

THE HIGH TECH TRIBUNE

Understanding Gold Market and Its Price Volatility

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Abstract: The price of gold per ounce rocketed from $4300 to $5,500 during the month of January 2026, roughly a 30% increase. Within a week of its high, the price was sharply dropped back to $4,400. This unprecedented gold price volatility is moved by many mysterious factors to unaware investors. Those forces go beyond the power of central banks and the gold market supply-demand dynamics. This article uncovers the hidden forces behind gold price volatility that investors need to be aware of. The recent US-Israel Iran war proved the presented hypothesis in this article. It was expected that the gold price to increase during the war, but the gold price was slightly lowered instead, another irrational behavior of gold prices. The goal of this article educates investors and readers to recognize opportunities by uncovering hidden forces that affect gold prices. This article shows "the invisible hand" that causes gold market dynamics.

The article starts with the most basics by explaining the gold market segments (jewelry, investment, central banks and industrial use) that define the gold global demands in recent years. Then it shows the gold supply resources by pointing to global mining companies, as the annual harvested gold limits the amount of supplied gold. Then, the article illustrates how the gold price is determined globally. The gold price is calibrated daily, twice, based on the fundamental economic principle of supply and demand. This price calibration process is an iterative process that dictated by the invisible hand to find the supply and demand equilibrium price.

Adam Smith defined the invisible hand as the hidden force that controls prices, even gold prices. In ideal world, those hidden forces are rooted to self-interest motives, such as the personal desire to make a living for survival and pleasure needs including power and wealth creation. Often, those forces can be manufactured by major players and affected by geopolitical factors, politics and monopoly. This article presents the reader with a hypothesis that gold prices are mainly controlled by the continuous evolution of global economic growth as well as the impact of USD global dominance in the West and the struggle for the Asian powers, mostly China, seeking an economic supremacy. This hypothesis is tested to be valid during the 2026 US-Israel-Iran war. During the war, the oil supplies suffered from dramatic shortages that could trigger inflation spikes. Contrary to the facts, gold prices were dropping during the war. It is a contradicting observation that can be only explained by high volume and high frequency trading, mostly by ETF and opportunistic traders.

This article covers many aspects of the gold market, and it can be easily extended into a book. Experts in the subject who have a good understanding of the gold market can jump to the last section of this article where the trends, dynamics and forces that manipulate the gold market are presented. Other readers, who would like to have a good understanding of the gold market, are encouraged to read the whole article. The article presents most crucial factors that are affecting the gold market, as this article is intended to serve as an excellent starting point for readers and investors who want to have a good grasp of the gold market. This article is intended for educational purposes only, and please read the legal disclaimer section at the end of this article before making any financial and investment decisions.

Introduction

Gold was used as a monetary currency for over 5000 years. Yes, it is old. All ancient civilizations including Egyptians, Mesopotamians, Greeks, and Romans used gold and silver as a mean to do trades. Empires used gold for millenniums. Gold was used to fund their armies, collect taxes, and settle international trade. Gold was the perfect currency for most of human history because of its scarcity, divisibility, durability, and resistance against corrosion.

Initially, ancient Egyptians and Romans harvested gold from easily accessible riverbeds deposits. But later, it was expanded into more sophisticated mining

techniques. Gold was recognized to be scarce. Empires also accumulated gold reserves through military conquest. Gold extraction declined during the medieval era and only saw a significant increase after the discovery of the Americas.

Because of the technological advancements after World War II and according to the World Gold Council (WGC), two-thirds of ever-mined gold was extracted after 1950. Through human history, approximately 216,256 Ton (SI metric Ton) of gold has been extracted already. This is roughly 80% of all extracted and unharvest gold. The remaining 20% of unmined underground gold is estimated to be around 54,770 Ton. It is worth mentioning that the total extracted gold through human history remains preserved.

The gold market is distributed into four market segments which are the jewelry market, the investment market, the central banks market and industrial use market. Roughly 45% (97,149 Ton) of all extracted gold is treasured for jewelry, where 23% (48,634 Ton) is stored as bullion for investments either as gold backed ETFs or as bars and coins. The central banks own 17% (37,775 Ton) as a gold reserve to support national currencies and act and a financial buffer. The remaining 15% (32,727 Tons) is apportioned for industrial use, mostly CPUs, smart phones, and electronic components, (Fig. 1).

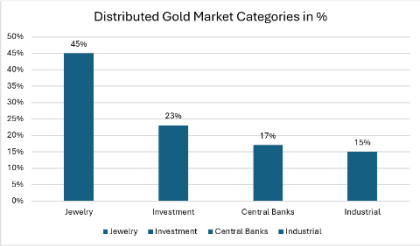

Fig. 1 The total harvested gold is divided into four segments- Jewelry, investments, Central banks, and industrial used.

Gold is a Long-Term Treasured Asset

It is worth noting that the total harvest gold is considered a long-term asset, such that the total amount of gold that is held roughly constant by each of the market segments. The jewelry market segment, mostly owned by individuals, and it holds approximately 45% of all harvested gold. Most individuals hold jewelry gold for decades and possibly centuries, passing ownership through generations. Only small amounts of jewelry gold are recycled or resold on the market.

The gold investment market is the second largest segment, and it holds 23% of all harvested gold. Investment gold is held as a long-term asset and stored as bullion bars and coins, usually for long periods of time. Small percentage of the total investment gold is allocated to gold-backed ETFs. Gold backed ETFs are the easiest and the quickest way to trade gold on the stock exchange markets, traders can use tickets such as GLD or GLDIX to trade gold backed ETF on the Nasdaq.

Central banks are the third market segment, and they own 17% of total harvested gold. Central banks keep gold as a long-term asset, in which the amount of gold is roughly held Constant. Only sparse numbers of central banks are forced to sell their gold reserves, usually to back-up their national currency or fiscal turmoil. Thus, small fraction of central banks' gold becomes available for trading. The same can be said about the industrial use market segment, holding 15% of all harvested gold.

