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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 in government affairs, 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 the 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, Turkey, Europe and the USA, the World Gold Council is an association whose members include the world's leading and most forward thinking gold mining companies.

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Introduction

The investment market for gold has one of the longest histories of all monetary instruments dating back to the first gold coin struck around 500 BC.

Yet as equity and debt markets grew in the twentieth century, many central banks have not kept pace with developments in the gold market and in particular have a limited sense of the size, scale, and liquidity of the gold market. Additionally, as the gold market is primarily an over-the-counter (OTC) market, information about most transactions is not as easily available to the public further masking this large and dynamic market. As a result, central bank reserve managers often question what size deals are normal and would not distort the market. Similarly, other market participants wonder, given the size of China's foreign currency reserves, whether any investment in gold by China would be possible without causing prices to shoot up significantly.

This paper follows in our series of occasional papers on aspects of central bank reserve management and sets out to explain the workings of the gold market with a particular focus on its size and liquidity. Given that central banks invest a majority of their reserves in sovereign debt markets, we compare gold to sovereign debt markets from both of these perspectives.

Through an analysis of the existing stock of gold and annual supply, we demonstrate that the depth and breadth of the financial market in gold is greater than all but the two largest debt markets in the world surpassing the size of all individual European sovereign debt markets. Furthermore, we find that the liquidity characteristics including daily trading volumes, average bid-ask spreads, and countercyclical qualities show that gold is as liquid as most sovereign debt bonds, if not more liquid. Additionally, unlike sovereign debt which experiences increased credit risk as the market size grows, gold bears no credit risk and benefits from stable annual increments in supply, which helps to preserve value. Finally, we provide examples of several central bank gold transactions to illustrate the depth of the market and limited impact these transactions have had. In particular, we demonstrate that a central bank can transact in size with limited impact on the market and in complete discretion.

I: The size of the global gold market

The financial market for gold allows market participants to use gold as a store of wealth, an investment, and a source of high quality collateral.

Examining gold's availability (the stock)

Total above ground stocks

Gold is virtually indestructible and all of the gold that has ever been mined still exists in one form or another. As of 2010, best estimates suggest that approximately 168,300 tonnes of gold have been mined over the course of human history.¹ If it were possible to gather all that gold together in one place, melt it down and cast it into a cube, that cube would be 20.6 meters (67.7 feet) on a side and could fit comfortably below the first landing of the Eiffel tower, which is 186 feet high. The same cube would stand about one-eighth the height of the Washington Monument, which is 555 feet high. Using the latest estimate of the world population of 6.8 billion people, the total amount of gold in above-ground stocks would equate to less than one 1-ounce gold coin per person on the planet at around 0.78 ounces of gold per person.² Chemical analysis shows that oxygen is the most common element on earth accounting for almost half (46.6%) of the total. Gold, by contrast, is one of the scarcest elements, representing just 0.0000001% or one part per billion. However, while gold is very rare, gold is used in jewellery throughout the world and also in many technological applications, where its unique properties make it for all practical purposes irreplaceable. Moreover, the financial market for gold is extremely robust, allowing market participants to use gold as a store of wealth, an investment, and as a source of high quality collateral.

The importance of the size of the gold market

Central banks manage very large pools of assets, so the size of the market for any individual asset is particularly important. A deep market allows reserve managers to invest these large pools of assets with fewer transactions, it provides more buyers and sellers in case there is a need to exit a position, and finally allows a central bank to reduce its potential impact or visibility when buying or selling in a particular market.

This is one of the reasons why individual sovereign debt markets are attractive to reserve managers as they are large and dwarf the size of individual equities. For example, the world's largest traded companies by market capitalisation are Exxon Mobil and Apple, which have market capitalisations of US\$323 and \$239 billion, respectively.³ While large, these companies are about half the size of the Spanish sovereign debt market and one quarter of the size of the UK debt market (Chart 1).

1 Gold stock estimate based World Gold Council calculations using GFMS 2010 Gold Survey and initial full year 2010 GFMS estimates.

