continue. Generally this demand is not directly linked to GDP and responds to government policies. It is linked to central bankers views of the global monetary system.

Gold demand is also geographically diverse (**Chart 3b**). This geographic spread, along with the oppositely correlated demand streams, helps to smooth out gold s demand curve. For example, in 2010-2011 investment demand was quite strong in the West while consumer demand was flat; in contrast, consumer demand in Asia outstripped investment demand as the region quickly recovered after the 2008-2009 financial crisis.

In addition, Asian economies typically devote more money to savings (the real average saving rate is around 30% and can reach levels greater than 50% of disposable income), supporting a more robust long-term demand trend.[4] Indeed, gold is a natural vehicle for savings in many Asian economies: from direct gold purchases to innovative banking solutions such as gold-accumulation plans.[5]

Chart 3: Jewellery and technology make up nearly 60% of demand as emerging markets buy nearly 70% of all gold

(a) Five-year average demand by sector

Reference notes are listed at the end of this article.

Source: GFMS-Thomson Reuters, World Gold Council

(b) Five-year average demand by region (excludes central banks)

Reference notes are listed at the end of this article.

Source: GFMS-Thomson Reuters, World Gold Council

4 Horioka C. Y. and A. Terada-Hagiwara, *The determinants and long-term projections of saving rates in developing Asia*, NBER, WP 17581, November 2011.

5 In 2011 the Industrial and Commercial Bank of China (ICBC) the largest commercial bank in the world launched the first gold-accumulation plan in China with help from the World Gold Council.

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The positive impact of economic growth on gold demand

Over the long run, gold is supported by consumption and long-term savings.

Conventional wisdom holds that good economic times are bad for gold. This is based on the fact that investment demand for gold tends to soften during times of growth. Over the short (and sometimes medium) term, gold investment can exert strong pressure on prices whether via the physical (and physically backed) markets, through derivatives in exchanges, or over-the-counter products. But over the longer term, economic growth tends to be good for gold.

For example, India and China s combined share of world gold demand grew from 25% in the early 1990s to more than 50% by 2013. Consumers and investors in China bought more than 1,200 tonnes of gold in 2013 20% more gold than the current combined gold holdings of all US-listed gold-backed ETFs. In both India and China gold demand is closely correlated to increasing wealth (**Chart 4**).

Chart 4: China and India s appetite for gold is closely linked to their rising incomes

(a) Chinese gold expenditure per capita vs. income per capita

Reference notes are listed at the end of this article.

Source: GFMS-Thomson Reuters, World Bank, World Gold Council

(b) Indian gold expenditure per capita vs. income per capita

Reference notes are listed at the end of this article.

Source: GFMS-Thomson Reuters, World Bank, World Gold Council

To further explore this link between economic growth and gold demand, we commissioned Professor Avinash Persaud[6] to carry out an econometric analysis of the gold market. He analysed the link between GDP growth and consumer demand globally as well as in 11 countries with the largest jewellery demand.

In the introduction to his study, Persaud observes that the [structure] of the gold market often surprises those unfamiliar with it. In value it is large. Annual gold demand is worth approximately US$175 billion to US$200 billion greater in size than the entire European luxury goods market. The [above ground] stock of mined gold in the world today around 177,000 tonnes is worth approximately US$7.5 trillion. In physical size it is small. The above ground stock would fit into a 21-meter (67-foot) cube or, equivalently, would fill 2.5 Olympic swimming pools.

The vast majority of gold is not used for speculative purposes.

He also notes, of the interplay between consumer and investment demand, that [t]he vast majority of gold demand is not for speculative or investment purposes, but for the more [commonplace] and deep-rooted purpose of fabrication of gold into jewellery or decoration. [ ] The level of investment demand is much smaller than jewellery demand, but shifts in investment demand can be large and play a critical swing role in the market.

6 Avinash Persaud is Chairman of Intelligence Capital Limited, a financial advisory firm based in London. He is a leading expert in global markets research and has ranked as one of top three currency analysts in global investor surveys for over a decade. Among others roles, he previously worked at J.P. Morgan as the Global Head of FX and Commodity Research. Mr. Persaud was elected a member of Council of the Royal Economic Society and is Emeritus Professor at Gresham College; Visiting Fellow at CERF-Cambridge University, and Governor of the London School of Economics. He was 2010 President of the Economics Section of the British Academy.

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Rising incomes are the key link between jewellery demand and economic growth

A 1% increase in GDP lifts jewellery demand by 5%

Persaud found that a 1% increase in real GDP increased jewellery consumption by an average of 5% holding all else equal. His analysis shows that this positive relationship between growth and jewellery demand applies beyond India and China. He found that jewellery demand in the 11 countries that consume the most gold correlates strongly to real GDP growth.

and the demand-lifting effect of rising incomes outweighs the demand-damping effect of higher prices.

He found that a simple regression that included real GDP growth and gold prices explained 60% of the changes in jewellery demand and consistently captured the direction of demand changes (**Chart 5**). This model found that the positive relationship between jewellery demand and economic growth is more significant than the negative effect that higher prices may have on demand. In other words, the demand-lifting effect of rising incomes outweighs the demand- damping effect of higher prices.

Demand for gold jewellery would get a double uptick if higher economic growth coincided with a temporary dip in gold prices.

Chart 5: Rises in economic growth explain increases in jewellery demand

Changes in annual gold jewellery demand (in log scale) as a function of real GDP (+) and the gold price (-)

Reference notes are listed at the end of this article.

Source: Avinash Persaud, World Gold Council

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Country-by-country analysis shows that the model works at a national level

The picture at a country level is not much different from the consumer trend (**Table 1**). Persaud found a highly significant and positive correlation to GDP and income growth and a negative relationship to price. These models explained anywhere from half to more than 90% of changes in jewellery demand for each country.

Table 1: Jewellery demand in the top gold-consuming countries responds consistently to economic growth, income and price

Summary results from linear regressions between changes in annual jewellery demand and various explanatory variables

	5-year average annual demand (tonnes)	Coefficient sign				
		Gold price elasticity	Income	GDP	Inflation	R-squared
World	2,048.4	-0.4	+	+	na	0.60
India	616.2	-1.1	++	+	++	0.50
China	582.1	na	++	+	++	0.60
US	60.9	-0.4	+	+	++	0.83
Russia	44.1	-0.5	+	+	na	0.92
Turkey	78.2	-0.5	+	+	+	0.48

++ = positive coefficient strong influence; + = positive coefficient; weaker influence.

na = coefficient is not statistically significant and was not included in the regression model.

Additional reference notes are listed at the end of this article.

Source: Avinash Persaud, GFMS-Thomson Reuters, World Gold Council

There were some additional interesting findings:[7]

Trading hubs are less affected by the relationship between growth and demand. Gold trading hubs such as Italy, the UAE and Hong Kong do not follow the model due to the large volume of gold traded in these countries.

Developing-country buyers are more sensitive to the gold price. India, Turkey, Egypt, Indonesia and the UAE were more sensitive to prices (with price elasticities around -1). This is probably because consumers are more aware of the underlying value of gold and are often reluctant to pay high mark-ups for brand or design.

Developed-country buyers are less price sensitive . The US, Russia, Italy and the UK were less sensitive to changes in price (around -0.5). Consumers may be used to paying higher mark-ups for brand and design, and jewellery prices vary less than the underlying gold price.

> China showed no sensitivity to price. Persaud suggests that the strong income growth combined with limited access to investment assets makes gold attractive to a growing number of people looking for a store of value [ ] gold represents one of the few assets that can hedge local inflation, currency movements and other local financial risks.
>
> Inflation boosted demand in many countries. In India, China, the US, UAE, Indonesia, Italy, the UK and Turkey (to a lesser extent) consumer demand for gold increased with higher inflation. This indicates that gold is seen as a way to protect wealth, even in the form of jewellery.

Persaud concluded that for gold jewellery demand:

Gold is a superior good one that responds positively to rising incomes.

Given a strong price elasticity of demand in many countries, a trebling in the gold price should have led to an even greater decline in gold jewellery consumption, and if prices were to stay high, a permanent decline in consumption. However, jewellery consumption is also highly sensitive (elastic) to rising income. Gold jewellery is what economists refer to as a superior good where demand increases proportionally more than income.

7 Some of the results are not included in Table 1 to simplify its view, but jewellery demand for all these countries follow a similar structure as discussed in the summary bullet points.

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Gold demand in electronics and the business cycle

A 1% rise in GDP, increases gold electronics demand by 5.1%.

Persaud found that for every 1% increase in global GDP, gold demand for electronics increased by 5.1% and that the gold price, perhaps surprisingly, has little influence on demand.

As shown in **Chart 3a**, gold used in technology accounts for 10% of annual gold demand, the majority of which goes to electronics (super conductors, bonding wire, etc). While this may sound small, gold used in electronics makes up close to 10% of annual demand twice as much as ETFs have contributed to gold demand on average between 2004 and 2013.

In his analysis, Persaud found that demand for gold in electronics can be easily and accurately explained by economic growth (**Chart 6**). In particular, he found that changes in global electronics demand are positively related to world GDP growth and negatively related to the previous year s growth (as a balancing feature). As a consequence, gold demand for electronics does not increase as much after a period of high and continuous growth as it does after a year of soft growth. Conversely, gold electronics demand gets a lift in the year following a period of negative growth. An additional binary (or indicator) variable helps explain the unusually low level of demand after the dot-com bubble burst in 2001 and the sharp drop in semi-conductor sales that year.