To understand how gold is priced, it is essential to explain the global gold supplies and demands. Pricing gold is calculated twice daily based on the supplies and demands for gold. A process that uses auction iteratively to find the optimal price that maximizes gold traded volume between the buyers and sellers. All those aspects will be discussed in detail later in this article. Before discussing the dynamics of gold pricing, this article presents the gold supply market in more details and then explains the trends in the demand market. Understanding the limited supplies and struggle to allocate harvested gold among the four gold market segments are essential forces that affect gold pricing.

Gold Supply Market

Only small portion of the total existing gold is traded. The newly added physical gold to the market is usually limited, it estimated that ~5000 Ton of newly harvested gold was supplied in 2025. This was a small increase from 4,962 Ton in 2024. The scarcity of gold is the limiting factor of the amount of supplied gold. Gold always exhibits high demand as everyone wants gold (individuals, investors, banks and industries). Therefore, the limited supplied gold dictates gold price.

Gold mining and gold recycling are the two main sources of gold. According to WGC, gold mining contributed to 3,671 Ton in 2025, a 1% increase from 2024. Where recycled gold contributed to 1,404 Ton in 2025, a 3% increase from 2024. The recycling increase is triggered by higher prices. (refer to table in Fig 2)

	2024	2025	Annual y/y% change
Supply			
Mine Production	3,650.4	3,671.6	1
Net Producer Hedging	-53.8	-73.6	-
Total Mine Supply	3,596.6	3,598.0	0
Recycled Gold	1,365.3	1,404.3	3
Total Supply	**4,961.9**	**5,002.3**	**1**

Fig. 2 Table shows sources of gold supplies year-over-year (Y/Y) for 2024/2025. Sources are divided into mine production, producer hedging and gold recycling.

Fig. 3 shows the scarcity of gold supplies, as the total gold supplied remains constant for the past three years, even with the rapid increase in gold prices. Mine production accounts for 75% of total gold supplied in 2025, where gold recycling accounted for the remaining 25%, mostly from jewelry.

A- Gold Mining Production: Gold Mining is a global industry with an

increasing geographical dispersion than ever before. The amount of gold produced has evenly split along regional lines. It is far from the regional concentrated supply four decades ago, that is when South Africa produced most of the world's gold. Fig. 4 illustrates the division of gold mining production for six major regions, North America, South and central America, Africa, Europe, Aisa, Oceania Australia, Papua New Guinea, New Zealand) and independent states (Russia, Uzbekistan, Kazakhstan, Kyrgyzstan). The top gold mining countries are China, Russia.

Fig. 5 illustrates the amount of gold mining production for the top five countries, the top 20 countries and the total production. Roughly 35% of the annual gold mining is harvested by the top five countries, another 45% by the remaining top 20 countries and the remaining ~25% is harvested by all other countries. The top gold mining countries are China, Russia, Australia, Canada and the US. Fig. 6 illustrates the annual gold mining production of the top five countries by ton.

Gold mining is a complex process that balances massive physical operations with large cap finances. To harvest gold from mines and then transform gold from ore to bullion involves several stages:

1. *Extraction:* Ore is removed from the earth using either large-scale open-pit methods for surface deposits or underground shafts for deeper higher-grade veins.
2. *Processing:* The ore is transported to a mill where it is crushed and then grounded into a fine powder.
3. *Chemical Leaching:* The powder is treated with chemicals, typically a cyanide solution, to dissolve the gold and separate it from waste rock.
4. *Smelting:* The recovered gold is melted into unrefined alloys typically containing 60-90% gold.
5. *Refining:* The smelted alloy bars are sent to external refineries to reach investment-grade purity of 99.5% or higher.

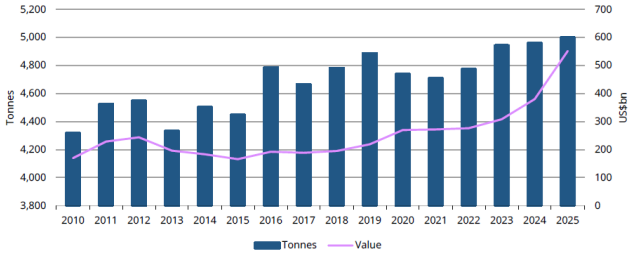

Fig. 3 Illustration of the annual gold demand and the total price in USD in billions. Note the last three years, the price is rapidly increasing while the demand is almost flat around 5000 tons.

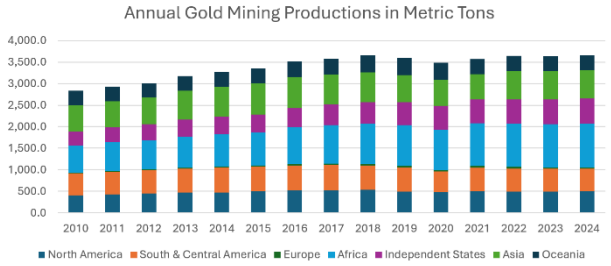

Fig. 4 Annual gold mining production segmented by region, with no dominant region that produces gold.

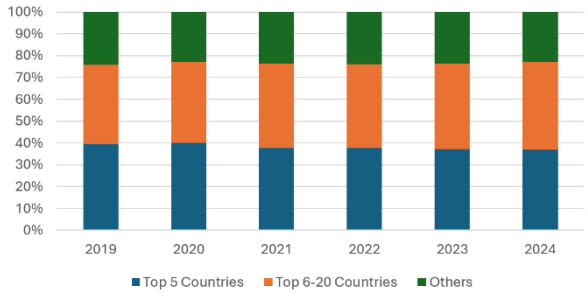

Fig. 5 Annual gold mining production segmented by top 5 countries, top 6-20 countries and other countries. Note that the top 5 countries produce 35% of annual gold harvested production, and 40% is harvested by the 6-20 countries, and the rest of the world harvest the remaining 25%.

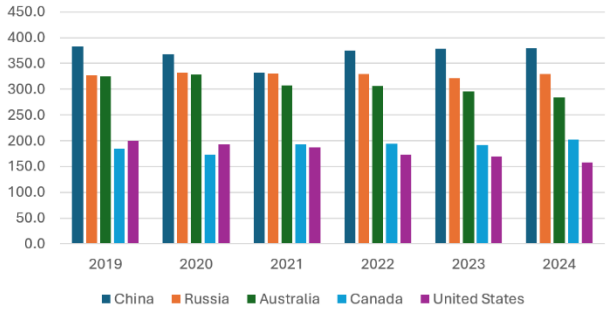

Fig. 6 Annual gold mining production of the top five countries (China, Russia, Australia, Canada and US).