2 US Census Bureau, 2010 estimate.

3 Market capitalisation calculated as of 31 December 2010, using Bloomberg.

Liquidity in the global gold market

Therefore, in order for a central bank to effectively evaluate the gold market, we will need to compare the size of the gold market with the total outstanding or investable debt of various sovereign debt markets. Making this comparison is not completely straightforward, yet with a few simple assumptions we are able to come to a reasonable conclusion on the size of the gold market. Since gold is a tangible asset it has many properties beyond those of a financial nature, which include adornment and technological applications. Despite gold's historical and growing role as a financial asset, jewellery accounts for the biggest single use of all the gold that has ever been mined (50%). Meanwhile, gold used in technological applications ranging from electronics like mobile phones and computers to complex medical applications accounts for another 12% of all above ground stocks.

Excluding these two commodity uses of gold, the second and third largest uses of gold are *private investment* and *official sector* holdings, which together can be considered the *financial market* for gold.⁴ While gold jewellery is for many purchasers, especially in the developing world, also a store of value akin to a financial asset, for the purposes of this exercise we will focus only on the sum of private investment and official sector holdings as the global financial market in gold. Together these two components account for approximately 36% of all above ground gold stocks or 60,400 tonnes (Chart 2). Multiplying this quantity by the average price of gold for 2010 provides an estimate of US\$2.4 trillion for the size of the investable gold market, which can be then compared to the total outstanding value of a sovereign debt market. Thus, we refer to this value as the total outstanding equivalent for the gold market.

Chart 1: Total outstanding/market capitalisation of equities, bonds and gold (in US\$ billions)

Source: Bloomberg, BIS, World Gold Council

Chart 2: Total above ground stocks of gold as of 2010 (in tonnes)

Source: GFMS and World Gold Council estimated 2010 calculations

4 Usage here is based on the stock of above ground gold.

In order to put the total outstanding equivalent in perspective, we compared this way of looking at the gold market to the largest sovereign debt markets in Chart 4, which shows that gold ranks higher than all European sovereign debt markets and trails only US Treasuries and Japanese government bonds. Thus, simply based on size, the gold market at \$2.4 trillion can provide significant depth and liquidity for large reserve portfolios, as it is only surpassed in size by two sovereign debt markets.

Given the size of the gold market, it follows quite logically that central banks continue to hold significant gold reserves, as witnessed by gold remaining the third largest reserve asset exceeded only by US dollar and Euro denominated assets. Additionally, if we were to break down total foreign reserve holdings by issuer, gold would be the second largest reserve asset. Chart 3 shows that while external reserves grew from \$2 to \$10 trillion in a period of 10 years, allocations to gold by central banks as a group remain relatively unchanged at 13% of total reserves.

Chart 3: Tremendous growth of world reserves, 2000

Note: Unallocated reserves were assumed to follow the same breakdown as allocated reserves.

Source: IMF COFER statistics and World Gold Council

Gold has no credit risk in contrast to sovereign debt

In this report we have analysed gold as if it were sovereign debt to illustrate that the size of the gold market is larger than most sovereign debt markets. However, one important difference between sovereign debt and gold is that gold does not constitute an obligation of a government, and is not a liability. Therefore, gold has no credit risk.

Furthermore, ever increasing debt markets driven by consistent fiscal deficits may benefit market participants from the perspective of market size; however, ultimately this also increases credit risk of the underlying bonds. Thus, as governments continue to raise more debt, the likelihood of a default or restructuring rises further diluting the value of the securities.

Chart 5 depicts the debt to GDP ratios of various OECD countries, which as a group average 100 percent debt to GDP.

Chart 5: Selected OECD countries /regions debt to GDP ratios, 2010

Source: OECD, December 2010

Liquidity in the global gold market

Chart 4: Largest debt markets and gold total outstanding debt (in US\$ billions)

Source: BIS, June 2010

Understanding annual gold supply (the flow)

Central banks have been accumulating reserves at a very rapid pace of on average 17% annually over the past 10 years. As a result, reserve managers need a market that is also growing allowing for incremental investment. The global gold market provides sufficient incremental supply for the investment needs of central banks as mine production is augmented by recycled gold and any net official sector sales, allowing for steady growth in the financial market in gold.