This simple model explains approximately two-thirds of variability in demand.

Chart 6: Electronics demand for gold is highly correlated to economic growth

Changes in annual gold electronics demand (in log scale) as a function of current (+) and past (-) GDP plus an indicator variable for 2001

Reference notes are listed at the end of this article.

Source: Avinash Persaud, World Gold Council

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Consumer demand is more relevant today than it was in during the 1970s

Investors who have followed the market for the long term may remember that during the 1970s, gold prices exponentially grew only to fall equally fast in the 1980s. Many market observers question whether we may see a similar development again and wonder whether consumer demand would be sufficient to support a drop in investment demand. In *The evolving nature of gold demand and supply*,[8] we explained the many differences between gold s performance this decade and forty years ago.

Four decades ago, Western investment demand was more relevant for the gold market than what it is today.

During the 1970s, demand was concentrated around investment and led primarily by developed markets (**Chart 7**). In addition, the dynamics of supply were truly different. During the 1980s, central banks were a large source of net supply, there was widespread producer hedging and gold was not as democratised as now (see *Ten-years of gold ETFs: a wider and more efficient market*).

Today, central banks are net buyers, their lending has dropped substantially, and there is barely any producer hedging (see **Focus 1**). In addition to the constrained supply, investors hold on average less than 1% of their assets in gold compared to more than 10% during the 1970s.

Chart 7: Geographic composition and source of demand is more diverse today than it was during the 1970s

10-year average global demand by source and geography during the 1970s and 2000s

Reference notes are listed at the end of this article.

Source: GFMS-Thomson Reuters, World Gold Council

Outlook: the practical impact of consumer demand on gold

Gold prices can be affected in the short term by investment flows, but consumption and savings in conjunction with supply shape the longer-term trend.

The price of gold can be explained as a long-term (and slow-moving) trend that deviates due to short- or medium-term market developments. Over the short (and potentially medium) term, gold investment whether via the physical (and physically backed) markets or through derivatives in exchanges or other-the-counter (OTC) can exert strong pressure on prices. This type of demand grows with uncertainty and falls as investor confidence grows. However, the longer-term trend is more closely linked to global consumption, savings and, at the same time, by the availability of supply (or lack thereof).

Our analysis suggests there is a clear, positive relationship between economic growth and consumer demand for gold through rising incomes. So it seems reasonable to suggest that positive GDP growth will not necessarily be negative for the gold market.

Not only consumption and gold savings demand make up the largest share of demand worldwide, but they even represent an important market in developed countries such as US where 50% of gold demand is linked to consumers (see **Chart 1**).

8 World Gold Council, *The evolving nature of gold demand and supply*, Gold Demand Trends: Third quarter 2011, November 2011.

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References

Chart 1: Consumer demand provides long-term support to the gold market

Average demand by region; it includes jewellery, technology, bars, coins and ETFs and excludes over-the-counter and central bank purchases. ETF demand assigned to the country of where the fund is listed. See reference notes for Chart 2 for a complete list of ETFs used for estimating full tonnage.

Chart 2: Investment demand through ETFs and similar products increased during the financial crisis and came down in 2013

Cumulative demand since 2003 from gold-backed ETFs, gold ETNs, and similar products that we periodically monitor. Namely: SPDR Gold Shares, iShares Gold Trust, Central Fund of Canada Ltd, Sprott Physical Gold Trust, ETFS Gold Trust, Central GoldTrust, Royal Canadian Mint - Canadian Gold Reserves, iShares Gold Bullion ETF, ETFS Physical Precious Metal Basket Shares, Merk Gold Trust, ETFS Asian Gold Trust, ZKB Gold ETF, ETFS Physical Gold/Jersey, Gold Bullion Securities Ltd, Julius Baer Precious Metals Fund - JB Physical Gold Fund, Xetra-Gold, Source Physical Gold P-ETC, iShares Gold CH, db Physical Gold Euro Hedged ETC, UBS ETF CH-Gold CHF hedged CHF, db Physical Gold ETC, db Physical Gold ETC EUR, Pictet CH Precious Metals Fund - Physical Gold, iShares Gold CHF Hedged CH, ETFS Physical Swiss Gold, iShares Physical Gold ETC, UBS ETF CH-Gold EUR hedged EUR A-dis, EUWAX Gold, Credit Suisse Institutional Fund II - Gold Blue, Raiffeisen ETF - Solid Gold Ounces - AC, iShares Gold EUR Hedged CH, ETFS Physical PM Basket, Raiffeisen ETF - Solid Gold, db Physical Gold GBP Hedged ETC, ETFS EUR Daily Hedged Physical Gold, FinEx Physically Held Gold ETF, ETFS GBP Daily Hedged Physical Gold, Goldman Sachs Gold Exchange Traded Scheme - GS Gold BeES, R*Shares Gold Exchange Traded Fund, Mitsubishi UFJ Japan Physical Gold ETF, SBI Gold Exchange Traded Scheme, Kotak Gold ETF, HDFC Gold Exchange Traded Fund, ValueGold ETF, UTI-Gold Exchange Traded Fund, AXIS GOLD ETF, Canara Robeco Gold Exchange Traded Fund, ICICI Prudential Gold ETF, IDBI Gold ETF, Birla Sun Life Gold ETF, Hang Seng RMB Gold ETF, Bualuang CHAY Gold ETF, K Gold ETF, Quantum Gold Fund, Motilal Oswal MOSt Shares Gold ETF, Religare Invesco Gold Exchange Traded Fund, Thanachart Gold ETF, ThaiDEX GOLD ETF, ETFS Physical Gold ETF, NewGold Issuer Ltd, ETFS Metal Securities Australia Ltd - ETFS Physical Gold, Istanbul Gold Exchange Traded Fund, BetaShares Gold Bullion ETF Currency Hedged, Kuveyt Turk Katilim Bankasi A.S.B Tipi Altin Borsa Yatirim Fonu, AfricaGoldETF.

For the few ETFs and ETPs in this list containing a portion of their assets in derivatives, only the total amount of actual physical gold was estimated and included in the computations.

Chart 3: Jewellery and technology make up nearly 60% of demand as emerging markets buy nearly 70% of all gold

(a) Average demand by source. It excludes over-the-counter gold demand.

(b) Average demand by region. It excludes over-the-counter and central bank gold demand.

Chart 4: China and India s appetite for gold is closely linked to their rising incomes

(a) Gold expenditure per capita as a function of gross national income per capita. Both in Indian rupee terms.

(b) Gold expenditure per capita as a function of gross national income per capita. Both in Chinese yuan terms.

Chart 5: Rises in economic growth explain increases in jewellery demand

Changes in global gold jewellery demand regressed against changes in real GDP and the price of gold. All input variables in log scale. The original analysis performed using annual data between 1993 and 2012. The chart incorporates 2013 data.

Table 1: Jewellery demand in the top gold-consuming countries responds consistently to economic growth, income and price

Changes in regional gold jewellery demand regressed against changes in local real GDP, local inflation the price of gold in local currency. All input variables except inflation in log scale. The original analysis included data up to 2012, but due to data availability, starting points change: world (1993); India (1989); China (1999); US (1981); Russia (2001); Turkey (1984).

Chart 6: Electronics demand for gold is highly correlated to economic growth

Changes in global gold electronics demand regressed against changes in world real GDP, the previous year s real GDP and a dummy (0/1) variable for 2001. Demand and GDP in log scale. The original analysis performed using annual data between 1985 and 2012. The chart shows the fitted model between 1993 and 2013 for consistency with Chart 5.

Chart 7: Geographic composition and source of demand is more diverse today than it was during the 1970s

The 1970s period is computed using the annual demand date from 1973 to 1979. The 2000s period is computing using annual demand data from 2004 to 2012. Negative values of demand was considered part of supply and not included in the calculations. Many of these figures have been subsequently revised as a result of changes in methodology.

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II: A practical hedge: less exotic, multipurpose, lower cost

The 2008-2009 financial crisis spawned the tail-risk hedge, an instrument that aims to protect investors from the worst of sudden, hard-to-predict market crashes.

These hedges can be rather like exotic sports cars: impressive performers, but expensive to own and too technically complex for most.

Our research shows that gold may not perform like a high-octane tailored hedge but can be a practical alternative. It is straightforward, delivers acceptable performance and is less costly to own.

A low cost multi-purpose tail-risk hedge

The 2008-2009 financial crisis added fat tail to our investment lexicon. Before then we knew that tails were the less-likely-to-occur events to the left and right of a return distribution curve and that the left tail is the one that brings woe to investors. We now know that those tails can be fatter than expected. Things that are, statistically speaking, highly unlikely can and do happen. Tail-risk hedges aim to insure investors against losses from those fat-tail events.

In late 2010 we set out gold s role as a tail-risk hedge[1]. This paper looks at a range of tail-risk hedges and considers these issues:

- Impressive performance brings higher cost of ownership. Structured hedges eat into investors resources: they have to be carefully monitored, have hidden risks, and their running costs are a drag on performance. We also note that few of these hedges have been tested in the battle conditions of a systemic crash.
- Tail-risk hedges should work in multiple scenarios. Structured hedges are often designed to respond to specific tail-risk triggers typically those that characterised the last systemic event to shake the market. Yet tail risks have unique profiles, so what worked last time may not work next time.
- Gold can be a useful part of the bigger tail-risk picture. It does not perform as well as a tailored, structured volatility-based hedge. Yet when one factors in the cost of ownership, the protection afforded, and the breadth of application, gold is a valuable alternative. We also suggest that a tail-risk hedging strategy that includes gold is better than any standalone hedge.