The gold mining industry is led by three giant companies which are Newmont Corporation (NEM) that is expecting to produce 5.3 million ounces in 2026, Agnico Eagle Mines Limited (AEM) with higher operational efficiency, and Barrick Gold Corporation (B) which Operates high-quality assets through multiple joint venture in Nevada and the Kibali mine in the Democratic Republic of Congo. Other companies do exist and all are part of the VanEck Gold Miners ETF (GDX) that can be traded on Nasdaq.

B- Gold Recycling: The amount of recycled gold is considered constant by most analysts, in which only 3% of recycled gold increased in 2025 from its previous year. Despite the 63% increase in gold prices, only small amount of gold was recycled. Recycled gold comes from

two main gold market segments, the jewelry segment and gold industrial segment. At the consumer level, fewer jewelry owners felt pressured to sell gold. Despite the increase of gold prices, jewelry owners did not have strong enough incentives to sell their jewelry gold. Mostly because of the economic stability especially in China and India where most jewelry gold is held. In addition, the rapid increase in gold prices has created a bullish sentiment among gold owners which encourages owners to hold to their gold for higher speculative gains. Also, gold owners in countries like India have been using gold as a collateral for loans which makes owners hold to their gold.

The recycling of electronic waste (e-waste) from electronic devices such as smartphones and servers is becoming a significant strategic focus. This is increasingly viewed as a sustainable supplement to traditional mining, with major brands like Pandora Group located in Denmark (CSE: Pandora). Pandora owns multiple global recycling centers, and it is reaching the goal of using 100% of recycled gold by 2025. It is worth noting that regional trends in recycling gold is located in North America, where North America holds the largest recycling market in 2025 with 40.3% of total recycling market. This was supported by its e-waste infrastructure and high consumer electronics consumption. China remains a major contributor to gold recycling volume because retailers are clearing old stocks of jewelry and replacing them with lighter and more affordable artifacts. India is diverging from the global recycling trends with a decline, as an incentive to gold-backed loans is reducing incentives to sell jewelry for recycling.

C- *Supply Chain:* The gold supply chain starts with miners then moves to refiners and then to mints and eventually reaches wholesalers and central banks. Gold mining companies extract raw gold from earth. Newmont Corporation is the world largest gold mining company with major operations in North America, South America, Australia and Ghana. Also, Barrick Gold that operates the Nevada Gold Mines complex, and it is the single largest gold-mining site globally. Agnico Eagle Mines is the largest Canadian mining company and the second largest gold producer in the world. It is operating mines in Canada, Australia, Finland and Mexico. Navoi Mining Metallurgy Company, Uzbekistan, is one of the four largest gold producing companies and operates Muruntau mine, the world's largest open-pit gold mine. Also, Polyus is the largest Russian gold mining company. It is holding one of the world's largest reserve bases.

Gold Refineries purify raw gold into investment-grade bars (purity up to 99.99%). The global "gold standard" for the quality, purity and ethical sourcing of gold is Managed by the London Bullion Market Association (LBMA). The LBMA "Good Delivery" certification is a uniform set of rules that ensure gold bullions are universally accepted for trade in international markets without the need for additional assaying. According to www.lbma.org.uk, there are 66 different companies that are distributed globally with LBMA Good Delivery certified bullion. To be officially classified as a LBMA Good Delivery bar, a product must meet strict physical and technical specifications. The gold bars must have a minimum purity of 99.5%. The whole sale gold bar must meet standard weight from 350 to 430 troy ounces of fine gold. Every bar must display a serial number, the refiner's hallmark (stamp), its fineness, and the year of manufacture. Also, the bars must have a specific trapezoidal shape for stable stacking, and the bar surface must be free of defects like cracks or dirt. Valcambi Suisse (Switzerland) is an example of one of the world's largest gold refiners, processing over 2,000 Ton annually. Also, Rand Refinery (South Africa) is one of the largest integrated gold refining and smelting sites in the world.

Fig. 7 illustration of gold bar and gold coins.

Gold Demand for 2024/2025

	2024	2025	Annual y/y% change
Demand			
Jewellery Fabrication	2,026.6	1,638.0	-19
Jewellery Consumption	1,886.9	1,542.3	-18
Jewellery Inventory	139.6	95.7	-31
Technology	326.2	322.8	-1
Electronics	270.8	270.4	0
Other Industrial	46.5	44.2	-5
Dentistry	8.9	8.2	-7
Investment	1,185.4	2,175.3	84
Total Bar and Coin	1,188.3	1,374.1	16
Bars	862.8	1,068.2	24
Official Coins	199.9	170.5	-15
Medals/Imitation coins	125.6	135.4	8
ETFs & Similar Products	-2.9	801.2	-
Central Banks & Other inst.	1,092.4	863.3	-21
Gold Demand	**4,630.6**	**4,999.4**	**8**
OTC and Other	331.3	2.9	-99
Total Demand	**4,961.9**	**5,002.3**	**1**
LBMA Gold Price (US$/oz)	2,386.2	3,431.5	44

Fig. 8 Tabel that illustrates the gold demands across different market segments

Gold mint is a facility that produces gold bullion coins and legal tender. It ensures specific weight and purity for investors and collectors. These institutions, such as The Perth Mint, stamp or press gold into refined and detailed products like Gold American Eagles and RAMP Suisse bars offer a high-polish alternative to cast.

Next, the certified LBMA Good Delivery gold bars and mint coins are distributed to customers. Moving gold from refineries and mints to customers is a highly regulated and multi-layered process that is defined by high security and comprehensive insurance coverage. The typical refinery and mint customers are

central banks, certified banks, wholesalers and large retailers. Central banks buy gold from the London OTC market, local mines, or through the Bank for International Settlements (BIS). Investors have the options to buy gold bars and coins from certified banks, or buy/sell gold backed ETFs, or trade gold using London OTC market, which remains the primary global hub for gold trading market. Jewelry retailers buy gold in the form of casting grain and chains from refineries and B2B wholesalers.