Annual gold supply

As of 2010 total above ground stocks of gold were estimated at 168,300 tonnes. This is an increase from 2009 which was 165,600 tonnes. It is worth noting that any growth in the above ground stocks of gold is solely due to mining; however when analysing the supply and demand flow of any particular year, two other forms of supply are typically included: recycled gold and net official sector transactions. Examining each form of supply provides context on the annual flow of new supply, which in a debt market would be the equivalent of new issuance. As gold is more than simply a commodity, the reader should note that supply shocks exhibited by commodities like oil are extremely unlikely given the geographical diversification of mine production and the diversification of having multiple sources of supply flows in any given year.⁵

Mine production

Mine production includes gold produced from primary deposits as well as secondary deposits where gold is recovered as a by-product metal from other mining activities. It accounts for 59% of total gold supply on average, for the past five years. Gold mine production has remained steady over the past ten years requiring increasing investment and deeper more complicated mines. Mine production is derived from numerous separate operations on all continents of the world, except Antarctica, making it a truly global asset with limited supply concentration risks in contrast to some other commodities. For example, no single region produces more than 20% of global mine supply. Therefore, any disruption to production in any one locality is unlikely to affect a significant number of these operations simultaneously.

Recycled gold

Recycled gold refers to gold that has been recovered from fabricated products, melted, refined and cast into bullions bars for subsequent resale into the gold market. It accounts for 36% of average annual gold supply. The predominant source of recycled gold is jewellery in the developing world. The supply of recycled gold fluctuates year to year and can respond to significant increases in price volatility and changes in economic conditions, in addition to higher prices.

5 See World Gold Council. *Gold: a commodity like no other*. April 2011.

Official sector supply

Finally, supply can also come from the *official sector*, which due to its large gold holdings can add a large amount of gold to the market in any given year. Central banks have switched from being net buyers to net sellers various times over the past 100 years. However, for a period of 21 years, several advanced economy central banks in an effort to rebalance their portfolios, engaged in gold sales programmes. In order to reduce the impact of their sales on the market, European central banks came together in 1999 to establish an agreement (CBGA – see page 7) to cap sales conducted within the group in any given year. These central banks sold on average almost 400 tonnes a year for just over two decades, accounting for 6% of supply in the last 5 years. Recently their appetite for sales has diminished. In fact, central banks have as a group turned net buyers again in 2010.

Capacity for central bank investment

Even in an environment of stable or declining mine production, annual supply is large enough to allow for incremental gold investments through recycled gold and sometimes net official sector sales. Chart 6 shows annual gold supply, which has averaged just over 3,700 tonnes in the past 10 years, and its value in US dollar terms in Chart 7. Looking at gold supply in US dollar terms provides a central bank reserve manager a perspective on the equivalent of new issuance in the debt market. However, as highlighted in the last section, large and growing debt markets actually have a declining benefit to reserve managers as this reduces the credit quality of the underlying asset. In the case of gold, the stable and moderate growth of supply actually supports the enduring value of gold – generating higher returns and wealth preservation benefits to reserve managers.

Chart 6: Diverse components of yearly gold supply (in tonnes)

Note: Data is subject to revision by GFMS.

Source: GFMS

Chart 7: Market value of yearly gold supply (in US\$ millions)

Note: Yearly gold supply is multiplied by average yearly gold prices to provide estimated yearly gold supply in US\$.

Source: GFMS and World Gold Council

Liquidity in the global gold market

Central Bank Gold Agreements

During the 1990s, there was evidence of a distinct trend away from the typical defensive posture common to most central banks, and toward a more focused search to enhance the yield on their external reserves. As a result, several European central banks turned to gold sales programmes as a means of rebalancing their reserve portfolios and generating greater returns. Sales reached a level where central banks were actually being accused of creating a disorderly market for gold.

It was in this context that the major European central banks joined together in September of 1999 to sign the first Central Bank Gold Agreement (CBGA1), under which they agreed to limit annual sales in the ensuing five-year period to 400 tonnes a year for a maximum of 2000 tonnes. Signatory central banks duly sold all 2000 tonnes. The signatories to the agreement were the European Central Bank and 14 other central banks.

CBGA2 ran from September 2004 to September 2009, with a ceiling of 2,500 tonnes, but signatory central banks sold only 1,884 tonnes, significantly less than the ceiling they set for themselves. The Bank of Greece replaced the Bank of England as a signatory to the CBGA2, as the UK government announced that it had no further plans to sell gold.