1 World Gold Council, *Gold as a tail-risk hedge*, October 2010 and *Managing portfolio risk for periods of stress*, Gold Portfolio Letter No. 11, December 2001.

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Tail risks are hard to mitigate and harder to ignore

High asset correlations and a double, even triple, whammy for investors

Tail events can induce a double, or even triple, whammy for investor portfolios.

The 2008-2009 financial crisis is a stark reminder of how hard tail-risk events can hit investor portfolios (**Chart 1**). Large price falls trigger margin calls, forced sales and further price falls. A vicious circle pushes prices down further, and these multi-asset sell-offs increase correlations between all assets.

Many investors risk getting hit by a double, or even triple, whammy. Their asset values fall while the present value of their liabilities rises - which for sponsors of defined benefit plans, to take one example, can leave funding ratios dangerously low.[2] There can also be a third whammy: a spike in inflation. If the tail event is driven, or closely followed by a surge in inflation, investors may have to sell assets to support inflation-linked spending.[3]

Chart 1: When the left tail bites: market crises prompt big drawdowns

Reference notes are listed at the end of this article.

Source: Bloomberg, World Gold Council

Definitions are less than straightforward

In order to manage tail risks, we must first define them.

We believe that to define tail-risk events you need to add a pinch of qualitative judgement to your quantitative rigour. That said, existing research appears to agree on three points:

> High correlations between asset classes. Tail risks tend to be systemic (they affect all financial markets). So while an idiosyncratic risk (one that affects a single market or industry) can be diversified away, a tail risk generally cannot. At a time of systemic risk, everyone wants liquidity, but no one is willing to provide it. This raises correlations between all asset classes which is why traditional diversification performs poorly.[4]

2 Sullivan, Ed., *Tail Risk Hedging: A Sensible Strategy for Defined Benefit Plans*. Pensions & Investments, Dec, 2012.

3 A recent paper (Ruff, J. & Childers, V., *Fighting the Next Battle: Redefining the Inflation-Protected Portfolio*, The Journal of Portfolio Management, Spring 2011) using a simple 60/40 portfolio, showed the destructive effects of inflation in the US, UK and Japan. Assuming a spending rate of 4% per year from a portfolio, an investor would have experienced a -3.5% annualised return and the compounding effect of inflation would have reduced real portfolio value by 65%. The inflationary episode in the UK between 1910 and 1920 would have seen almost 90% of real portfolio value wiped out and a Japanese investor in the post-war decade starting 1946 would have lost 52%.

4 Bhansali, V., *Tail Risk Management*, Journal of Portfolio Management, summer 2008.

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At least two standard deviations from the mean. The investment industry seems to quantify tail risks as events that fall beyond two or three standard deviations from the mean with perhaps a recent convergence on three. The drawback of analysing very low-probability events is that the dataset is very small. For a three-sigma weekly event, the expectation is that one strikes approximately once every 28 years. Two standard deviations is still a large enough move to severely impact investor portfolios and results in a larger set of events to analyse.

Volatility is an appropriate metric. Most investors consider their investment goals as continuous - a private investor may need to draw funds at a moment s notice, or a fund manager has to service a client s redemptions - so we believe volatility, even in the short term, to be more relevant to this analysis than other considerations such as longer-term terminal (or target) wealth.[5]

Tail-risk hedging is not just a defensive strategy

On top of loss-avoidance, tail risk hedges provide other benefits.

Aside from the loss-reduction benefit, tail-risk hedging gives investors two other distinct advantages: opportunity and confidence. Tail-risk hedging is commonly viewed as a defensive strategy akin to buying home insurance but many contend that it is a useful, proactive strategy in the long term.

A tail risk hedge is designed to gives investors positive cash-flow during market turbulence, thereby providing them with the opportunity to take advantage of oversold and mispriced assets.

Research from bond giant PIMCO argues that an aggressive portfolio with tail-risk hedges in place has more upside potential than a less risky one but similar levels of downside risk.[6] This can give investors the confidence to use more aggressive investment strategies and harvest more equity premium in the long term.[7] As the PIMCO report comments, Tail-risk hedging may allow certain investors to maintain an allocation to risk assets where they might otherwise deem the position to be too risky. It can also help stabilise portfolios on a mark-to-market basis.[8]

Tail risk hedges therefore provide not just the short-term buffer when markets fall but also confidence to invest higher up the risk scale over the long-term - and the opportunity to invest when markets are distressed.

5 Estrada, J., *Rethinking Risk*, IESE Business School working paper, May, 2014.
6 Bhansali, V., Davis, J.M., *Offensive Risk Management: Can Tail Risk Hedging Be Profitable?* PIMCO white paper, 2010.
7 Bhansali, V. *Tail Risk Management*. Journal of Portfolio Management, summer 2008.
8 www.pimco.co.uk/EN/Insights/Pages/Is-Now-the-Right-Time-to-Hedge-Tail-Risk.aspx

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Hedge strategies have to balance performance and cost

Treasuries, cash and other traditional strategies can help

Following the 2008-2009 crisis, investors are now faced with a large choice of hedge strategies.

The universe of marketed tail risk hedges is quite broad, with numerous considerations for investors striving to hedge against rare correlated sell-offs: Time horizon, leveraged or not, active or passive and more. Each strategy has pros and cons.

Highly levered strategies such as put option strategies or volatility futures require little initial funding and respond well but are costly over time. This partly explains why traditional strategies using cash or treasuries are still popular candidates as all-weather hedges though the current low-interest rate environment has put a mathematical cap on their absolute effectiveness.[9]

Credit strategies are common too. Liquid indices on credit default swaps, a type of insurance on corporate bond default, are popular and an easier way to express a short view on corporate bonds than actually shorting the bonds - though access for ordinary investors is limited.

Some traditionalists promote momentum-based and defensive equity strategies as an alternative to the costs and uncertainty of volatility-based hedges. Value investing is a tail-risk of sorts: as undervalued investments grow in value investors convert the gains to cash. This mitigates the tail-risk built into overvalued assets.[10] The drawback here mirrors that of a cash hedging strategy it requires judgement and active management. In addition, it also requires active management and good judgement in measuring value.

Derivative-based hedges are attractively priced

Derivatives-based hedge prices are at historical lows, but while attractive prospects now - they are not cheap to own.

The post 2008-2009 crisis response to tail-risk hedging has tended to be derivative-based. Yet two things are worth noting about these instruments: they tend to be expensive to own and, at times, to transact and few have been tested in practice.

Tail events are rare and almost impossible to accurately predict. There are plenty of natural buyers, but few sellers who face large losses when tail events occur. Hence there is a high premium for this insurance and the higher the expected quality of protection, the more expensive the hedge. For example, a put option position could cost a standard portfolio about 2% per year in performance.[11] This can be hard to sell to investors when seas look flat and calm.

As a result, structured products such as collared options that aim to maximise benefits per unit of cost have been designed and bundled for investors. Although attractive propositions, many of these strategies have not been rigorously tested in practice and can be opaque in their inherent risks (counterparty, liquidity) and potential costs (slippage) to investors.

That said the performance upside to volatility-based strategies is currently high as market volatility languishes close to multi-year lows. (see *Investment Commen*tary: first half 2014).

9 World Gold Council, *Can gold replace bonds in balancing equity risk?* Gold Investor, Volume 5, March 2014.
10 Montier, J., *A value investor s perspective on tail risk protection: An ode to the joy of cash*, June 2011.
11 Assuming: 60% in an S&P 500 Index fund and 40% in a US Bond fund and a rolling 3-month-to-maturity 10% out-of-the money put option from Dec 1986 to July 2014.

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A practical lower-cost alternative to volatility-based hedges

Gold provides a useful alternative, substituting some effectiveness for stability, low maintenance costs and broad applicability for some effectiveness.

The high portfolio performance drag, uncertainty and opacity of tail-risk hedges can be a considerable barrier for investors.

This is where we believe gold offers investors a useful alternative.

Although not immune to price drops, gold s long term annual real return is positive. Gold also tends to negatively correlate to equities at times of large selloffs a precondition of tail-risk hedges yet is often positively correlated to equities when they do well (**Chart 2**). Most tail-risk hedges, while more negatively correlated during tail events, do not enjoy that additional benefit.

Chart 2: Gold s equity correlation is positive in right-tail events and negative when left-tail events hit markets

Reference notes are listed at the end of this article.

Source: World Gold Council

The tail-risk hedge characteristics of gold are not of the magnitude or precision of dedicated hedges. Yet, the benefits of an allocation to gold may balance what you lose in foregoing a dedicated hedge:

Gold is a real asset and, unlike most financial assets, should benefit in an inflationary environment.

- No counterparty risk with physical gold. If you re buying insurance, you need to be sure of your insurer s ability to pay out in the event of a catastrophe. Yet in the markets your insurer is precisely the sort of institution likely to be going bust as a result of some unexpected tail event.[12] In contrast, gold is no one s liability.
- Very high liquidity even when constrained elsewhere gold has capped supply growth but is widely and readily available
- Little position maintenance or active management is required
- There is less drag on portfolio performance as cost of ownership is lower

Finally, unlike financial assets, gold is a real asset and is supported by rising inflation. A sudden rise in inflation negatively affects bonds and assets that derive value from future cash flows. Inflation also damages the real economy and creates risk aversion driving up risk premiums.[13]

12 blogs.reuters.com/felix-salmon/2011/07/01/why-you-cant-hedge-tail-risk/
13 www.nber.org/digest/oct04/w10263.html

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Tail-risk hedges comparing tradable, available alternatives

Gold s return profile mimics that of volatility-based strategies. Our analysis supports this but also shows gold s conditional performance to be more modest and less consistent than some hedges, at least during short-lived tail event windows. We will show however, how the costs of holding gold compares favourably to other tail-risk hedges.

