

GOLD MARKET STUDY

**Tuvshintugs Batdelger,
Delgermaa Begz,
Munkh-Ireedui Bayarjargal**

Economic Research Institute (ERI)

Abstract

This study reviews key developments in the gold market between 2010 and 2016 and analyzes current market conditions. It further presents detailed projections of gold production and price trends for major global and Mongolian gold producers in the coming years, based on data from sources including the World Gold Council and Bloomberg. Gold is one of Mongolia's principal export commodities and a significant source of fiscal revenue. Conducted in collaboration with the Japan International Cooperation Agency, this study aims to assess the current state and future outlook of the global and Mongolian gold markets.

Keywords:

Gold, gold demand, gold supply, gold price, Mongolia

Ulaanbaatar, Mongolia

2017

REPORT

GOLD MARKET STUDY March 2017



ULAANBAATAR 2017

CONTENTS

GOLD DEMAND	5
World Gold Demand.....	5
<i>Jewelry.....</i>	7
<i>Technology</i>	9
<i>Investment.....</i>	10
<i>Reserve asset management</i>	12
<i>Total demand outlook to 2017.....</i>	14
Mongolian Gold Demand	15
<i>Mongolian gold export.....</i>	15
<i>Local purchase of gold.....</i>	16
<i>Gold demand-impacting policies.....</i>	20
<i>Outlook of Mongolian gold demand</i>	20
<i>Conclusion of Mongolian gold demand analysis.....</i>	21
GOLD SUPPLY	23
World Gold Supply	23
<i>Gold Mine Production.....</i>	24
<i>Mining production by countries.....</i>	26
<i>Major mining corporations and their projects.....</i>	28
Mongolian Gold Supply	31
<i>Major gold deposits.....</i>	32
<i>Supply distribution, contracting and delivery.....</i>	35
<i>Outlook of Mongolian gold supply</i>	36
<i>Related supply-impacting policies.....</i>	37
<i>Conclusion of Mongolian gold supply analysis</i>	38
GOLD PRICE.....	39
Analysis of prices	39
World gold prices: Current developments.....	40
Gold price projection	40
<i>2017 gold price trend.....</i>	40
<i>Gold price long term outlook.....</i>	41
Prices for Mongolian gold: Past trends and current state	42
Conclusion of gold price analysis	43
APPENDIX	44
REFERENCES	45

CONTENTS OF FIGURES AND TABLES

Figure 1-1. World gold demand and price.....	5
Figure 1-2. The composition of the total demand for gold	6
Figure 1-3. Total demand by countries, 2010-2016	6
Figure 1-4. Demand for gold jewelry and price, 2010-2016.....	7
Figure 1-5. Gold jewelry consumption (tons)	8
Figure 1-6. Gold technological consumption (tons),2010-2016.....	9
Figure 1-7. Demand for gold investment and gold prices, 2010-2016	10
Figure 1-8. Demand for gold investment by regions, 2010-2016.....	11
Figure 1-9. Demand for bars and coins, and etfs, 2010-2016	12
Figure 1-10. Demand for reserve asset management, 2010-2016	13
Figure 1-11. Mongolian gold export (excluding concentrate)	15
Figure 1-12. Oyu tolgoi gold export, thousand oz 2013-2016	16
Figure 1-13. The participants in gold production and trade	17
Figure 1-14. The Bank of Mongolia's gold purchase,tons 2010-2016	18
Figure 1-15. Purchased gold by the BOM, tons.....	18
Figure 1-16. Tax revenue composition of gold companies, bln Togrog.....	19
Figure 1-17. Gold submission projection.....	21
Figure 1-18. Gold export projection	21
Figure 2-1. World gold supply, 2010-2016	23
Figure 2-2. Three main sources of gold supply	23
Figure 2-3. Gold mine production, 2011-2016	24
Figure 2-4. Top companies all in sustaining costs, in 2015 and 2016	25
Figure 2-5. 2015 Top companies aisc and prices, USD	25
Figure 2-6. World Gold exploration expinditures, bln USD.....	26
Figure 2-7. Number of major gold discoveries in the world	26
Figure 2-8. Mining production by countries	27
Figure 2-9. Mongolian gold production, tons.....	31
Figure 2-10. Main gold projects, their geographical distribution	33
Figure 2-11. Oyu Tolgoi copper- gold mine geographical distribution.....	34
Figure 2-12. Pure gold supply distribution	35
Figure 2-13. Gold production outlook (midterm 4 years), tons.....	36
Figure 2-14. Gold production outlook (long term 10 years), tons	36
Figure 3-1. Gold prices, USD.....	39