CBGA3 began in September 2009 with an annual ceiling of 400 tonnes, and was designed to accommodate the IMF programme of limited gold sales. CBGA3 covered the 15 original signatories to CBGA2 (the European Central Bank and the national banks of Belgium, Germany, Ireland, Greece, Spain, France, Italy, Luxembourg, The Netherlands, Austria, Portugal, Finland, Sweden and Switzerland), together with the national banks of Slovenia, Cyprus, Malta and Slovakia, and Estonia which all joined the second agreement when they adopted the Euro.

In CBGA3, sales have ground to a virtual halt, with the European central banks selling only 8 tonnes in the first 16 months of the agreement. As the focus in Europe has shifted toward the sovereign debt crisis, it has become apparent that the appetite for additional gold sales designed to adjust the balance of central bank reserve portfolios has been significantly reduced. Furthermore, at a time when even the very existence of the euro area is increasingly being called into question, it seems that European central bankers have taken greater comfort in their large gold holdings just about the only asset they hold that is actually increasing in value.

A change in behaviour

Historically, central banks have retained gold as a strategic reserve asset. In the period from 1989 to 2009, the official sector was a net seller of gold to the private sector, supplying an average of just under 400 tonnes per year. This resulted in net movements of gold from the official to the private sector. During the five year period from 2004 to 2009, however, the pace of net sales has slowed significantly.

In 2009, dwindling sales from European central banks under CBGA2, coupled with substantial purchases on the part of several central banks outside the CBGA2 including China, Russia, and India, resulted in net annual sales of 41 tonnes being the lowest level recorded since 1989. Then in 2010, central banks turned net buyers of gold again, purchasing 87 tonnes of gold as European central banks all but halted sales and emerging market central banks continued to buy gold. This seismic shift in behaviour has reduced the overall net supply of gold to the private sector market.

Chart 8: Official sector net transactions since 1985 (in tonnes)

Source: GFMS

II: Liquidity and background of the bullion market

The gold market is global with trading taking place around the clock in the over-the-counter (OTC) market between diverse market participants.

The OTC market is complemented by other gold markets around the world, including exchanges where derivatives such as futures and options may be traded. In addition to the robust spot and forward markets, a large and active swap market further augments available liquidity and allows investors to lend and borrow gold. When comparing gold with other high quality liquid assets, gold proves to be among the highest quality with a narrow bid-ask spread and a significant amount of daily turnover.

The global OTC wholesale market and the LBMA

Similar to sovereign debt markets, most gold trading takes place in a global over-the-counter (OTC) wholesale market. While OTC markets are among the deepest and most liquid markets in the world, they are often opaque as transactions are dealt outside of any exchange. The global gold OTC market is centred on gold stored in London vaults, and a majority of global transactions are settled through changes in the ownership of these stocks.

The *London Bullion Market Association*, which represents the bullion dealers in the global OTC gold market, has established a host of guidelines and best practices which support the efficiency of the market. Gold bullion trades can be done anywhere in the world and settled *loco London* which is globally recognised as settlement with a *loco London* account representing gold holdings on deposit with an LBMA bullion dealer in London.

The LBMA has also established a global standard for *London Good Delivery* bars which must be produced by an LBMA approved refiner to meet the uniform requirements on size, fineness, and shape. Finally, the price of gold is fixed twice daily in London. The fixing ensures that there is an international benchmark published price that is widely used as a pricing basis by producers, consumers, investors and central banks, and any quantity of gold may be dealt. Since 1919, the fix has been carried out by five banks, all market-making members of the LBMA. At the start of each fixing, the Chairman announces an opening price to the other four members, who relay the price to their dealing rooms, who are in contact with as many bullion dealers who are interested in buying or selling on the fix, or who have clients that may be interested). Each fixing member then nets of his bank's positions and declares himself, as the representative of those interested parties, as a net buyer or seller (and of how much), or to be in balance.

Charts 9 and 10: Daily trading volume of gold OTC, Comex, Tocom and MCX

Daily trading volume (in millions of ounces)

Daily trading volume (in US\$ billions)

Note: Gold OTC estimated by using LBMA average daily volumes cleared through gold stored in London with a multiple of three.