We also consider the breadth of events a tail-risk hedge can protect against and conclude that gold is a generalist hedge. More tailored hedges may not cover investors in all possible scenarios.

We tested nine hedge instruments across a range of two-sigma events

Our analysis shows the conditional and unconditional performance of set of tradable hedges during two-sigma portfolio sell-offs.

We ran our analysis on a typical moderately aggressive portfolio with 60% in equities and 40% in fixed income.[14] Research shows that in such a portfolio, up to 92% of portfolio risk comes from equities which could justify using only equity-driven events for analysis. [15] But in our dataset, using portfolio rather than just equity returns marginally increases the number of tail events resulting in more robust analysis. In addition, including treasuries in the portfolio already incorporates the effect they have as natural portfolio hedges.[16]

We focused on tradable hedging instruments, ones that investors can actually acquire. This reduced our dataset to a window spanning 8.5 years (104 months to be precise) as most of these instruments were introduced only during the last decade. We used weekly returns in order to capture as many atypical market moves as possible.[17]

The period analysed coincides with strong gold performance. But it is also a period very supportive of other hedges given two giant market wobbles: 2008-2009 and 2011 (**Chart 3**). Extended high volatility has been a relative boon for derivative-based hedges during the last decade.

Chart 3: The last nine years have been particularly volatile

Reference notes are listed at the end of this article.

Source: Bloomberg, World Gold Council

14 Please see references
15 Qian, E., *Risk Parity and Diversification*, The Journal of Investing, Volume 20, No. 1, Spring 2011.
16 Benson, R. Shapiro, R.K., Smith, D, Thomas, R., *A Comparison of Tail Risk Protection Strategies in the U.S. Market*, Alternative Investment Analyst Review, 2013.
17 Although sell-offs experienced during most recessions have lasted months and in some instances years, it is not beyond most investors to adjust their portfolio to changing conditions. What starts off as a tail event becomes a

trend to which the investor can defensively position a portfolio. Analysing weekly returns is justified on this basis. We deflate returns by the US CPI (All-U) index.

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Our dataset includes 11 two-sigma falls (and seven two-sigma rises). This is well in excess of the five events expected under a bell curve and reminds us that asset prices frequently behave in a non-normal way.

We include a common, but not exhaustive, set of liquid tradable hedges based on three themes: volatility, credit/rates and real assets.

The hedges we analysed fall across three categories:[18]

Volatility-based:

VIX short-term future: The S&P 500 VIX short-term futures index, an index of rolled front month VIX futures (rolls between 1st and 2nd future). The shorter maturity future has a greater response to volatility but is more mean reverting and has a higher roll cost than longer dated futures.

VIX mid-term future: The S&P 500 VIX mid-term futures index, which rolls between the fourth to seventh VIX futures contracts. With a slightly more moderate response than the VIX short-term future, the VIX mid-term futures strategy is less of a performance drag.

We also tested the VIX index itself as an illustrative benchmark of how different the tradable derivatives perform relative to the non-tradable VIX Index and highlight some of these in the text.[19]

Variance swap: A tradable mid-term variance swap index, which pays forward three-month implied variance on the S&P 500 and receives realised variance on the index in six months time.[20]

Credit /rate-based.

Short HY: A short high yield exchange-trade product. An instrument seeking investment results that are the inverse of a liquid high-yield corporate bond index. High yield bonds, those with low-to-junk level credit ratings are particularly sensitive to volatility and risk aversion.

TIPS: A Treasury Inflation-Protected Security (TIPS) index, which aims to add to the existing treasury position with the additional support of being indexed to inflation.

Cash: We use a one-month cash index.

CDS IG: A liquid investment-grade credit default swap (CDS) on the bonds of 125 of the most liquid North American investment-grade entities. A systemic event is likely to instantly affect the market s perception of credit ratings and default probability. CDS indices have become popular hedge instruments following the 2008-2009 financial crisis.

A CDS IG on-the-run series is available through Markit; however, a listed vehicle available that incorporates the costs of rolling an off-the-run into a new

on-the-run series is not currently available. Investors need to actively manage the timing of the roll when a new on-the-run series when it becomes available. For this analysis, we constructed a rolling on-the-run index that rolls at expiry.

Real-assets:

Gold. We use physical gold priced in US dollars.

Silver: Along with gold we introduce physical silver to the analysis priced in US dollars, to determine to what extent, if any the two might be interchangeable as tail-risk hedges.

18 The selection of hedges is by no means exhaustive, omitting more complex structures. It is illustrative of various thematic approaches.

19 The difference between the performance of the VIX index and futures based on the index stems from the roll cost induced by contango (longer dated futures being more expensive than short dated futures) and represents both the cost of rolling from one contract into the next and the convergence between spot and futures price with the latter falling towards the spot until they converge (theoretically) at the maturity of the futures contract.

20 A variance swap is a straightforward bet that realised variance (volatility squared) on an index (typically an equity index) will be higher than that priced into options on that index, via their implied variance. Such a swap therefore benefits from unexpected volatility spikes that occur during tail events.

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Performance during tail events

Gold s conditional performance is modest, ranked mid-table, in line with cash.

Table 1 summarises the performances of our various hedges during the 11 events we examined. On average a 60/40 portfolio dropped between 3.9% and 12.3% during tail events, with the latter weekly fall occurring at the peak of the 2008/2009 collapse. The volatility-based hedges reacted strongly, with the short-term VIX futures rising a maximum of 35% in a single week, the mark of a potent hedge. However, this was short of the rise in the non-tradable VIX index which shot up 62% in the same week. The short-term VIX futures strategy was the only hedge to manage positive returns during all tail events.

Average performance was positive for all but two instruments: the TIPs fund and silver. Silver did not fare particularly well because, while it shares similarities with gold, it is also a metal with a very different supply and demand make-up, taking its cues from cyclical risk assets much more than gold does. Gold s average return ranked it jointly in fifth place with cash, a modest mid-table achievement.

Table 1: On the basis of conditional returns during tail events, gold ranks in the middle of the pack

* CDS IG represents a theoretical construct based on available on-the-run tradable indices.

Additional reference notes are listed at the end of this article.

Source: World Gold Council

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How reliable is your hedge?

Gold proves not to be a particularly reliable hedge in our analysis

The conditional magnitude of returns a tail-risk hedge provides during tail events may be the primary consideration for investors. But that magnitude can vary, thus influencing how reliable a hedge is during each event. **Table 2** shows that all but two of the strategies had experienced losses during a tail event. Most of these losses were lower than that of the portfolio, which would still result in loss reduction at the portfolio level.

Only gold and silver experienced instances of excess losses (greater than that of the portfolio), though for gold this was limited to a single week (week ending 23 September 2011).

On a measure of variability (non-annualised standard deviation of returns), the short-term VIX futures strategy was highest (+11.2%), followed closely by the CDS IG strategy and silver and more than twice that of gold. But the variability has to be scaled by the average returns to provide some context, which the information ratio in the final column does. On this measure gold is less consistent than the other hedges, and thus ranks eighth overall.

We attribute gold s poor reliability score both to the fact that it is used as a liquidity source during sell-offs and that unlike volatility-based assets, gold does not derive its value directly from volatility but requires buyers and sellers to create the conditions for it to go up. [21] This may or may not happen quickly.

Table 2: Gold s reliability has been uncertain

* CDS IG represents a theoretical construct based on available on-the-run tradable indices.

Additional reference notes are listed at the end of this article.

Source: World Gold Council

21 Though we do not have evidence that this occurs during a single weekly loss

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The long-term performance and costs

The benefits of many hedges during tail events are eroded over time by the cost of holding them, rolling them and rebalancing them.

The previous section viewed hedging performance purely in the context of the tail events. The attributes listed in **Table 1** are only attainable with perfect market-timing foresight. In practice, investment mandates, risk management and the immense difficulty in market timing particularly as turbulence strikes - prevail upon investors to have hedges in place as a constant, if not prolonged, addition to the portfolio. This changes the perspectives from which the outcomes we summarised from **Table 1** and **Table 2** should be viewed.

First, tail events will not always be contained within the neat periodic windows that empirical research requires. They could occur at much shorter intervals and barely register in weekly returns as we saw on 6 May 2010 during the infamous flash crash . Or they could drag out as we saw in 2008 and span a period of several months with non-contiguous but frequent tail sell-offs. In fact, an effective tail hedge may need to extend its performance beyond the window that defined the event. The VIX and its offshoots (particularly at shorter maturities), as well as other hedges that rely on volatility such as put option strategies, have been shown to be mean reverting. In other words, if the sell off is an isolated event, then the value of the hedge is likely to come tumbling back towards the average quickly afterwards. This may not be so bad for the passive investor who is in for the long haul (accepting the carry costs), but makes timing with such hedges quite difficult for those wishing to actively manage their hedges.

There are a number of ways to measure the cost of holding a hedge. **Table 3** summarises the key ones for the period from December 2005 to July 2014. These results assume that investors rebalanced every week potentially unrealistic, but frequent rebalancing would be a requirement for most hedges to ensure their effectiveness. [22]

Table 3: The opportunity cost and damage limitation of your hedge is key

* CDS IG represents a theoretical construct based on available on-the-run tradable indices.