Figure 3-2. 2017 gold price forecast by major analysts	41
Figure 3-3. EIU gold demand and supply forecasts.....	42
Figure 3-4. Gold price outlook	42
Table 1. Gold export income by counties (excluding OT gold export)	16
Table 2. Budget Revenue by Main commodities, bln Togrog	19
Table 3. Three major supplies of gold	23
Table 4. Gold production by top companies, 2010 and 2016	28
Table 5. List of mines, and the companies' production and revenue in 2016.....	29
Table 6. The top 10 gold mines, and their owners and resources	29
Table 7. The list of up-and-coming gold mines.....	30
Table 8. Mongolian major gold mining companies' production (tons).....	31
Table 9. Local gold reserves, tons	32
Table 10. Major gold deposits and their reserves	32
Table 11. Results of policy implementations (1992-2015).....	37
Table 12. 2016 New gold mines and their information.....	44

ABBREVIATION

OT	Oyu Tolgoi
BoM	The Bank of Mongolia
MRAM	Mineral Resource Authority of Mongolia
MOM	The Ministry of Mining
MOF	The Ministry of Finance
BMI	Business Monitor International Ltd
UB	Ulaanbaatar
oz	ounce
moz	million ounces
toz	troy ounce (approximately 1.0971 oz)
\$/USD	U.S dollar
Togrog	Mongolian currency/Tugrik
mln	million
bln	billionGold Demand

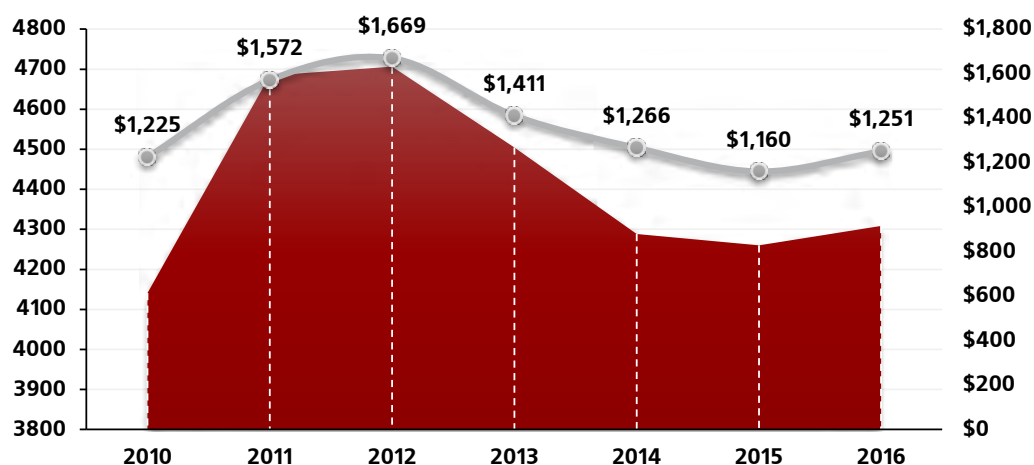
GOLD DEMAND

World Gold Demand

World gold demand consist of four major usages of gold: jewelry, technology, investment and reserve asset management.

Although the total demand for gold in the past 10 years was on an increasing trend, it fluctuated quite significantly in the past 5 years. In particular, the demand for gold increased significantly between 2010 and 2012 from 4,141 tons to 4,707 tons. For the period after 2013 the demand for gold started to decrease and as of the end of 2016 it stood at 4,309 tons.

FIGURE 1-1. WORLD GOLD DEMAND AND PRICE

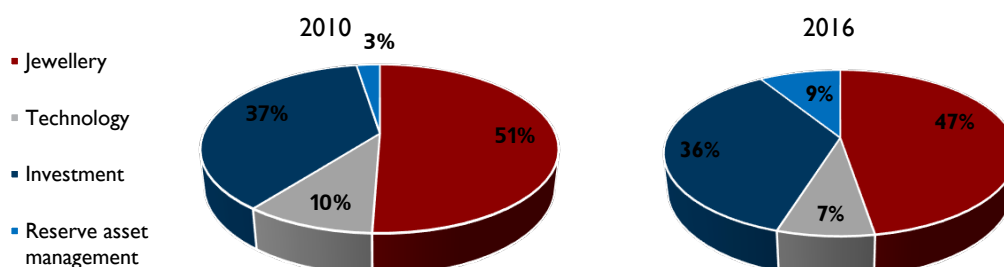


Source: World Gold Council

As of 2016 the composition of the total demand for gold is as follows.