In summary, there are two main sources for supplying physical gold which are gold mining and recycling. Gold mining is globally spread across all continents (excluding Antarctica). Recycled gold mostly comes from electronic waste and jewelry resales. Refineries and mints purify gold in investing quality (>99.5%) and ship gold to central banks, certified banks, vault and wholesalers.

The Global Gold Demand Market

The annual global demand for physical gold has exceeded 5,000 Ton for the first time in 2025 including the sum of investment activities on the OTC markets. The high demand was combined with 53 new price records reaching unprecedented value of $555B, +45% year-over-year. The global demand for gold is segmented into four market segments: The gold jewelry market, investments, central banks and industrial use. The industrial use market is mostly for manufacturing electronic components and connectors but also include other industrial uses and dentistry. Fig. 8 illustrates a table that summarizes the 2024/2025 global demand for gold broken down by each of the market segments.

In the following, we will decipher each of the gold market segments (gold jewelry, investment, central banks and industrial use). Meanwhile, we will illustrate some of the hidden key forces that impact the global demand for gold within each market segment.

A- The Gold Jewelry Market: The gold jewelry market is probably the most obvious and easy to understand. Gold jewelry is culturally dependent where gold jewelry is associated with wealth. In some cultures, gold jewelry is passed through generations. In other cultures, gold jewelry reflects affection that is exchanged as gifts. In some cultures, as in the Middle East, bulky gold jewelry is preferred because it reflects affluence and social status. But, in other cultures as in Western Europe, smaller size aesthetic gold jewelry is preferred as it reflects elegance and fashion. Clearly, the difference in taste reflects cultural wisdom that is accumulated through centuries and passed through generations.

Despite the high gold retail prices in recent years, the overall consumer sentiment toward gold jewelry remains positive in 2025/2026. Even with the affordability constraints on consumers that caused lowered the global demand for gold jewelry by volume, the consumer sentiment remains positive. It was observed that the demand for jewelry has dropped 19% by volume from 2,026 Ton in 2024 to 1,638 Ton in 2025. On the contrary, the total consumer spending in total USD has increased globally by 18%, climbing to a record high of $128B in 2025.

Compared to the rest of the world, China and India have the largest volume drop of gold jewelry in 2025, refer to Fig. 9. China's year-over-year gold jewelry consumption has dropped 25% by volume, from 479.1 Ton in 2024 to 360.1 Ton in 2025. Yet, China collective annual spending on gold jewelry had increased by 8%, reaching $39B in 2025. Another factor that caused the volume decline is the new increase in Chinese value added tax (VAT) policy. This added a burden on gold jewelry sales by discouraging consumers from buying jewelry and prompting a shift towards gold investment. Young Chinese consumers favored more affordable light weight hard pure gold jewelry. At which high-ticket chunky heritage gold pieces are being sold through boutique stores for high end

Tonnes	2024	2025	y/y % change
World total	1,886.9	1,542.3	-18 ▼
India	563.4	430.5	-24 ▲
China	479.1	360.1	-25 ▼

Fig. 9 Tabel that illustrates the jewelry gold demands in China and India. Note that the jewelry gold volume has dropped by ~25% in China and India compared to the 18% global drop.

consumers. This is providing evidence of resilience at the top-end of the Chinese gold jewelry market. It is anticipated that affordability will continue to be a major constraint in 2026, and the external economic pressure as well as the outlook of the domestic economic uncertainties may weigh on consumer gold jewelry demands in China.

India's sentiment towards gold jewelry remained very strong in 2025. Typical Indian consumers have fixed budgets for jewelry spending that impacted the gold demanded quantity in 2025. Despite a slight demand increase in 14 karat jewelry among younger demographic, high karat gold remains popular. Indians favors high karat gold because it preserves its value on the long-term. Gold jewelry exchange remains a key trend in India, as a mean for monetization. Indian bank backing loans on gold jewelry has increased by 125% in 2025, reaching $40B.

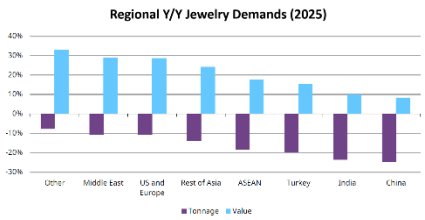

Fig. 10 illustrates the regional jewelry gold demands in volume and USD in 2025. Note that the global jewelry gold demands increased in USD but decreased in volume.

The Middle East gold jewelry market was aligned with global trend. A decline in volume demand is met with an increase in USD spending. The VAT in Saudi Arabia and UAE aggregated with recoded high prices impacted the gold jewelry demands by volume. Demand in Iran was resilient with only 1% drop in 2025. The Iranian consumers consider gold a safe-haven against geopolitical tensions, especially the US-Israel-Iran war in 2025 & 2026.

The US gold jewelry market was also aligned with the global trend. The consumption was impacted by higher prices. But the decline in volumed demands was met by a 28% increase in total USD spending, totaling $13B in 2025. The US K-shaped economy appeared to hold healthy demand for premium high-carat and high-end gold jewelry, where affordability constraint is less of an issue among the higher income segments of the market.

Europe's gold jewelry demand has registered third consecutive annual volume decline in 2025. This is in contrast with the increase in USD spending for past consecutive five years, reaching a record of $7B in 2025. Australian gold jewelry is also aligned with global trends, as Australian volumes registered a 22% decline in 2025, but its gold jewelry USD spending increased by 11%.

B- Gold Investments Market: Investing in gold is a classic for hedging wealth against geopolitical conflicts, inflation and market volatility. One of the biggest disadvantages of investing in gold is that its volume does not increase over time. It is a non-productive asset. Gold doesn't pay dividends or interest. But gold holds its real value over time. Therefore, gold investors hold gold as a long-term asset that is easy to liquefy and they focus on ownership methods and the storage costs. It is worth mentioning the difference between zero-sum gold traders who trade gold often based on speculations and investors who hold gold for long time.