Additional reference notes are listed at the end of this article.

Source: World Gold Council

22 For simplicity, we have omitted all transaction and slippage costs because these can further erode the benefit of structured and/or derivative-based hedges.

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Gold scores highest on an opportunity-cost basis. Its allocation to reduce average tail costs may be higher than research normally suggests, but its positive unconditional return adds to portfolio value better than other hedges.

First, following previous research, we asked: What allocation to the hedge would have been required to reduce the average tail loss by 20%?[23] That is, with an average loss of c.5.5%, how big an allocation would have been required to ensure the average fell to 4.4%. This reflects the opportunity cost of holding a hedge as more capital must be funnelled from the core portfolio to the hedge as the allocation increases. The first column lays this bare: A position in the short term VIX futures strategy, could it have been achieved, would only have required a sacrifice of 4.1% while silver at this point evidently not a very effective tail risk hedge would have chewed up half of the portfolio. As expected, volatility-based hedges required smaller positions to achieve their aim though will need continuous capital infusions to maintain their ratios, while TIPs, gold and cash required higher allocations. Gold s 17.4% allocation here is not contradictory to the 2-10% our research has shown is optimal. Why? In part because we are looking at discrete weekly price drops not long-term average returns. As discussed earlier, gold s reliability during these discrete windows is low, so even a higher allocation will only slightly lower the average portfolio loss as excessive losses will rise along with excessive gains.

Moving further along the columns in **Table 3**, although its allocation was somewhat less beneficial, gold ranks more highly in other areas, both in terms of limiting maximum and minimum portfolio losses during events and lowering portfolio volatility (standard deviation). The combined and averaged ranks place it at the top on these metrics.

The preceding sections have looked at gold during tail event windows. Now we take a look at how gold fared during normal market conditions. We have covered gold s asymmetric correlation characteristics in depth how it is close to zero when equities rally but negative when they fall. It is outside the event windows where gold shows its strongest suit. The cost of carrying derivate hedges is extremely prohibitive. **Table 4** posts the performance of hedged portfolios (with the designated weights from **Table 3**).

Over the last nine years, gold improved on portfolio performance a cost became a gain a feat only matched by silver. All other hedges produced a performance drag, with the short term VIX futures scraping over 3% per year from the portfolio and this with only a 5% allocation! A CDS strategy would have also underperformed returning only 4.9% over the period including the cost of roll.[24]

Although gold reduced portfolio volatility less than other hedges over the period, both information ratios and drawdown limitations were best in class.

Table 4: A passive allocation to many hedges eats away at portfolio performance

* CDS IG represents a theoretical construct based on available on-the-run tradable indices.

Additional reference notes are listed at the end of this article.

Source: World Gold Council

23 Benson, R. Shapiro, R.K., Smith, D, Thomas, R. *A, Comparison of Tail Risk Protection Strategies in the U.S. Market*, Alternative Investment Analyst Review, 2013.

24 We estimate the cost to the portfolio of rolling from an off-the-run to an on-the-run series would have been less than 0.2% per year over the analysed period. Though small in this environment, a prolonged period of benign markets would amplify that impact as the cost of rolling could be higher as rates rise.

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How broadly applicable is your hedge?

The more convoluted and structured a hedge becomes, the more risks it is likely to embed. These are implicit costs to the insurance a hedge provides.

The choices among the resulting rankings (outlined in **Table 5**) are somewhat subjective of course. They depend on what qualities one looks for in a hedge. Though the opportunity and holding costs are accounted for, the analysis above omits an important aspect that could be critical to the choice and potency of the tail risk hedge: Applicability.

The unique nature of each tail event is often overlooked in the literature. All tail events are likely to deliver higher asset correlations and lower asset prices but the relative collapse of assets will not be the same. And different triggers may have different consequences. So it is likely that the more prescriptive a hedge is, the less likely it is to react well to all possible triggers.

As some commentators have pointed out, the risk is that the medicine may be as bad, if not worse, than the disease. They note that portfolios can be ruined by equity crashes, credit spread widenings, bond defaults, high interest rates, sustained inflation, increases in volatility, illiquidity, etc [25] To protect your portfolio against so-called tail risk may require spending money on insurance against all these risks, and there is no panacea here either .

Long-dated treasuries and cash are good example of tail-risk hedges that are often poorly prescribed. They are a liquid port in most credit storms, but would both be ravaged by an inflationary tail event, and treasuries could arguably also fall foul of a credit-crisis tail event remember the US debt ceiling debates? Such an event if it were to occur, which it thankfully did not a few years ago, would also send shockwaves through other markets, particularly those sensitive to funding costs and margins. Cue derivatives and short strategies.

Regulatory change is another risk rarely discounted by investors. Only recently, Federal Reserve officials, fearing the inevitable rise in rates, discussed the potential introduction of exit taxation on bond mutual funds. Such changes materially alter the value, risk, and cost of an investor s holdings.

An alternate source of concern is for liquidity. How liquid is your hedge? Whatever you think now, it risks changing rapidly during a big tail event. That s when it becomes an issue. Tail events thin out markets and dealers become reluctant to provide quotes and funding costs rise. It is, according to J.P. Morgan, an unfavourable environment to unwind an option position [26]

25 Derman, E., *There Are Many Ways to Die, Some via Doctors*, Reuters, July 2011.
26 J.P. Morgan, Tail-risk hedging with FX options, 7 January 2011.

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Table 5: Across all measured criteria, gold ranks jointly at second among hedges

* CDS IG represents a theoretical construct based on available on-the-run tradable indices.

Additional reference notes are listed at the end of this article.

Source: World Gold Council

Gold has a role to play

Excluding the high costs of most hedges, gold has not at least over recent and very short windows been a particularly effective tail risk hedge. Our previous research has shown that in the longer term and over longer windows, gold s attributes are far more certain. But the return profile of gold is compelling. The asymmetric correlation means it straddles the ground between a dedicated tail risk hedge and a risk asset. It contributes to portfolio performance during normal environments but still displays the properties of a tail-risk hedge. This suggests that some combination of hedges following the old adage of not putting all of one s eggs in one should perform better than any single hedge. Gold s unique profile further suggests that it should typically form a part of this combination.

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References

Chart 1: When the left tail bites: market crises prompt big drawdowns

The 60/40 portfolio is a combination of MSCI World Total Return Index and the BofA Merrill Lynch Global Government 7-10 year Total Return Index.

Chart 2: Gold s equity correlation is positive in right-tail events and negative when left-tail events hit markets

Chart 2 shows weekly return correlation between equities, gold and commodities when equities move by more than two standard deviations; January 1987 to July 2010

Chart 3: The last nine years have been particularly volatile

The chart shows the CBOE Volatility (VIX) index and its average level over four sub-periods between January 1990 and July 2014. The periods were picked arbitrarily to highlight the existence of periods of extended market uncertainty like the one we have seen during the past 9 years.

Table 1: On the basis of conditional returns during tail events, gold ranks in the middle of the pack

Table 1 shows the absolute maximum, minimum and average performance of our selection of hedges during tail event weeks when our 60/40 portfolio dropped by two standard deviations or more (-3.9% or more). Our weekly dataset covers the period between January 2005 and July 2014 and results in 11 observed tail events .

Ranking is performed as follows:. Each category, represented by a column is ranked from one to nine. An average is taken of each ranked column and this average is then ranked from one to nine a rank of ranks.

Table 2: Gold s reliability has been uncertain

Table 2 follows the same ranking process as detailed in Table 1, but does not include the average return which was already ranked in Table 1 under conditional performance. It is listed however because it is a component of the information ratio (average divided by standard deviation) which is ranked. The column positive percent shows the proportion of tail-event returns that were higher than that of the portfolio (excess returns).

Table 3: The opportunity cost and damage limitation of your hedge is key

Table 3 ranks four measures that represent the opportunity cost of holding a hedge: That which is given up or sacrificed by allocating to the hedge. The first column is the allocation required to reduce average portfolio losses during tail events by 20% (from -5.5% to -4.4%). Twenty percent was chosen based on previous research (see footnote 35). Using this allocation, portfolio minimum and maximum returns are then ranked (the average is a constant -4.4%) as a higher value for either represents less return given up during the tail events. Equally the standard deviations of the portfolio returns are ranked, as they represent the cost (gain) of risk reduction. Ranking is done as per Table 1.

Table 4: A passive allocation to many hedges eats away at portfolio performance

Table 4 measures and ranks the annual average, volatility, information ratio and maximum drawdown of a portfolio with an allocated hedge (as per table 3) over the whole analysis period. Ranking is done as per Table 1. For CDS We estimate that this cost would have been less than 0.2% per year over the analysed period. Though small in this environment, a prolonged period of benign markets would amplify that impact as the cost of rolling could be higher as rates increase. The available on-the-run index we use omits the roll-cost between tranches. To illustrate the estimated additional impact of the roll cost assuming a roll at expiry of a tranche, we constructed an index that includes the cost of rolls. During the period analysed, this instrument would have lost an annualised 2.2% vs. a gain of 0.4% excluding the cost. Using a 6.8% allocation as discussed in Table 3, the portfolio impact of

including the roll would be 6.8% * (2.2%- 0.4%%) per year or 0.17%.

Table 5: Across all measured criteria, gold ranks jointly at second among hedges

Table 5 adds all the ranks together from Tables 1 to 4, averages these ranks and ranks them.