Jewelry	2,041 tons
Technology	322 tons
Investment	1,561 tons
Reserve asset management	384 tons

This composition has not changed quite significantly in the past 6 years as we can see from the graph below.

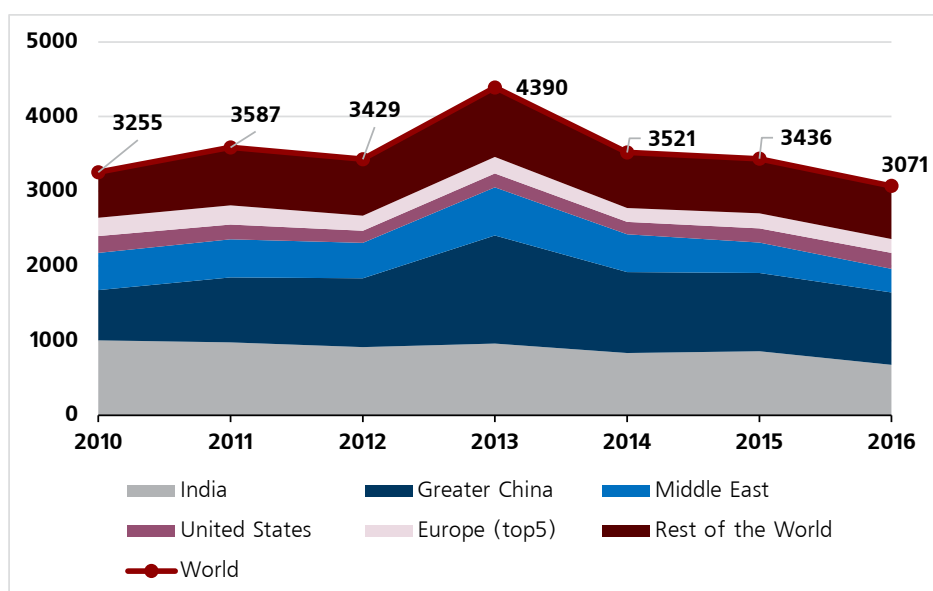
FIGURE 1-2. THE COMPOSITION OF THE TOTAL DEMAND FOR GOLD

Source: Metals Focus; GFMS, Thomson Reuters; ICE Benchmark Administration; World Gold Council

We can see that major usage of gold is jewelry. Roughly half of the total demand is for jewelry and it stayed that way for the last ten years. However, other components of the total demand such as investment and central bank's activities of purchasing and selling gold has been volatile. It is notable that usage of gold for technology has been stable as a share of total demand.

In the past years, economic slowdown in China, which represent together with India 60% of total jewelry usage, led to decrease in gold jewelry demand. The dynamics in the jewelry demand is still driving the total gold demand. Lately, the total demand was boosted by increase in exchange traded products (ETP), which was largely driven by strategic decisions of investors and long term positions they took in gold.

In terms of geographical area, China is the biggest user of gold closely followed by India.

FIGURE 1-3. TOTAL DEMAND BY COUNTRIES, 2010-2016

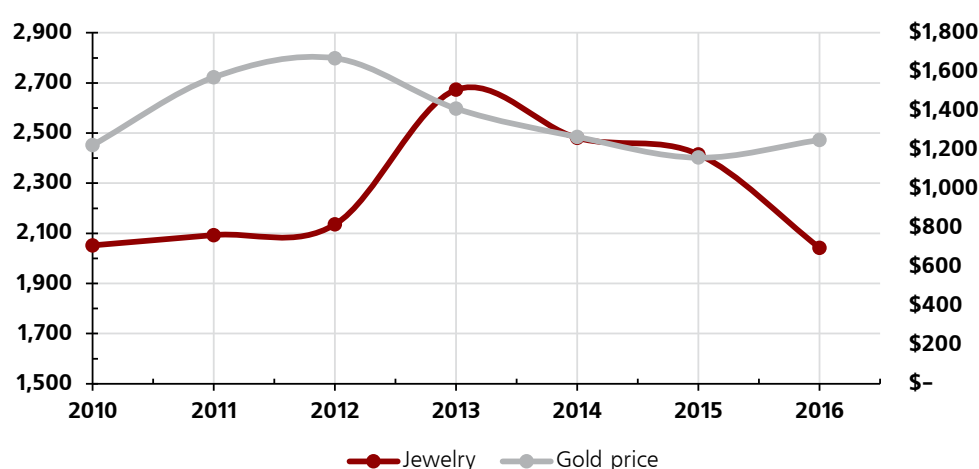
Source: World Gold Council

From the recent trend in gold usages, we can see that demand from India and Middle east is on declining trend whereas demand from China is on increasing trend. For the past 6 years, demand from China increased by more than 40%, which is mostly fueled by increase in demand for jewelry. In contrast, demand for gold from India and Middle eastern countries declined by more than 30% due to various factors such as economic slowdown, technological advances and people's taste towards gold.