Investing in gold is exercised through one of three methods:

1- *Investing in physical gold bars and coins*: Here, the investor purchases gold from reputable bullion dealers, local coin shops, and designated local banks. The gold can be stored at home, or in a bank safe deposit box or in a high security facility like Brinks, which will offer "allocated" storage for your gold bar. When purchasing physical gold bars, investors pay a percentage, the premium, over the spot price. The premium goes as a profit to the dealer and minting costs. In addition, investors may select to pay insurance and storage fees.

2- *Investing in Gold-backed ETF on the exchange stock market*. Investors may elect to buy ETF shares (stocks) that represent ownership to the value of gold that is held in private vaults. The physical bars are held in massive underground vaults, often in London or New York. The investor does not have a right to the physical gold, but the investor owns a claim to its value. Investors buy and sell gold ETFs like buying and selling regular shares through brokers such as Schwab, fidelity, Goldman Sacs and others. The ETF management charges annual management fees in addition to the broker commission.

3- *Investing in vaulted gold*. This is where large-scale vaulted gold investments are taken place, usually executed by institutions and high net-worth individuals (HNWI). Vaulted gold investors use London Good Delivery bars, in which the gold bars meet very strict requirements. To remain as Good Delivery, the bars must stay within the secure vaulting network of accredited bullion banks. If a bar is removed from this system, it loses its Good Delivery status and it must be re-assayed before it can be sold at wholesale prices again. This guarantees the chain of integrity legal title. While London and New York remain dominant vaulting locations; other locations such as Singapore, Zurich, and Dubai are becoming leading global hubs for private institutional vaulting due to political neutrality and favorable tax structures. Large investors often split their holdings across multiple jurisdictions to mitigate "country risk."

Institutional investors (hedge funds, central banks, and sovereign wealth funds) trade directly with Bullion Banks. Bullion banks are specialized departments within designated major global banks such as JPMorgan Chase, HSBC, UBS and ICBC Standard Bank. These banks act as "market makers," quoting continuous buy and sell prices for large quantities. Those institutions also lease gold to jewelers or miners, who pay interest in the form of more gold. The London Bullion Market Association (LBMA) is the de-facto global authority where trades are settled by gold physical delivery within the London vault system. London vaults (including the Bank of England) hold hundreds of thousands of bars, serving as the "clearinghouse" for global institutional gold. It designates where the gold is physically stored and where the legal delivery occurs. Other global loco gold markets exist such as Loco Zurich, Switzerland, which is the world's refining capital. Trades often involve 1kg bars and it is preferred for private wealth because of privacy policies. The Loco Hong Kong is the primary gateway to the Chinese market, the world's largest consumer. The Loco Singapore is growing rapidly in 2026 as an alternative to Western hubs. Singapore offers tax-free investment-grade gold, and it has built massive vaults. Finally, Loco New York (COMEX) is primarily a futures market. While most trades are settled in cash, "loco New York" delivery involves specific warrants for gold held in

COMEX-approved vaults in the NYC area.

Institutional channels offer two distinct ways to hold gold accounts for investors: Allocated accounts and Unallocated accounts. In the Allocated account, the bank acts as a custodian, where the bank gives the investors the outright legal ownership of specific and uniquely numbered bars. These allocated bars are held in the investors' name, and they are not assets of the bank or vaulting company. On the other hand, the gold bars of the unallocated account are part of the bank assets where the investor has a claim against the bank pool. The Allocated accounts are suitable for long-term investors and central banks who pay storage fees, whereas the unallocated accounts are more suited for investors who are looking for easier liquidity.

The demand for gold investment increased by 84% in 2025 to 2,175 Ton from 1,185 Ton in 2024. Most of the increase was allocated to gold ETFs, a total of 801 Ton, 36% of the total investment demand. This may explain the small spread between the true gold price and the gold backed ETF like GLD in 2026. The bar and coin investments increased by 16% in 2025, where China's demand for gold investment increased by 28%.

Tonnes	2024	2025	y/y % change
Investment	1,185.4	2,175.3	84 ▲
Bar and coin	1,188.3	1,374.1	16 ▲
India	239.4	280.4	17 ▲
China, P.R.: Mainland	336.2	431.7	28 ▲
Gold ETFs	-2.9	801.2	- ▲

Fig. 11 Tabel that illustrates the amount of gold invested in tons. Note ~36% of the gold demands for investments (801 tons) went to ETF, that is ~18% of the global demands was allocated to ETF in 2025. Also, China's demand for investments increased by 28%.

C- Central Banks Gold Demands: Central banks are independent public institutions that serve as the bank for the governments and other banks, thus central banks do not serve the public. The central bank of a given country is responsible for managing the country's currency as well as the monetary system by focusing on macroeconomic stability. In addition, central banks are responsible for maintaining price stability by adjusting the interest rates to control inflation, typically targeting 2% inflation rate. Also, central banks provide emergency liquidity to commercial banks during financial crises to prevent systemic collapse. Thus, central banks regulate and monitors private financial institutions to ensure that other commercial banks follow risk management standards and remain solvent. In addition, central banks manage national holding of foreign currencies, such as USD, euro, Japanese Yen and gold. This diversified basket of foreigner currencies stabilizes exchange rates and ensure international payments.

Foreign currency management is guided by three primary objectives: liquidity, safety, and returns. The central bank portfolio is typically divided into two major trenches. A short-term liquidity trench that provides highly liquid assets such as cash or treasury bills for immediate market need. A long-term investment trench such as government bonds, corporate securities or gold that are intended to generate higher returns once liquidity is needed.

Central banks directly buy or sell foreign currencies in the Foreign Exchange market (FX market) to manage their own currency's value. The FX market is the global, decentralized marketplace for buying and selling currencies, with a daily volume exceeding $7.5 trillion. It is the world's most liquid financial market, operating 24 hours a day, five days a week, allowing banks, businesses, and traders to speculate on or hedge against currency fluctuations. Investors may invest in the FX market through reputable brokers such as forex.com. When the domestic currency is depreciated, the central bank may sell foreign reserves to buy its own domestic currency. Thus increases its demand to counter the currency depreciation. On the other hand, the central bank may buy foreign assets with their own currency to weaken its value and keep exports competitive.