Source: Bloomberg, LBMA, World Gold Council

Liquidity in the global gold market

If the market is out of balance, with more gold required than offered, then the price will be adjusted upward (and vice versa) until a balance is reached. At this point the price is declared fixed. The fix is thus entirely open and any market user may participate through his bank. The fix is the price at which all identified orders to buy and sell can be matched, so that the global market is in balance at the fix price at the moment of the fix. Once the fix price is declared, normal trading continues.

Trading volume and turnover

The trading volume in the global gold market is significant and greater than trading of other high quality assets like sovereign debt. The LBMA, through surveys of its members, estimates that the daily net amount of gold that was transferred between one loco London account and another averaged \$22 billion in 2010 (based on the average 2010 gold price). However, this number represents only the movement of physical gold rather than all trades, as a significant amount of trades are netted within a bullion bank's own trading book. Another large volume of trades is not captured in the typical netting of deals between two bullion banks. For example, a day's worth of trading between two bullion dealers would result in just one transfer entry between them. Thus in practice trading volumes are significantly higher. Many dealers estimate that actual daily turnover is an absolute minimum of three times the amount of transfers reported by the LBMA and could be upwards of ten times higher. This would put global OTC trading volumes anywhere between \$67 and \$224 billion. Using the more conservative estimate of \$67 billion means that average daily trading volumes in gold are larger than the UK gilt market and the German bund market combined. Chart 11 illustrates that estimated daily turnover in gold is greater than most sovereign debt with the exception of US Treasuries.

Table 1: Average daily trading volume 2010

| | Millions of oz/day | Billions of US\$/day |
|---------------|-----------------------|-------------------------|
| Gold OTC | 55.1 | 67.4 |
| COMEX (USA) | 16.9 | 20.8 |
| TOCOM (Japan) | 1.5 | 1.8 |
| MCX (India) | 1.4 | 1.8 |

Source: Gold OTC estimated by using LBMA average daily volumes cleared through gold stored in London with a multiple of three

Bid-Ask Spread

In addition to trading volume and turnover, another important metric that provides an indication of liquidity is the bid-ask spread. Very tight spreads are an indicator of strong market liquidity, whereas wide spreads indicate additional costs of selling or buying the asset. Bullion traders indicate that typical bid-ask spreads on gold traded OTC are from \$0.50 to \$0.85 per ounce. With the average price of gold in 2010 at \$1,224.52 that would equate to a bid-ask spread of 0.04% to 0.07%, which is extremely narrow and comparable to many Treasury securities.

Gold exchange markets

In addition to global OTC trading, there are several gold exchange markets around the world that include the Istanbul Gold Exchange (trading gold since 1995), the Shanghai Gold Exchange (trading gold since 2002), and the Hong Kong Chinese Gold & Silver Exchange Society (trading gold since 1918). As emerging market financial systems become more developed and globalised, these local exchanges are likely to see additional trading volume and further support the global liquidity of the gold market.

Chart 11: Average daily turnover as % of total outstanding

Note: Gold OTC estimated by using LBMA average daily volumes with a multiple of three.

Source: SIFMA, Japanese MOF, German Finance Agency, UK DMO, GFMS, and World Gold Council calculations

The gold swap market

The gold swap market adds considerable liquidity to gold as an asset class. A gold swap involves an exchange of gold for dollars (or other desired currency), with an agreement that the transaction be unwound at a future date, at an agreed price. In a typical gold swap transaction, a central bank will temporarily exchange a portion of its gold holdings for dollars. The bullion dealer taking the other side of the transaction will pay the central bank the Gold Forward Offer Rate (GOFO). The gold serves effectively as collateral for the dollars. As the transaction is a swap, it is executed through one buy and one sell transaction, with the central bank selling gold in the first transaction and buying gold in the second.

An institution receiving dollars can then invest this cash in any form of investment, with London Interbank Offering Rate (LIBOR) lending being considered a base line investment. Thus the *gold lease rate* is the difference or spread between LIBOR and the GOFO rate. Typically, LIBOR has been higher than GOFO, making gold lease rates positive. As central banks are substantial holders of gold, they have usually appeared on the lending side of this transaction, lending gold and earning this positive spread. However, interest rates have declined significantly in recent years and the LIBOR rate has become less homogenous (i.e. due to higher perceived credit risk, not all banks can borrow at LIBOR). This has made GOFO rates higher than LIBOR, which has resulted in a negative lease rate.