Jewelry

The biggest component of gold usage is jewelry and the following graph shows gold demand for jewelry.

FIGURE 1-4. DEMAND FOR GOLD JEWELRY AND PRICE, 2010-2016

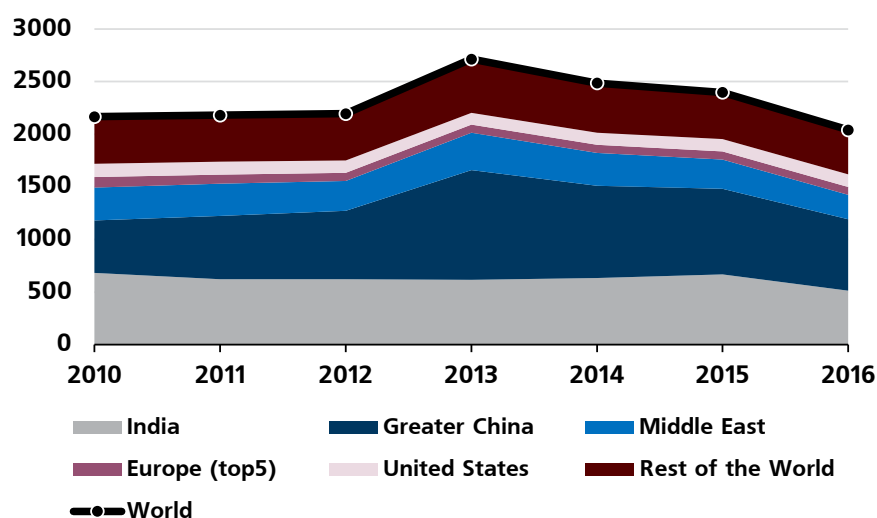


Source: Metals Focus; ICE Benchmark Administration; World Gold Council

The demand for gold jewelry is largely determined by the general performance of the economy. In particular, when the economy is expanding the demand for gold increases whereas when the economy is slowing down the demand for gold jewelry decreases.

It should also be noted that the demand for gold jewelry should increase during this period since gold prices were on decreasing trend since 2012.

Interestingly, it seems the demand for gold is only weakly dictated by the dynamics in prices. In particular, we see that in the past six years the demand for jewelry was on an increasing trend while the price of gold was on declining trend. However, this correlation breaks down for the period between 2013 and 2016, which suggests that non-price factors influencing the jewelry demand is an important factor.

FIGURE 1-5. GOLD JEWELRY CONSUMPTION (TONS)

Source: Metals Focus; ICE Benchmark Administration; World Gold Council

From the figure above, we can see that China and India are major consumers of gold for jewelry.

Although the demand for gold jewelry in India was stable since 2011, it decreased significantly in 2016. The demand from India has been hampered by slow demand for jewelry from rural areas. In particular, a lack of monsoon rainfall in 2014 and 2015 significantly reduced disposable income of rural population, which led to decrease in the demand for gold. In 2016, significant crackdown on undeclared income and related policy steps to withdraw high denominated banknotes led to sharp shortage in liquidity. Thus, local demand for gold significantly increased as people rushed to purchase gold. However, this increase was only temporary and continued liquidity shortage in rural India softened demand for gold.

Jewelry demand in China slowed down significantly and reached its lowest level in the last four years. China's demand for jewelry is decreasing because of general economic slowdown in the country as well as prices of gold still stayed at relatively high levels at or around last 3 years' high. Moreover, it is noted that Chinese consumer's preference shifted away from 24 carat gold jewelry towards 18 carat gold jewelry products. This shift in preferences away from gold is also being observed in other south east Asian countries. (see World Gold Council 3Q2016)

It is interesting to note that for these 2 countries the demand for jewelry was increasing or stayed at high levels prior to 2013 despite significant increase in gold price.