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III: Ten years of gold ETFs: a wider and more efficient market

Ten years ago it would have been difficult to predict that a new investment product, a variant of a mutual fund, would change the gold investment landscape. Odder still to suggest that this new type of vehicle might one day accumulate more gold holdings than many central banks. Yet the gold-backed ETF has done both these things and more.

We examined the ten-year history and growth catalysts of gold ETFs and asked whether they have delivered value for investors and for the wider gold market. We have also analysed the impact, if any, gold ETFs have had on gold price volatility

Gold-backed ETFs have been good for investors and for gold

Over the past decade, gold-backed exchange-traded funds (ETFs) have transformed the gold investment market. Yet, their rise has not been universally popular. They may have put pressure on gold vendors margins, and some investors believe that they have led to an increase in the volatility of the gold market.

As we see it, ETFs may not be an answer to every gold investor s needs, but the gold market has benefited more broadly since their launch. Overall, we believe that ETFs have reduced total cost of ownership, increased efficiencies, provided liquidity and access, and brought new interest and demand into gold as a strategic investment.

In this article, we explore the following themes:

- The rise and impressive growth (**Chart 1**), of gold ETFs, the factors that drew investors to them and what ETFs have offered gold investors that fulfilled previously unmet needs
- How many ETF investors represented new demand for gold as opposed to replacing existing investment demand
- The effect of ETFs on market factors such as premiums, spreads, and volatility.

Chart 1: Currently, physically backed ETFs collectively hold 1,700 tonnes of gold worldwide

Reference notes are listed at the end of this article.

Source: Respective ETF/ETC providers, Bloomberg, World Gold Council

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An attractive and efficient investment vehicle

The last decade has been an eventful one for gold markets. We have seen a remarkable 12-year bull market, a shift in demand from the developed West to the rising East, and global central banks as net buyers of gold for the first time since 1985. ETFs and other exchange-traded products have been another key development that made it easier for investors to gain access to gold (**Focus 1**), especially following the 2008-2009 financial crisis.

ETF s gave investors a cost-effective and efficient way to invest in gold

Historically, investors have bought gold in a number of ways. They have been able to buy gold futures contracts or gold mining stocks, own shares in a mutual fund with an actively managed precious metal strategy, or hold physical gold (directly or indirectly) in the form of bars and coins. Since 2003, ETFs as well as other exchange-traded products were added to the list of alternatives available to investors. While each of other vehicles for acquiring physical gold may still suit many investors, the unique characteristics of ETFs have drawn investors into the gold market for a number of reasons.

Gold ETFs have helped lower the overall cost of owning gold and increased the efficiency of holding gold bullion within a portfolio because they offer:

Lower management fees. Investors who buy an actively managed mutual fund with a precious metal strategy pay fees that range from an average of 160 basis points (bps) to more than 250bps.[1] ETF fees are typically 40bps or less because their structures get the benefit of economies of scale. Investors can invest in allocated gold accounts with comparable costs to gold ETFs; however, unlike ETFs, these accounts require a large minimum investment.

Reduction of premiums. Gold-backed ETFs helped to democratise physical gold investment. ETFs offered investors of all sizes wholesale prices for the first time, while offering shares at fractional units of an ounce of gold, resulting in a much cheaper cost per purchase than bullion. In contrast, investors who chose physical bars and coins may pay additional premiums over the gold price depending on the size of their investment.

Elimination of separate storage and vaulting costs. The management fee of exchange-trade products typically includes storage and vaulting costs for physical gold. Investors who hold gold bullion and coins bear the expense of storage and vaulting directly or through a third-party.

Standardisation in quality and security. Gold-backed ETFs generally hold a standard form of gold bullion in troy ounces, kilograms, or grams. For example, some ETFs hold exclusively London Good Delivery bars which have standardised quality and characteristics in weight (400 troy oz), minimum fineness (99.5%), and dimensions that, in conjunction with periodical audits, reduce the cost of inconsistency and fraud.[2] Additionally, these bars are typically stored at custodian or bullion banks that have experience, networks, and facilities to properly secure the gold, helping reduce any cost of theft.

Added liquidity. Gold is very liquid and can be easily converted into cash. Investors who hold gold via ETFs are participating in a deep and broad market

that collectively trades more than US$1.1 billion a day, rivalling single stocks and many equity-linked ETFs.

Increased operational efficiency and transparency. Gold ETFs provide transparency and security through an approved custodian, typically a bullion bank or dealer, with experience in managing gold accounts. Additionally, gold ETFs must meet strict regulatory requirements similar to publically traded equities and publish intra-day prices and reports

1 Source: Bloomberg. Based on expense ratio of gold funds with inception dates prior to 2003. Funds include: Tocqueville Gold Fund, First Eagle Gold Fund, Oppenheimer Gold & Special Minerals Fund, American Century Global Gold Fund, Gabelli Gold Fund, OCM Gold Fund, and Midas Fund.

2 SPDR® Gold Shares (GLD) is an example of such a fund.

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Focus 1: Rise and growth of gold ETFs

ETFs debuted in the late 1980s. In their early days, ETFs were used to replicate baskets of stocks. The best known and currently largest ETF is the SPDR S&P 500 Trust, launched in 1993.[3] It was not until 10 years later, that this differentiated fund structure was applied to non-traditional, hard assets such as gold. In March 2003, the World Gold Council helped launch the first ever gold ETF developed by what is now known as ETF Securities on the Australian stock exchange, giving investors a new, easy, and cost effective way to hold gold.[4] Later similar products were launched around the world. Most major exchanges now list gold ETFs, showing the global interest in this vehicle.[5]

SPDR® Gold Shares (GLD) which will have its 10th anniversary this year was the first physically backed gold- ETF launched in the US. Developed and sponsored by World Gold Trust Services LLC (a wholly owned subsidiary of the World Gold Council), GLD® was listed on the NYSE in November 2004. It is the largest gold-backed ETF holding approximately 800 tonnes of physical gold at the time of writing as well as a gold industry benchmark.

One of the most remarkable aspects of gold ETFs since their inception is the rate of growth and investor interest. For example, GLD reached more than US$1 billion in assets under management within its first three trading days. Within a year from its launch, the fund had tripled these assets.

Despite the sizable outflows experienced in 2013, assets in gold ETFs currently rival the market capitalisation of major global companies or the gold holdings of major central banks. As of August 2014, the 1,700 tonnes gold held collectively by the 60 gold-backed ETFs we track had a value of US$71 billion. To put this in perspective, if these ETFs were a company, they would be in the top 10% of companies worldwide ranked by market capitalisation.[6]

When measured against the constituents of the S&P 500, gold ETFs listed in the US fall within the top 20% of US companies by size.[7] In addition, these 60 funds hold more gold than central banks combined with the exception of the US, Germany, Italy and France. Unlike central bank gold holdings, however, ETF shares are divided among millions of account holders.

Perhaps the most interesting comparison of gold ETFs comes when their liquidity is compared to some of the most liquid and actively traded equities. As shown in **Chart 2**, the average daily traded value as measured by trading volume of GLD alone (the most liquid gold ETF) is comparable to top technology and financial companies alone and to broad index equity ETFs.

Chart 2: Gold ETFs provide plentiful liquidity for investors

One year average daily traded value (US$ billion)

Reference notes are listed at the end of this article.

Source: Bloomberg, World Gold Council

While a gold-backed ETF investor typically holds physical gold indirectly through a Fund or Trust, the ETF price closely tracks the spot price of gold. Its structure also reduces some of the drawbacks typically associated with actively managed or derivative-based products.

Less tracking error. ETFs are a passive implementation with no management or reinvestment decisions of the underlying holdings. Unlike futures contracts, gold-backed ETFs do not face contango and backwardation concerns, or rollover and reinvestment decisions on maturity.

Reduced counterparty risk. Major gold-backed ETFs hold no derivative contracts, reducing their exposure to counterparty risk. In addition, many ETFs hold gold in allocated 8 accounts that shield investors from a default by the custodian.

These aspects of gold ETFs helped shape the gold market to make gold investing more accessible to all types of investors ranging from small private investors to large institutional holders as a hedge asset, a diversifier and a form of portfolio insurance against multiple investment risks.

3 An ETF that is composed of the same basket of market cap-weighted stocks as the S&P 500 Index.
4 Kitco, *Founder of first gold ETF surprised at growth of product, expects more, March 2013,* www.kitco.com/reports/KitcoNews20130328AS_interview.html
5 Exchanges include: London Stock Exchange, Australian Stock exchange, NYSE, Johannesburg Stock Exchange, Euronext Paris, Mexican Bourse, Singapore, Deutsche Borse, and Borsa Italiana
6 As measured by the market capitalisation of firms listed in the MSCI All Country World Index.
7 Constituents of the MSCI All Country World Index and S&P 500 Index as of 31 August 2014. Source: Bloomberg, World Gold Council.
8 An allocated account is an account with a bullion dealer, which may also be a bank, to which individually identified units of gold (such as bars) owned by the account holder are credited. The gold held in an allocated gold account is specific to that account and is identified by a list that shows, for each unit of gold, the refiner, assay or fineness, serial number and gross and fine weight.

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Expansion of gold investment demand

We have already mentioned the extraordinary growth of gold ETFs. But what has driven this growth? In our view, there are two key factors. Overall investment interest for gold from investors who sought diversification and risk management, and the cost-effective market access that ETFs provide, drawing in new types of investors, both retail and institutional.