This has effectively resulted in some central banks taking the other side of the typical gold swap transaction, now borrowing gold and receiving GOFO rates, which are higher than lending their cash for LIBOR or its equivalent. This change, in turn, has seen hedge funds and commercial banks appearing on the lending side of gold swap transactions. Following the collapse of Lehman Brothers in 2008, the financial markets were engulfed in a liquidity crisis caused by a reappraisal of counterparty credit risk and a lack of liquidity in the financial markets. This was epitomised by the spike in LIBOR rates. Raising US dollars became extremely difficult, especially for non-US banks, and the US Federal Reserve launched a policy of providing unlimited amounts of dollars through a global swaps programme. Chart 12 shows this spike in 3 month LIBOR rates and also shows that during this liquidity crisis, 3 month GOFO rates actually declined significantly, and fell below US Treasury and US Agency financing rates, called repo rates. This decline in GOFO rates exhibits gold's countercyclical properties and shows that using gold in order to secure US dollars was even more advantageous (cheaper) than using US Treasuries or Agency securities. The ease of which banks were able to raise US dollars with gold during this time period would encourage portfolio managers to consider gold as part of a liquidity portfolio in addition to any strategic allocation.

Chart 12: 3 month financing rates of gold, US treasuries and agencies, and LIBOR

Source: Bloomberg, JP Morgan, World Gold Council

Liquidity in the global gold market

Futures exchanges

As illustrated the global over-the-counter gold market is extremely liquid in its own right. However, if we include the volumes traded on gold futures exchanges, we see that derivatives markets add additional liquidity and flexibility to the market. In fact, in 2010, the top three commodity exchanges that trade gold averaged \$24.3 billion in daily gold trading volume, which is the equivalent of 19.8 million ounces per day.

On futures exchanges, trading costs are typically negotiable. As a matter of practice and as is common among other derivatives, only a small percentage of the futures market turnover in gold is ever settled by physical delivery of the gold. Most exchanges permit trading on margin, which can add to the speculative risk involved given the potential for margin calls if the price moves against the contract holder. Additionally, most exchanges operate through a central clearance system, in which the exchange acts as counterparty for each member for clearing purposes.

The most significant gold futures exchanges are the CME Group, formerly the COMEX division of the NYMEX in New York, the Tokyo Commodity Exchange or TOCOM, and the Multi Commodity Exchange of India (the MCX). COMEX began to offer trading in gold futures contracts in 1974. For most of the period since that date, COMEX has been the largest exchange in the world for trading precious metals futures and options. More than 70% of all gold futures volume are traded on the CME Group's COMEX exchange.

The TOCOM has been trading gold since 1982. Trading on these exchanges is based on fixed delivery dates and transaction sizes for the futures and options contracts traded. The TOCOM has historically been the second largest futures exchange; however the MCX has recently witnessed trading volumes in equal size to the TOCOM. The MCX started its operations in 2003 and is already on pace to be the second largest exchange in gold.

The Shanghai Futures Exchange and NYSE LIFFE exchanges are the next two largest exchanges with trading in gold, which are followed by many smaller exchanges around the world. Collectively these exchanges provide further liquidity to the global gold market.

Diverse market players

The gold market has a wide range of buyers and sellers who have different trading motivations and who react differently to price moves. The motivations for gold investment demand are disparate. Some investors buy gold as a long-term strategic asset, some as an inflation or dollar hedge, some as a safe-haven and others because of their tactical view on the gold market.

Secondly, gold is more than a financial asset, with the largest use of gold still being in the jewellery sector and a significant level of gold being increasingly used in technological applications. In fact, over the past 5 years, on average 58% of yearly gold demand has come from jewellery and 12% from technology. While the analysis in this paper has for the most part limited the scope to simply the financial market in gold, it is crucial to recognise that when investment demand wanes, other uses of gold in jewellery and technology can serve as a meaningful backstop to the financial market.

Finally, sources of supply are also diverse. Gold mining takes place on all continents and is not geographically concentrated mitigating the potential for severe supply shocks to the gold market. Furthermore, the annual supply of gold (the flow) comes from a combination of newly mined gold and the mobilisation of above ground stocks from the recycling of fabricated products and sometimes net sales out of central bank reserves. In the five years to 2009, 59% of supply came from newly mined production, 6% from net official sector sales and 36% from the recycling of fabricated products, principally jewellery from emerging markets. This diversity of sources of supply for gold serves to ensure a highly liquid market.