Central banks purchase gold as a long-term asset to hedge against economic and geopolitical risks. Gold is used also as strategic independence against unpredicted geopolitical turmoil. Central banks aim to reduce the concentration of risk by moving away from over-reliance on the USD by adding more gold to their reserves. In 2026, the global value of central banks gold reserves surpassed the U.S. Treasuries for the first time in 30 years (since 1996). Unlike Treasury notes, gold is physically held domestically and cannot be blocked by foreign governments or sanctions. Hence, gold is becoming sovereign financial asset that is replacing a weaponized USD for geopolitical reasons. In addition, central banks are using gold as hedge against inflation, as gold preserves a long-term stored value against fiat currencies that are devalued by persistent inflation and aggressive monetary expansion.

Fig. 12 illustrates the central bank's global demand for gold. Note that the demand was steady from 2011 to 2021 with annual demands of ~500 tons on average. But the annual demand increased to ~1100 tons on average from 2022 to 2024. In 2025, central bank demand was held steady at 863 tons.

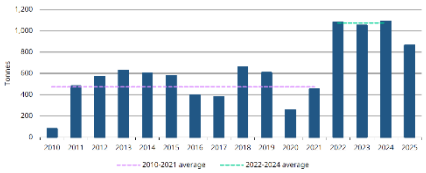

Fig. 12 Illustrates the global central bank demands for gold. From 2011-2021, the annual average central banks demands were ~500 tons on the average. From 2022-2024 the average jumped to ~1100 tons. The central banks gold demands held steady at 8 tons in 2025.

The increase is mostly caused by the Russia-Ukraine war, the Middle East

tensions, the use of USD as an economic weapon against sovereign nations and applying economic sanctions against countries. Thus, other central banks have been increasing their gold reserve against USD and other fiat currencies like Euros and Yen. Analysts are projecting central banks to continue their strong gold demand throughout 2026 as other nations are moving away from USD.

D- Technological and Industrial Gold Demands: Away from its scarcity and being treasured as a precious metal, gold has unique physical and chemical properties such as its conductivity, its resistance to corrosion, and its high malleability. Those make gold irreplaceable in industrial uses. Gold is used in electronics manufacturing, aerospace applications, healthcare and dentistry. The total technological demand for gold in 2025 was held steady at 322.8 Ton, a small decline from 326.2 Ton in 2024.

The electronics sector dominated the industrial gold demand. Gold is used for making printed circuit boards, connectors, and high-performance semiconductors, especially for Artificial intelligence (AI) circuitries and Telecommunications. AI requires high speed hardware to transfer and process data across electronic modules, and gold is used to make reliable interconnects. Also, gold is used to make high density interconnect (HDI) boards needed in 5G communications technology. The increased number of Low Earth Orbit (LEO) satellites require gold connections to stand against extreme environmental conditions. Basically, electronic technological advancement is expanding the use of gold as bonding wires for contacts, and as an essential element in manufacturing semiconductor chips. Gold is also used in green technology, in which gold is a key component in manufacturing solar panels. Thin layers of gold are deposited within solar panels to enhance their conductivity and extract more energy. In addition, gold is used in space applications as gold reflects 99% of space damaging infrared radiation. Gold is used as a thermal shield on satellite components, space telescopes, and astronaut helmet visors to protect against extreme heat and solar radiation.

Gold's nanoscale optical properties have been used in medical diagnostics and treatment. Gold nanoparticles are used in

Tonnes	2024	2025	y/y % change
Technology	326.2	322.8	-1 ▼
Electronics	270.8	270.4	0 ▼
Other industrial	46.5	44.2	-5 ▼
Dentistry	8.9	8.2	-7 ▼

Fig. 13 Tabel that illustrates 322.8 tons of gold in 2025 were allocated for technology uses. Note ~83.7% are used in electronics and the technology demands is held steady from 2024.

Rapid Diagnostic Tests (RDTs) for diseases like malaria, HIV, and COVID. In addition, gold is used in cancer treatments as its nanoparticle deliver drugs directly to tumors. Also, gold is used to destroy cancer cells via photothermal therapy, a process that sends gold particles to cancerous cells, and then heating up gold particles with lasers to destroy cancerous cells.

It is worth mentioning at this point that the ore from e-waste recycling gold contains up to 800 times more gold concentration than extracted raw ore from mines, making e-waste recycling a strategic resource for gold industrial use.

Determining Gold Prices Globally

Determining the global gold price at a given instant in time is not a simple task. It requires coordination among all major parties involved in all regions and from all gold market segments. The price itself is governed by the economic principle of supply and demand. In which the gold price is selected at the optimum value where supply gold by volume meets the demand. At this price, the total exchange is the most efficient, the maximum volume is exchanged and the maximum value in USD is executed. Searching for the optimal price follows an iterative price search algorithm where the algorithm searches for the maximum volume to be exchanged by dynamically changing the price using auction process. The auction keeps on adjusting the price until the sell volume meets the buy volume.

The mechanism of setting up global gold prices is not dictated by a single entity, but it emerges from an interplay of two major hubs that are the London Bullion Market Association (LBMA) and the commodities exchange (COMEX) in New York, in addition to other markets that are globally dispersed.

The Loco London market is the largest physical over the counter (OTC) gold market. The LBMA calibrates the gold price twice daily through an electronic auction, as the price may drift away during the trading sessions. LBMA price auction follows a process that reaches an equilibrium price based on global sell and buy orders. So, the LBMA auction serves as an official reference for settling long-term physical contracts, valuing central bank reserves, and pricing gold-backed ETFs. Other loco markets exist where large volumes of physical gold are traded, vaulted, and settled. Those are Loco Shanghai Gold Exchange (SGE), Loco Zurich and Loco Dubai Gold and Commodities Exchange (DGCX). The SGE is dedicated to the gold distribution through China mainland, the Zurich gold market is dominated by major Swiss refineries and large banks serving as a discreet and high-security storage hub for institutional and private clients. The DGCX accounts for about 15% of global trade. DGCX offers physical delivery contracts to Middle Eastern and Asian markets.