Outlook for 2017

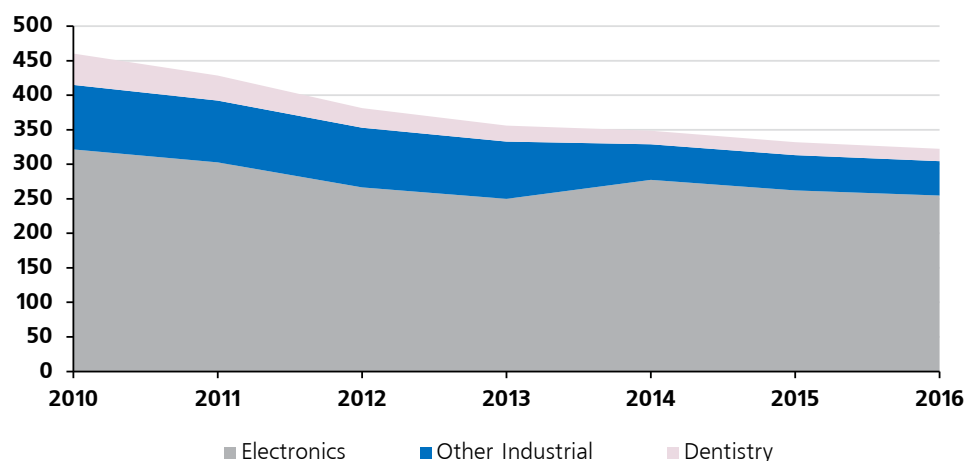
In general, jewelry demand for gold is decreasing and it is expected to continue this trend in 2017. Although India's jewelry demand will likely to increase due to more favorable weather conditions, which means better rural economic performance and hence more disposable income, weakness in China and south east Asian countries as well as weak demand in Europe

will continue. Hence, it is expected that jewelry demand will be decreasing to 2,397 tons (Economic Intelligence Unit) levels.

Technology

As we can see from the graph below, the demand for gold for technological usage decreased significantly in the past 6 years from 459.7 tons down to 322 tons.

FIGURE 1-6. GOLD TECHNOLOGICAL CONSUMPTION (TONS), 2010–2016



Source: Metals Focus; ICE Benchmark Administration; World Gold Council

There are three major usages of gold for technological purposes. As of 2016, the demand for technological gold composition was as follows:

Electronics	254.5 tons
Dentistry	50 tons
Other industrial usage	18 tons

We can see that the most important usage of gold in the technology sector is in electronics, which represent more than 80% of total electronics demand. Gold is widely used in gold bonding wire, connectors, printed circuit boards, electrical contacts and circuits. (composition of electronics gold to be explained in detail)

Although prices fluctuated significantly for the last 6 years, the demand for gold for technological usage was driven by a strong demand in the electronics sector. However, at the same time, the sector itself developed alternatives for the gold. Strong technological advances supported the demand for electronics products and hence the demand for gold. For instance, the demand for LED products is improving. But, at the same time, the gold price is not decreasing significantly enough and stays at high levels, which encourages the sector to find cheaper alternatives. In particular, the sector is increasingly shifting towards alternatives to gold. Alternatives are widely used in bonding wire and printed circuit boards are increasingly becoming smaller in size reducing usage of gold. Hence, it is expected that this downward trend in the technological usage of gold will continue in the future.

In terms of other technological usages of gold, the demand gold for plated products is stagnating. This kind of demand usually high during festivities period, although it should be noted that the demand for these purposes is decreasing.

Gold is also becoming less attractive for dental purposes. Not only the sector is shifting towards replacements of gold, consumers are also changing their preference away from gold towards ceramic materials. It is expected that this trend will continue in the future.

Outlook for 2017

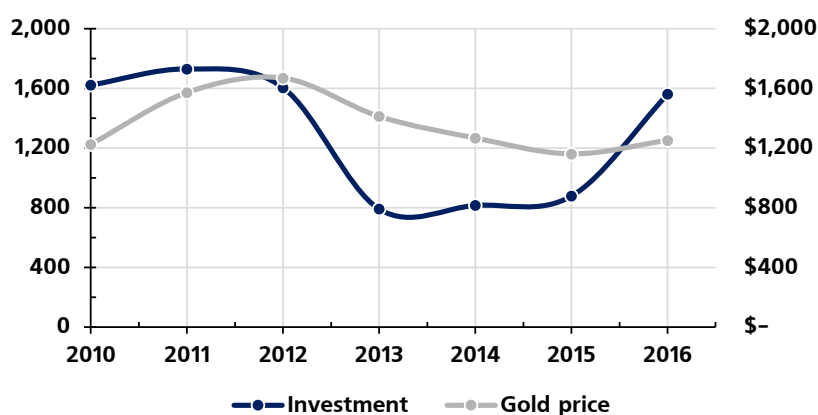
The downward trend in the demand for gold for technological usages will continue to decrease in 2017. Although this demand is driven by the technological advances and alternatives to gold, the demand for gold may even further weaken if prices stay at today's levels.