Market regulation

The global gold markets are overseen and regulated by both governmental and self-regulatory organisations. In addition, certain trade associations have established rules and protocols for market practices and participants. In the United Kingdom, responsibility for the regulation of the financial market participants, including the major participating members of the LBMA, falls under the authority of the Financial Services Authority, or FSA, as provided by the Financial Services and Markets Act 2000, or FSM Act. Under this act, all UK-based banks, together with other investment firms, are subject to a range of requirements, including fitness and properness, capital adequacy, liquidity, and systems and controls. The FSA is responsible for regulating investment products, including derivatives, and those who deal in investment products. Regulation of spot, commercial forwards, and deposits of gold and silver

not covered by the FSM Act is provided for by The London Code of Conduct for Non-Investment Products (the NIPS code), which was established by market participants in conjunction with the Bank of England.

US participants in the OTC gold market are generally regulated by the market regulators which regulate their activities in the other markets in which they operate. For example, participating banks are regulated by the banking authorities, namely the Federal Reserve, the Office of the Comptroller of the Currency, and the Federal Deposit Insurance Corporation.

In the US, Congress created the Commodity Futures Trading Commission (CFTC) in 1974 as an independent agency with the mandate to regulate commodity futures and option markets in the US. The CFTC regulates market participants and has established rules designed to prevent market manipulation, abusive trade practices and fraud. In 2010, the US government passed the Dodd-Frank Wall Street Reform and Consumer Protection Act which authorises and instructs the CFTC to develop new rules for regulating swap dealers, increasing transparency, improving pricing in the derivatives marketplace, and lowering the risk to the American public. Over the coming years, the CFTC will be working with key stakeholders to establish new rules in these areas that will likely alter the shape of the futures exchange market in the US.

III: Recent public market activity

We find compelling evidence that a central bank can conduct sizeable transactions without necessarily moving the gold market.

As the gold market is largely over-the-counter, there is little visibility to the many thousands of transactions that take place every day. Given this opacity, some investors and reserve managers question how much a large investor could reasonably transact in the gold market without any disruption to the price. Since we do not have the benefit of knowing everything about the various private transactions that take place each day, we decided to look at several transactions that were made public after the fact and examine how that activity may have impacted the market. The IMF sales programme, the Riksbank financial crisis swap, and the BIS swaps with commercial banks are significant transactions that took place over the past few years providing perspective on the ability to transact in size within the global gold market. From these three examples, we find compelling evidence that a central bank can conduct sizeable transactions without necessarily moving the gold market and could have confidence that its transactions are unlikely to cause any notable disruption.

IMF's programme of limited gold sales

Following the recommendations of the Crockett Report, the IMF's Executive Board announced in September 2009 that it intended to begin a programme of limited gold sales covering a total of 403.3 tonnes of gold. Demand for concessional loans from the IMF had declined steeply in recent years; countries that could afford to do so preferred to pay a few basis points more for loans from commercial banks, rather than submit to the restrictive economic policies the IMF imposed for example on Asian countries in the late 1990s as a condition of receiving IMF assistance. Driven by a need to change its income model, the IMF decided on a programme of strictly limited gold sales. The profits will be used to set up an endowment to finance the IMF's regular research and monitoring work. At the request of the G20, a portion of the profits from gold sales will be devoted to assistance for the world's poorest countries. The IMF conducted the majority of its sales in off-market transactions at market prices with central banks, selling 200 tonnes to the Reserve Bank of India, 10 tonnes each to Sri Lanka and Bangladesh, and 2 tonnes to Mauritius. The remaining sales of 181.3 tonnes were conducted through on-market sales within the ceiling set by the third Central Bank Gold Agreement (CBGA3). These on-market sales concluded on December 21, 2010. This means that the IMF sold on average 18 tonnes a month between February and December of 2010. During that period gold prices rose steadily and there were no reports of a large seller counteracting normal market activity. Thus, the ease at which the IMF conducted its gold sales in a 10 month period demonstrates the depth and breadth of the gold market. Chart 13 shows the IMF sales as reported by the IMF in their IFS statistics, charted against the gold price.