Other smaller regional markets such as the Loco Hong Kong market which serves as a gateway for the Chinese market with other global markets for physical exchange. The Loco Singapore market is a growing tax-free market for

Southeast Asia. Loco Mumbai market is the center for India's massive gold imports and wholesale distribution. Loco Istanbul market manages high physical volumes for Middle East and Europe. Also, the Loco Perth market serves as an exchange point between the Australian miners and major refining and distribution points.

Despite all those markets, London OTC market is the world's leading venue for physical gold trading. Managed by LBMA for Good Delivery 400-ounce bars stored in high-security vaults. The New York COMEX market is the world's most active futures gold exchange. COMEX prices are driven by the most actively traded front-month contract, where traders agree to buy or sell gold at a set price on a future date. The constant flow of these paper trades reflects real-time market sentiment. However, less than 1% results in physical gold delivery. Unlike the LBMA fixed price, Loco London Market and COMEX prices fluctuate every second during trading sessions, often react to macroeconomic news, providing immediate price signals that drive short-term volatility. Understanding the twin-engine system of COMEX and LBMA is essential for interpreting daily market price change.

The first daily LBMA price fix is determined at 10:30 a.m. and second one at 3:00 p.m., both are at London time. The LBMA price fix establishes the official reference price, and the process follows an iterative price-search algorithm to find the optimal price at which the maximum volume of sell and buy is exchanged; it is the most efficient point where the sell gold volume meets the buy gold volume. This iterative process uses an electronic auction to find the optimal price.

Only accredited participants are allowed to place bids in the auction. The participants submit their buy and sell orders using an electronic platform that is managed by International Exchange Benchmark Administration (IBA). Currently, 15 accredited participants are authorized to submit orders directly into the LBMA Gold Price auction. The participants are categorized into groups who are good representations of major global players. The LBMA participants are categorized into:

- *Major Global Banks:* Which are Citibank, Goldman Sachs, HSBC Bank USA, JPMorgan Chase, Morgan Stanley, and Standard Chartered. Those banks provide liquidity, act as intermediaries for global clients, and maintain stable pricing. They act on behalf of a vast range of global clients including investors, investment institutions and even central banks who need to buy or sell large quantities of gold at a single trusted price.
- *Specialized Bullion Players*: Those are StoneX Financial, Marex and Toronto-Dominion Bank. Those institutions act as prime brokers for mining firms and refineries. They ensure their large physical selloffs are executed at the official global prices.
- *Regional & Tech-Driven Firms*: This group includes Bank of China, DRW Investments, Jane Street Global Trading, Koch Supply & Virtu Financial and Coins 'N Things. The Bank of China joined in 2015 to ensures the price reflects supply and demand from China, the world's largest producer and consumer of gold. Jane Street Global Trading, Virtu Financial, and DRW Investments are known for high-frequency electronic trading, so they also provide liquidity. Coins 'N Things is a major supplier to the United States Mint producing American Eagle bullion and circulating coins. Koch Supply & Trading provides risk-management perspectives by bridging the gap between raw production and the global financial markets.

All participants in the LBMA pricing process must adhere to the strict code of the FMSB Standard to prevent market manipulation and manage conflicts of interest. In addition, the auctions are centrally cleared by allowing non-back firms to participate to reduce the credit risks associated with trading.

The LBMA Auction Process to Determine Gold Prices: In each price setting session, accredited participants submit all sell (supply) and buy (demand) orders into an electronic platform. The platform determines if the sell volume matches the buy volume at that price. If the volume is not met (unbalanced) the price will be repeatedly adjusted and new buy and sell orders will be entered into the system. This process is repeated until the sell orders meet the buy orders within 10,000 ounces. The price is adjusted using auction process in which the new price keeps on changing until the balanced condition is met. The auction chairperson proposes the initial auction price, and then the participants would enter their sell and buy orders. If the price is way off from the balanced price, i.e. very low or very high, it would result in unmatched difference between the sell and the buy orders. During the process, if the auction price is very high, it would result in a much higher sell volume than buy volume, and then the new price will be lowered to decrease the sell orders and increase the buy orders. On the other hand, if the auction price is low, it would result in more buy orders than sell orders. Then the new price will be raised to

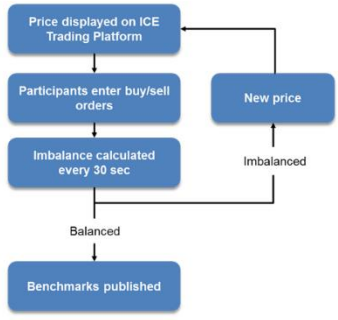

Fig. 14 LBMA mechanism to set the gold price following IBA guidelines. Where the price is set twice daily at 10:30 a.m. and 3:00 p.m. London time. This process iteratively finds the meeting price between supply and demand by adjusting the price up or down.

increase the sell orders and reduce the buy orders. In both cases, the sell and buy volumes are unmatched, resulting in imbalanced condition. The auction waits for 30 seconds to calculate the imbalance between the buy and sell volumes at every new proposed price. When the imbalance is more than 10,000 ounces, a new price is adjusted repeatedly, and new orders entered the system. This process repeats until the difference between the sell and buy volumes are less than 10,000 ounces.

The average daily trading volume in 2026 is around 50 million ounces. The traded volume during the auction session is much higher than the 10,000 ounces imbalance condition. In the Loco London market, a very small fraction of total traded volume involves the physical movement of bars across banks. Most transactions are settled through unallocated accounts or electronic clearing within the same bank or institution. Only net differences are transferred across banks, and this is typically ranged from 1% to 5% of the average traded volume.

COMEX prices, on the other hand, are driven by front-month contract. In which traders agree to buy or sell gold at a set price on a future date. Less than 1% of these contracts result in physical delivery. The constant inflow of these on-paper bets reflects market sentiment and global economic data in real-time. Unlike the continuous, high-speed trading of COMEX, the LBMA auction focuses on finding a single equilibrium price that is adjusted twice daily. Thus, it is a better representation of the physical gold daily trading.