Investment

Gold is widely used as an investment vehicle or rather investment diversification instrument. Major buyers of gold are investors and the gold is used in two major ways as an investment tool. The gold is bought in physical form in bars and coins, or in the form of exchange traded fund or similar products.

From the graph below we see how demand for gold for investment purposes evolved during the 2010-2016 period.

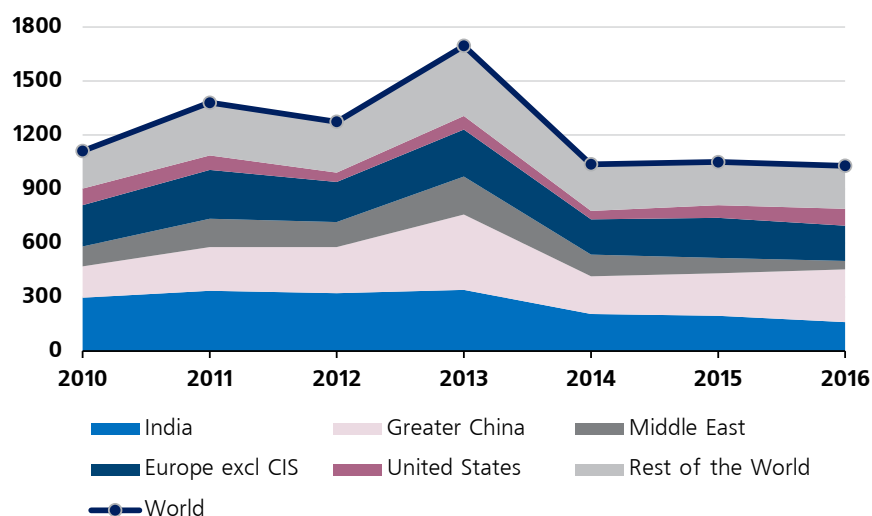
FIGURE 1-7. DEMAND FOR GOLD INVESTMENT AND GOLD PRICES, 2010-2016



Source: Metals Focus; ICE Benchmark Administration; World Gold Council

It is notable that the demand for gold for investment purposes increased during the period 2010-2014 and this is despite the fact the price for gold was fluctuating between USD 1,500 and USD 1,750 during this period. High demand for investment purposes was due to the fact that after 2008/2009 world economic crisis uncertainty was still very high and there were few alternatives for investment. Investors found gold as a safe haven.

However, for the period after 2014 this type of demand significantly shrank. The demand for bars and coins and for ETF products are shown below.

FIGURE 1-8. DEMAND FOR GOLD INVESTMENT BY REGIONS, 2010-2016

Source: Bloomberg

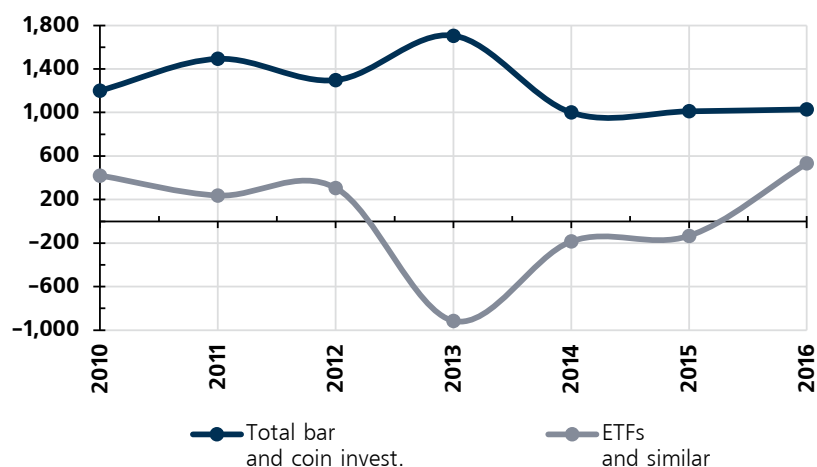
The demand for bar and coins were largely driven by demands from Greater China (including Hong Kong, Taiwan), India and Europe. In 2016, major purchases were made by following countries:

China	291.8 tons
India	161.6 tons
Europe	196.0 tons

Indian demand for bar and coins dropped significantly since 2013. This is because prices are stabilized still at high levels. Noticeably, the government of India took policies to curb cash transactions as part of fighting corruption. These efforts discouraged the gold buying in the country.