ETFs catch the attention of new gold investors

ETFs spurred organic growth in gold investment and have had a net positive contribution to demand.

While demand for ETFs attracted some demand from other gold investment products, we do not believe that there has been a simple one-for-one substitution effect from retail physical gold markets into ETFs. Instead we see evidence pointing to ETFs having a net positive effect and expanding investment demand. The overall gain from increased average gold prices, investing interest in gold, and the cost reductions from ETFs was in the interest of all gold investors and participants. ETFs appealed to some existing gold investors while attracting investors who previously had not held gold.

For the first time, ETFs offered retail investors low margins equating to wholesale prices of gold. In addition, they offered institutional investors a liquid and easy-to-execute vehicle. This democratisation and simplification of the investment process helped bring new investors into the gold market.

Retail bar and coin demand is typically driven by a distinct type of gold investor who prefers to have direct control over the storage of their physical gold investment. Bar and coin investment has historically been a stable and consistent source of gold demand. Prior to the 2008-2009 financial crisis, annual bar and coin demand did not vary much from its long-term average (**Chart 3**).

While some bar and coin investors may have also been early adopters of ETFs, retail investor purchases of physical bars and coins increased dramatically after the crisis dwarfing ETF demand for gold. Since 2004 annual bar and coin demand has been, on average, at least three times as large as ETF demand.[9] Further, the vast majority of inflows into retail bars and coins occurred from 2008 to 2013 (several years after the launch of gold-backed ETFs) when annual demand for bars and coins increased more than 350%. It even expanded considerably during 2013, contrary to the heavy outflows seen in gold-backed ETFs. Arguably, many bar and coin buyers saw the price pullback as an opportunity to buy.

Chart 3: ETF demand stands largely in addition to bar and coin demand

Variation in gold demand above/below the respective pre-financial crisis average*

* For bars and coins, the average was computed using data from 1980 to 2007. For ETFs, the average represents data from 2003 to 2007. The average exclude data post 2007 to remove the effect of the 2008-2009 financial crisis on investment

demand. Additional reference notes are listed at the end of this article.

Source: GFMS-Thomson Reuters, World Gold Council

9 GFMS-Thomson Reuters.

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ETFs draw more diverse and strategically focused investors to gold

As the gold investment landscape evolved over the past 10 years, the types of investors involved in gold markets broadened. Many investors who began to invest in gold had previously been unable to do so, while other investors began viewing gold as a tactical and often strategic component of their portfolios.

Strategic investors remain invested in gold ETFs despite shorter-term speculation by other participants.

For retail investors, gold ETFs offered economies of scale in gold investing. For the first time, smaller retail investors could buy gold through financial markets, which had previously been reserved for larger, sophisticated investors with access to futures markets. Gold ETFs allowed investors to make small purchases to gain exposure to gold in smaller, divisible units, while maintaining the liquidity of a financial instrument. ETFs were also approved for holding in several forms of retirement accounts, making them more appealing as an efficient way for these investors to diversify their long-term portfolios.

Institutional investors such as mutual funds, asset managers, pension funds, and endowments looked to incorporate gold in their investment strategies. ETFs offered a cost effective and efficient way to implement gold as a tail risk hedge, a portfolio diversifier, and a preserver of wealth. Additionally, ETFs provided a deep and liquid vehicle that improved spreads per transaction and deeper markets for larger transactions. The ability to buy and write options contracts for gold ETFs to express specific market views became prevalent as well.

In addition, current holders of ETFs appear to have longer-term horizons than those who have already exited the market. During 2013, the gold price fell and ETFs collectively experienced 900 tonnes in outflows. Many market participants have questioned whether such outflows marked the beginning of a trend, or if the investors who sold-off their positions were different from those who only partly sold or did not sell at all.

Chart 4: While many speculative holders have recently exited the market, strategic investors remain steadfast in gold ETFs

(a) Prior US gold ETF holders as of 30 June 2014

Reference notes are listed at the end of this article.

Source: Bloomberg, SEC, World Gold Council

(b) Current US gold ETF holders as of 30 June 2014

Reference notes are listed at the end of this article.

Source: Bloomberg, SEC, World Gold Council

Our analysis suggests that investors who have already sold their gold ETF holdings may have been in the market for more tactical (short-term) and less strategic (long-term) reasons than those who remained in the market. Using publicly available albeit limited information, we found that the average (and median) holding period of current US-listed ETF holders (who report their positions to the SEC) is at least twice as long as those who have already closed out their positions (**Chart 4**).[10] And at least a third of these current US-listed ETF holders have invested in gold for more than five years (compared to only 8% of previous holders). While we recognise that this is not definitive proof, it does indicate to us that many investors who still hold gold have been doing so with a long term view.

10 This analysis is based on 13F data for SPDR Gold Trust and iShares Gold Trust. This data is limited and it typically corresponds to 30-40% of shares outstanding held by firms that meet the requirements necessary for filing a 13F report with the SEC.

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Focus 2: Maintaining liquidity in the face of high volatility

Another way ETFs have helped improve the gold market in the past decade: providing tight bid-ask spreads in transactions. The average bid-ask spread for GLD has generally ranged between 1 and 1.5 cents 1 and 3 basis points since inception (18 November 2004). When looking at intraday data, the spreads remain thin despite days of heightened activity in volume and price movements.

Over the past 10 years, some of the most volatile days in the GLD price have offered average bid-ask spreads not too far from its historical average (**Table 1**). This highlights the depth and liquidity of the gold market, as well as the efficiency that ETFs offer in capturing liquidity during volatile markets when it is needed most. [11]

Table 1: Bid-ask spreads have remained tight for gold

		30-day	Average spread	
Date	**Daily return**	**volatility**	**US$0.01**	**Basis points**
13 Jun 2006	-6.9%	34.9%	1.2	2.6
17 Sep 2008	11.3%	44.8%	1.4	1.7
10 Oct 2008	-7.4%	56.7%	2.4	2.8
4 Nov 2008	6.2%	50.1%	1.5	2.1
21 Nov 2008	7.4%	46.1%	1.4	1.8
23 Sep 2011	-5.5%	36.5%	2.5	1.9
15 Apr 2013	-8.8%	32.5%	1.5	1.2
18 Sep 2013	4.4%	23.5%	1.7	1.4

Reference notes are listed at the end of this article.

Source: Bloomberg, World Gold Council

Gold ETFs helped increase efficiency in the market

The advent of ETFs has provided many benefits to the gold market. Our analysis suggests that ETFs may have helped reduce the traditional premium on gold bullion and coins over spot gold, making markets more efficient. The effects of ETFs would have benefitted all types of gold investors. They have helped maintain tighter spreads in volatile markets (**Focus 2**), and are unlikely to have markedly driven up volatility in gold prices.

Increased competition supported a reduction in premiums for the retail market

The introduction of gold ETFs increased competition in the gold market by making an additional and cost-effective vehicle available to investors. It also spurred further

financial innovation as many other products and alternatives to investors followed. This competition has helped gold investors and aided in increasing the efficiency of gold prices.

Competition from ETFs may have contributed to a reduction in premiums over physical bar and coins.

For example, there has been an apparent reduction in global gold bullion coin premiums over the last two decades (**Chart 5**). In the time periods measured, all gold bullion coins have seen premiums over the melt or metal value come down since the end of 2004 when gold ETFs became broadly available in several markets. The one exception is the South African Krugerrand, whose average premiums have increased over the past decade.[12]

Overall there has been an average net reduction of 64bps across six major 1-oz bullion gold coins in the last decade. This relates to a 9.3% reduction in premiums since ETFs became an option for investors. While it is difficult to directly attribute the cause of these compressions to gold-backed ETFs, it makes intuitive sense that given a cheap and liquid investment alternative, dealers would need to reduce their premiums to stay competitive. It is reasonable to say that the competition of ETF gold investments has at the very least aided in the reduction of gold bullion coin premiums, thereby making the market more efficient and accessible.

11 The most volatile trading days occur during times of heightened market tension such as during the Lehman Brothers bankruptcy in 2008 and subsequent financial crisis, as well as during 2011 when European Sovereign debt crises re-emerged and the US was downgraded by Standard & Poor s from its previous AAA credit rating.

12 The explanation behind this is due to a continued slowdown in the production of Krugerrands in recent years relative to other bullion coins. This has therefore created a higher premium from limited supply, but still well below premiums on other coins.

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Chart 5: Premiums on gold bullion coins have reduced since ETFs have come to market

February 1991 through August 2014

* Data as of 1997. Reference notes are listed at the end of this article.

Source: Bloomberg, Certified Coin Exchange, LBMA, World Gold Council

Probing the broader effect of ETFs gold market volatility

The transparency in gold ETFs has helped in price discovery and compression of spreads but has not likely resulted in higher volatility.