Shanghai Gold Benchmark Price (SHAU): It is also known as the Shanghai Gold Fix. It is Renminbi denominated global benchmark price for gold, and it was launched in April 2016 by SGE. SHAU provides a local reference price that reflects Chinese market demand and reduces dependency on the U.S. dollar-based LBMA Gold Price.

Similar to LBMA process, the price is determined through a centralized, electronic auction designed to find an equilibrium where buy and sell volumes match. The process starts by establishing an initial price based on quotes from fixed members. The participants submit buy and sell volumes based on the current price. If the buy and sell volumes are imbalanced by 400 kg, the price is adjusted accordingly and a new round begins. Once the imbalanced volume is within 400 kg, the price is determined and the benchmark price is established.

SHAU competes with the London-based process by shifting gold trading from a Western dollar-centric model to a physical Yuan dominated process. Both LBMA and SHAU provide twice-daily price-fix, but they differ fundamentally in their structure and market purpose. LBMA uses USD per ounce, but SHAU uses Yaun per gram. Unlike the London market, which relies heavily on unallocated accounts, every trade in Shanghai market is backed by physical bullion stored in certified vaults. SHAU has higher gold standard of 1 kg bar with 99.99% purity. The government of China controls gold import quotas, causing the SHAU price spread by $20-$40 higher than London and New York prices. In other word, gold is more expensive in China. The physical delivery requirement and strong wholesale demand from Chinese jewelers and investors keeps local Chinese prices elevated. The price spread creates massive arbitrage opportunities, where traders buy gold in London to ship and sell in Shanghai; hence, making China a price floor for the global market.

Gold Market Trends and Price Volatility

To understand the gold market trends and causes for the recent volatilities in gold prices, it is important to have an understanding of the demands forces as the gold supplies are limited by the amount of gold harvested.

Forces of Gold Demands: Understanding the gold market and how the gold price is established is crucial for making educated decisions. At this point, we have shown that the gold price is calibrated daily by supply and demand such that the price is selected for maximizing the gold exchange volume. Also, we know that the total new influx of gold is limited by the amount of gold harvested by mining companies. At the same time, gold is physically stored as a long-term asset (not investment), and physical gold does not liquidate that easily. Despite the high daily exchange volume, only small fractions of physical gold have been exchanged.

Each of the four gold demand market segments has its own internal forces that governs its demands. The jewelry market is driven by population growth and economic growth. Therefore, it is expected the jewelry demand for gold will increase as more people need to buy jewelry. However, gold affordability will continue to be a limiting factor in the volume. Hence, it is expected that the global spending on jewelry to increase in USD while demand of volume will be regulated. We can conclude that the jewelry market acts as a regulating buffer that will absorb any shortage in other market segments. If the demand shortage occurs in other segments, the jewelry demand will increase. Hence, jewelry demands act as a buffer to stabilize prices when the segments demands are reduced.

Central banks hold gold as a long-term asset to ensure economic stability and to protect against financial crises. While fiat currencies are not back by physical commodities, gold remains crucial asset added to central banks in addition to other foreign currencies like USD, Euro and Yen. First, Gold is a hedged asset that holds its value as an insurance, compared to bonds and stocks. Unlike bonds,

physical gold is tangible asset that carries no credit risks and the possibility of default. Gold provides protection against sanctions and hedges against inflation. Also, gold provides liquidity in extreme economic emergencies. It is expected the central banks demand for gold to continue increasing globally to adjust for anticipated global economic growth. In other words, central banks need to continue adding gold to leverage for economic growth.

It is anticipated that the physical gold demand for investments will continue to increase. It is considered a haven to hold wealth. Unlike currency, gold value does not depreciate over time due to economic growth and inflation. Unlike speculative gold trading in which traders seek profits from price fluctuations, investors hold gold to mitigate economic risks. Gold serves as vehicle to liquidate assets during economic collapse. Therefore, investment institutions and investors include gold in their portfolio as a liquefying asset. Experts recommend that investors should hold anywhere from 5% to 20% of their total assets in gold to mitigate any unforeseen risks and to leverage against inflation and economic collapse. In simple words, investment demands for physical gold will continue to increase as the global economy continues to expand, because investors continue to mitigate their risks with everlasting increase in wealth.

The industrial demand for gold will continue to increase. As the gold prices continue to rise, the amount of e-recycling gold for industrial use will increase. Eventually, the e-recycling will be near self-sufficient, and only small amount of new physical gold is needed for industrial use.

The 2026 Q1 demands for gold are consistent with the presented hypotheses. Where 535.6 Ton is bought for investments, a 42% increase from Q1 2025. Central banks bought 243.7 Ton, a 3% increase from Q1 2025. The industry bought 82 Ton of gold, 1% increase from Q1 2025. As expected, the jewelry demand for gold dropped to 335 Ton, 23% drop from 2025, but the jewelry expenditure increased by 30% to $47 billion.

Gold Price Volatility: In January 2026, the gold market experienced unprecedented price volatility, when the gold price rallied several times from $4,321per Ounce reaching its peak at $5,595 per Ounce on January 28, 2026. The price dropped to $4,894 per Ounce by the end of January 31, 2026. The month functioned as a rollercoaster, with prices swinging over $1,400. The extreme intraday swings were amplified by retail and OTC activity rather than institutional speculation. High-frequency trading algorithms triggered massive selloff during a 28-minute crash. The lowest price year to date reached $4,100 per Ounce and it occurred on March 23, 2026, due to geopolitical conflict in Middle East. The price has been stabilized and trading around $4,600 as of May 1, 2026.

In summary, the gold price swings is expected to continue because of the increase amount of ETF and speculative gold trading investment that is triggered by an automated high frequency algorithmic trading. However, those swings will be considered noise that needs to be filtered out. The demands of physical gold will continue to surplus the supplied mostly driven by the global economic growth. This forces central banks to increase their gold portion in their portfolio, which also has a positive effect due to the increase in prices. Also, the global economic growth increases the wealth of investment institutions and investors, thus the demand for investment gold increases to mitigate risks. The jewelry demand is acting as a buffer that would absorb any demands drop, thus it acts as a price stabilizer. Finally, the demand for industrial use is steady and stable.