China's demand also started to be sluggish since 2013. As economic growth in China started to slow down, it also dampened the demand for bar and coins. Also, Chinese investors are moving away from gold as an investment instrument towards more attractive investment tools. These developments led Chinese demand to fall from 406 tons to 284.6 tons or by more than 30% in just three years for the period between 2013 and 2016.

On the other hand, European investors also sold off gold since prices started to decrease from its temporary high levels.

FIGURE 1-9. DEMAND FOR BARS AND COINS, AND ETFs, 2010-2016

Source: Metals Focus; ICE Benchmark Administration; World Gold Council

We can see from the graph above that the demand for coins and bars significantly decreased in 2014 by 40 percent and it is not recovering from that levels since then. The demand for ETF products is also not recovering. In fact, the negative number of ETFs is showing the fact that the stock of ETF products is decreasing and it started declining since 2013.

This decline in both investment products is related to decreasing prices of gold and investors are increasingly finding better alternatives for investment.

It should be noted that although gold does not serve as an attractive investment vehicle, today's levels are still higher than that of prior 2008/2009 crisis levels.

Investors stopped unloading gold ETFs in 2016 and purchased 531 tons of gold for ETF purposes. In fact, purchase of gold ETFs is the main reason that the total demand of gold maintained at today's levels.

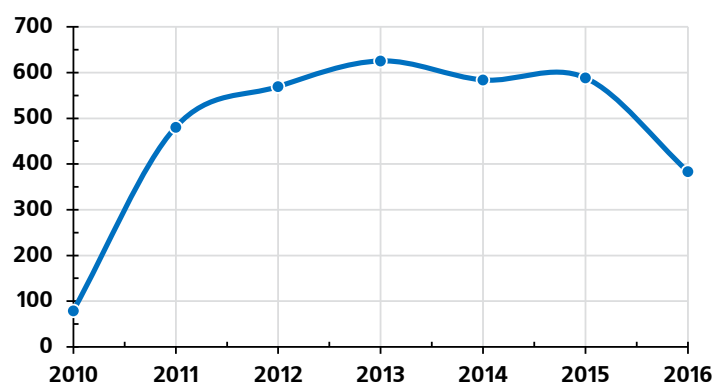
There are two major influencing factors for gold demand for ETF products. In the short term, since other financial documents are more attractive investors will be moving out of ETFs. In the longer term, investors might be unwilling to sell gold since further gold price reductions will entail losses for investors.

Outlook for 2017

For 2017, it is expected that the investment for gold will continue to decrease. This is because as US economy improves the demand for gold will deteriorate further. However, if US funds rate increases further it may have opposite effect and dampen the flight out of gold.

Reserve asset management

Gold is being intensively used in central banks around the world as part of reserve asset management. The graph below shows total purchase of gold made by central banks.

FIGURE 1-10. DEMAND FOR RESERVE ASSET MANAGEMENT, 2010-2016

Source: Metals Focus; ICE Benchmark Administration; World Gold Council

It can be seen that central banks ramped up purchase of gold for their reserves in the last six years. Although in 2016 the level of purchase slowed down significantly from 588 tons in 2015 to 384 tons, it is still at high levels historically.

It should also be noted that significant increase in purchases were mostly led by emerging countries' central banks. In the third quarter of 2016 alone following central banks drove purchase of gold.

Russia	84 tons
China	61 tons
Kazakhstan	16 tons
Mauritius	3 tons

(Note: Data from IMF, national data, Macquarie Research, August 2016)

However, these central banks are not the biggest holders of gold stocks. The following table shows countries with the highest total reserves of gold as of 2016.

USA	8,134 tons
Germany	3,378 tons
Italy	2,452 tons
France	2,436 tons
China	1,843 tons
Russia	1,615 tons

Gold is increasingly becoming attractive tool for central banks' reserve management because with negative US interest rates gold they tend to diversify away from US dollars.

It is difficult to predict what central banks will do in terms of stocking its gold reserves as these purchases may affect the gold market and its price.

The decision of central banks whether to increase its foreign reserves is dependent on what monetary and exchange rate policy these central banks are carrying out. If a country decides to increase reserves of gold it means that the central bank will supply money into the economy thus expansionary policy will take place. This way central banks increase their foreign reserves and they will have to decide whether to hold their foreign reserves in gold

or in foreign currencies. Purchase of gold by central banks thus dependent on liquidity and return of other alternative financial assets.

In the near future, it is expected that central banks will continue buying gold at past years' levels since uncertainty surrounding gold prices and general economic performance is not expected to change dramatically.