Chart 13: IMF on-market sales have no impact on gold prices

Source: IMF International Financial Statistics

Liquidity in the global gold market

BIS and Riksbank's gold swaps

For a large reserve manager, swaps can provide a source of income or yield on gold when lease rates are positive or conversely they can also provide a cheaper method of generating liquidity in times of severe financial stress without actually selling gold holdings.

During the past several years, financial conditions tightened significantly at various stages of the recession, making raising dollar liquidity very challenging. Following the bankruptcy of Lehman Brothers in September of 2008, many commercial banks found it extremely difficult to raise dollars, even against assets previously regarded as very liquid. In order to be able to provide liquidity to the Scandinavian banking system, the Swedish Riksbank utilised its gold reserves by swapping some of its gold to obtain dollar liquidity before it was able to gain access to the US dollar swap facilities with the Federal Reserve. This illustrates another benefit for reserve managers of holding gold in their external portfolios. As many other assets would not be accepted as collateral for US dollars, gold's safe haven qualities and counter-cyclical behaviour ensured its liquidity in a time of crisis.

Another example of gold being used to generate liquidity occurred in 2010 when the European fiscal crisis first began to unfold. In March of 2010, the Bank for International Settlements (BIS) noted in its annual report that the Bank's gold reserves had increased significantly due to swap transactions with commercial banks. The BIS's gold holdings had increased over 380 tonnes from 118.6 tonnes in November of 2009 to 500.8 tonnes in October of 2010.

While the BIS has been reticent about the exact nature of these swaps, it has become clear that in a reversal of the more typical gold swap, European commercial banks in need of liquidity were swapping gold with the BIS in order to raise cash during the critical moments of the European fiscal crisis. Cash LIBOR rates at that time for European institutions were significantly higher than borrowing with gold as collateral. Furthermore as many European commercial banks struggled to obtain funding for their large European sovereign debt holdings, it is easy to understand why the BIS would only lend to these institutions on collateral they considered of a very high quality that could not be impacted by further credit downgrades.

Thus in this situation, as it has in many times in the past, gold proved to be more high quality than sovereign debt. In this BIS example commercial banks mobilised the equivalent of almost 30 tonnes per month to the BIS for their funding needs, mostly drawn from unallocated holdings on their books. Interestingly, market commentators only commented on this transaction well after it was completed and published in the BIS annual report further illustrating that central banks can deal in size with no apparent market disruption and complete discretion.

Chart 14: BIS gold holdings increase due to swaps with commercial banks

Source: IMF International Financial Statistics

Conclusion

Gold has played a special role for central banks for the past 150 years, first serving as an anchor for central bank monetary bases and serving primarily as a reserve asset preserving national wealth.

Yet central banks frequently struggle to compare gold with their growing foreign exchange reserves predominantly held in sovereign debt. In this paper, we illustrate that the investable gold market is larger than all sovereign debt markets, apart from the United States and Japan.

We also show that the daily turnover, bid-ask spreads, and diversity of market players rival or outpace the liquidity of most sovereign debt markets. Finally, we present several recent examples of large gold market transactions to demonstrate that a central bank reserve manager can transact in size in the gold market without disrupting the market and with complete discretion.

In examining gold relative to sovereign debt, we have also shown that unlike sovereign debt markets, gold's lack of credit risk allows for the gold market to get larger without any negative implications. Meanwhile, as sovereign debt markets grow, the increased credit risk dilutes the quality of the existing stock of debt. While gold no longer plays an official role in the global monetary and financial system, it remains one of the most high quality liquid assets in the marketplace. There can be no doubt that gold will continue to play an important role on the balance sheets of central banks, governments and financial institutions in the years to come.

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Appendix

Chart 15: Supply and liquidity

Gold total outstanding equivalent (private investment and official sector holdings) in tonnes

Source: Estimates from GFMS gold survey, 2000 through 2010

Gold total outstanding equivalent (private investment and official sector holdings) in US\$ billions

Source: Estimates from GFMS gold survey, 2000 through 2010

Chart 16: Total above ground stocks of gold (in tonnes)

Note: Data is subject to revisions.

Source: GFMS and World Gold Council estimates

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