Our analysis suggests that, unlike in other markets, gold ETFs are unlikely to have added volatility to gold prices. In recent years, there has been a lot of criticism and commentary about the increase of volatility and correlations in markets attributed to the increased usage of ETFs but the evidence is mixed.[13]

For equities, research from the Wharton School of Business et al. has found that ETFs have resulted in increased price volatility (driven by technical and arbitrage trading), 14 but others such as the Investment Company Institute (ICI) have found the opposite.[15] For commodities in general, some research indicates that the increasing usage of commodities by non-commercial traders has led to increased correlations among previously negatively correlated commodities such as copper, oil, and natural gas, where investors access through derivatives markets tends to be much larger than through the underlying commodity.[16] However, other analyses support the hypothesis that fund flows in many commodities have had minimal impact on the underlying commodity prices. According to ICI Research, net fund flows into commodity funds are not indicative of future price changes.[17] Instead, the findings reveal that commodity price growth is driven by fundamental economic factors (ie supply and demand) and have been strongly linked to the global business cycle as well as the US dollar value. These findings are consistent with other research focusing on agricultural commodities. In a report prepared for the OECD, Professors Scott Irwin and Dwight Sanders of the University of Illinois found that [while] the increased participation of index fund investments in commodity markets represents a significant structural change, this has not generated increased price volatility, implied or realised, in agricultural futures markets.[18]

For gold, as we see it, the characteristics of the market support the notion that gold ETFs have likely had limited influence on price volatility. What then drives gold s volatility if not ETFs, as commonly presumed due to the unprecedented increase in gold ETF assets over the last decade?

WSJ, *SEC Reviewing Effects of ETFs on Volatility,* October 2011: online.wsj.com/news/articles/SB10001424052970204618704576641232663031162

14 Ben-David, I, Francesco, F., and Moussawi, R., *Do ETFs Increase Volatility?* Working paper; Fischer College of Business, The Ohio State University, University of Lugano and the Swiss Finance Institute, Wharton Research Data Services, The Wharton School, University of Pennsylvania; January 2014.

15 Antoniewicz, R., Investment Company Institute, *Key Data Undercut Critics Arguments on ETFs and Intraday Volatility,* 19 April 2012 : www.ici.org/viewpoints/view_12_etfs_intraday

16 Domanski, D, et al., *Financial investors and commodity markets*. BIS Quarterly Review, *March 2007*.

17 ICI Research Perspective, *Commodity Markets and Commodity Mutual Funds,* May 2012.

18 Irwin, S., et al, *The Impact of Index and Swap Funds on Commodity Futures Markets,* OECD Food, Agriculture and Fisheries Working Papers, No. 27, 2010.

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Daily volumes in ETFs, while significant, are small when compared to the trading activity in futures and OTC markets.

Intuitively, derivatives markets, due to their sheer size, volume of trading and prevalence of leverage should have a more important effect on volatility. While much of attention is given to ETFs because of their transparency and the availability of timely data based on them, in reality, their relative size and potential impact on the overall market is small. As of 30 June 2014, approximately US$1.1 billion is traded daily through ETFs; in comparison, US$20 billion is traded in futures and US$150 to US$250 billion is traded in the London over-the-counter (OTC) market.[19]

Based on COMEX data (the most liquid and widely used commodity exchange) as a proxy for gold futures activity, several variables can be used to explain gold volatility over the last decade. It seems plausible that futures markets would have a much greater impact on gold volatility when one compares trading volumes to those of gold ETFs. Using GLD as an example for gold ETFs (chosen because of its size and liquidity), there is a clear disparity between volumes in both the primary and secondary markets of ETFs and volume experienced in futures market (**Chart 6a**). Currently, the volume of the futures market is several times larger than the volume of the secondary market in GLD. One reason for this, among others, is the fact that futures utilise leverage and therefore the number of traded contracts is a multiple of the underlying money required in settling a trade. In addition, only a small portion of all contracts require physical gold delivery. Further, the effect of the futures market on volatility is likely smaller than the potential impact from the OTC market. With daily volumes 10 times the size of volume in the futures market, OTC transactions can have a bigger effect on prices (**Chart 6b**).

Chart 6: Trading volume of gold futures is several factors larger than primary and secondary market volume of gold ETFs

(a) Gold futures monthly volume relative to gold ETF

Reference notes are listed at the end of this article.

Source: Bloomberg, CFTC, CME, World Gold Council

(b) OTC monthly volume relative to gold futures and ETF

Reference notes are listed at the end of this article.

Source: Bloomberg, LBMA, CFTC, CME, World Gold Council

Additionally, variability in open interest[20] on COMEX gold futures appears more stable and range bound, while the variability in net long positions[21] defined as net non-commercial commitments and a measure often used to capture speculative activity fluctuates across a much broader range (**Chart 7**). In fact, the variability of net longs is more than six times that of open interest contracts, and it is more than 37 times that of gold ETFs creations and redemptions in the primary market. This implies that speculation in gold futures markets, represented by the net long non-commercial positions, changes more rapidly than ETF holdings and, consequently, is likely to have a larger impact on the volatility seen in gold prices more generally.

19 Volume calculations are based on a one-year average of daily volumes as of September 2014. For ETFs we included the top five largest funds by tonnage (SPDR Gold Trust, iShares Gold Trust, ZKB Gold ETF, ETFS Physical Gold, Gold Bullion Securities), accounting for 75-80% of gold ETFs. Source: London Bullion Market Association, Bloomberg, World Gold Council.

20 Open interest is the total of all futures and/or option contracts entered into and not yet offset by a transaction, by delivery, by exercise, etc. The aggregate of all long open interest is equal to the aggregate of all short open interest. Source: CFTC.

21 A condition by which, collectively, there are more non-commercial and non-reportable long futures positions than short positions.

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Chart 7: Speculative net long positions vary much more than gold ETF net creations and redemptions

Reference notes are listed at the end of this article.

Source: Bloomberg, CFTC, CME, World Gold Council

ETFs have opened the door to additional investment demand

The past decade for gold ETFs has left a prominent mark, with future potential growth and development. Yet, there is room for further innovation. Some ETFs are available in countries with less developed financial markets, making them less popular vehicles for providing access to the gold market. In developed markets, there is still unmet demand for physical bullion.[22]

As new interest in gold has combined with the established global investment demand for gold as a diversifying asset, tail-risk hedge, and preserver of wealth, we believe there is potential growth for several years to come. New and differentiating investment products will likely come to market to meet investors needs. This will no doubt continue to shape gold investment and further develop the efficiency of the global gold market into the next decade.

22 As an example, sales of gold bullion in the US during 2013 reached historical highs and surveys commissioned by the World Gold Council have indicated the desire of investors to continue buying gold.

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References

Chart 1: Currently, physically backed ETFs collectively hold 1,700 tonnes of gold worldwide

Data as of 31 August 2014. Gold holdings are as reported by the ETF/ETC issuers. Where data is unavailable, holdings have been calculated using reported AUM numbers.

Chart 2: Gold ETFs provide plentiful liquidity for investors

Average daily traded value calculated as the trailing one year volume as of 31 August 2014. Volume of securities is the aggregate trade value across publicly available exchanges.

Chart 3: ETF demand stands largely in addition to bar and coin demand

Deviation from mean calculated as the difference from the three-year annual average minus the average annual demand from the respective start date through 2007. For bars and coins, we computed the average using data from 1980 to 2007. For ETFs, the average represents data from 2003 to 2007. The average exclude data post 2007 to remove the effect of the 2008-2009 financial crisis on investment demand.

Chart 4: While many speculative holders have recently exited the market, strategic investors remain steadfast in gold ETFs

Data as of 30 June 2014. Holdings were taken from quarterly SEC Form 13F filings for SPDR Gold Trust and iShares Gold Trust to provide a representation of US gold ETF investors. 13F Filings have historically represented 30-40% of total outstanding shareholders at quarter end since inception of both ETFs. The 13F form is a filing with the Securities and Exchange Commission, also known as the

Information Required of Institutional Investment Managers Form. It is a quarterly filing required of institutional investment managers with over $100 million in qualifying assets. Companies may include insurance companies, banks, pension funds, investment advisors, hedge funds, broker-dealers, and private wealth investors.

Table 1: Bid-ask spreads have remained tight for gold

Most volatile days defined as those exceeding three standard deviations of the average daily return for SPDR Gold Trust since inception (18 November 2014). Calculations as of 15 August 2014. Average of the best bid and best ask for the NYSE ticks were used to calculate the intraday spreads.

Chart 5: Premiums on gold bullion coins have reduced since ETFs have come to market

For the American Eagle, Canadian Maple Leaf, and South African Krugerrand prices, data series begins in December 1991. For the Chinese Panda, Viennese Philharmonic, and Australian Kangaroo prices, data series begin in June 1997 due to data availability. Average premiums calculated on daily basis as difference of coin price over daily London Gold PM Fix price.

Chart 6: Trading volume of gold futures is several factors larger than primary and secondary market volume of gold ETFs

(a) Futures volume based on average daily volumes per month of all gold contracts traded on CME COMEX through 31 July 2014. GLD primary market volume based on daily average per month of net creation/redemption activity by authorized participants of the SPDR Gold Trust through 31 July 2014. GLD secondary market volume based on average daily volume per month of SPDR Gold Trust shares traded in the NYSE through 31 July 2014.

(b) OTC market volumes are not often published. Instead, we use the daily average per month of clearing statistics of the net (loco London) gold transfers settled between clearing members of the LBMA through 30 June 2014. The range shown in the picture multiplies net transfers by a factor of six (lower limit) and 10 (upper limit). This is consistent with previously published research by the World

Gold Council. It is also consistent with an estimate of total loco London volumes based on a 2011 survey that the LBMA conducted among its gold trading members. Futures volume based on average daily volumes per month of all gold contracts traded on CME COMEX through 31 July 2014. GLD secondary market volume based on average daily volume per month of SPDR Gold Trust shares traded in NYSE through 31 July 2014.

Chart 7: Speculative net long positions vary much more than gold ETF

Standard deviation is calculated on a rolling three-year basis. For GLD the start date of data is March 2005 to prevent volatility due to inflows of fund of the ETF during the inception month of November 2004

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