In 1999, central banks of developed countries signed Central Bank Gold Agreement, which limited gold sales of participating central banks to 400 tons per year and 2,000 tons maximum for the five-year period until 2004. This agreement was amended in 2004 allowing participating central banks to sell 500 tons of gold per year and 2,500 tons for the next five years. This agreement was further updated again in 2009, but in 2014's agreement there was no limits set and only general agreement not to sell in large quantities that would fluctuate prices.

Outlook for 2017

It is expected that Chinese and Russian central banks will continue to purchase gold, whereas other central banks such as Turkey and Venezuela might intensify selling gold due to their domestic economic difficulties. Therefore, we might see further decline in the demand for gold for reserve management purposes at central banks.

Total demand outlook to 2017

For the current year, following issues are important in terms how the total demand of gold will be determined:

- ETPs were not attractive to investors, but in the last quarter of 2016 it increased
- Jewelry demand from rural India are expected to increase, but overall jewelry demand is sluggish
- Technology sector is finding cheaper alternatives to gold, thus demand is sluggish
- Central bank purchase is hard to predict, but central banks of China and Russia will determine the demand.

Overall, total demand of gold in the world market is expected to be sluggish for 2017. In particular, demand for gold jewelry and usage of gold in technology sector are expected to be sluggish, whereas demand for investment and central bank purchase for asset management purposes are harder to predict.

Mongolian Gold Demand

In Mongolia, gold is one of the major exporting commodities and an important source for government budget revenue through its export taxes and royalties. Mongolian gold demand is basically determined by the export and local gold consumption.

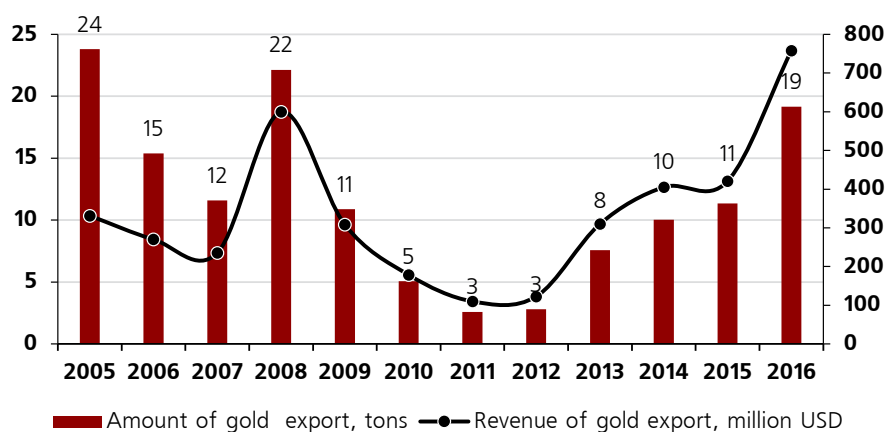
Mongolian gold export

Mongolian gold is exported in 2 types of forms as pure gold and gold concentrate.

Pure gold

As shown in the Figure 1-11, it shows amount of pure gold export and its revenue (excluding gold concentrate export).

FIGURE 1-11. MONGOLIAN GOLD EXPORT (EXCLUDING CONCENTRATE)



Source: Mongolian Customs

Historically, Mongolian gold export peaked at 22.1 tons in 2008, and revenue of export accounted 600mln USD while GDP was 5.62 bln USD. Later, the gold export dramatically dropped because of lower gold output as well as changes in policy and regulations in the sector. Indeed, Mongolia exported only 2.8 tons of gold in 2012 and this has been the lowest point since 2005. Notably, gold export revenue was 420.6 mln USD and 758 mln USD in 2015 and 2016, respectively. (Mongolian Customs, 2016)

Even though the world gold price increased by 80 percent between 2008 and 2012, revenue of Mongolian gold export was significantly lower as a result low quantity of gold export.

However, gold export rebounded since 2011, and Mongolia exported 11 tons of gold to the international market in 2015 due to favorable changes in regulations and improvements in the world gold market.

As shown in the table below, Canada was the major destination of Mongolian gold during the period between 2010 until 2013. This is related to the fact that the Boroo Gold Company sends its produce directly to refineries in Canada.

TABLE 1. GOLD EXPORT INCOME BY COUNTIES (EXCLUDING OT GOLD EXPORT)

Country, mln \$	2010	2011	2012	2013	2014	2015
Canada	141.0	90.0	116.8	134.1		
Great Britain	37.3			175.8	380.0	315.4
Korea	0.0	6.1				
France					0.0	
Switzerland		13.6	5.5		25.3	104.3
India						0.9
Total	178.3	109.8	122.3	309.8	405.2	420.6

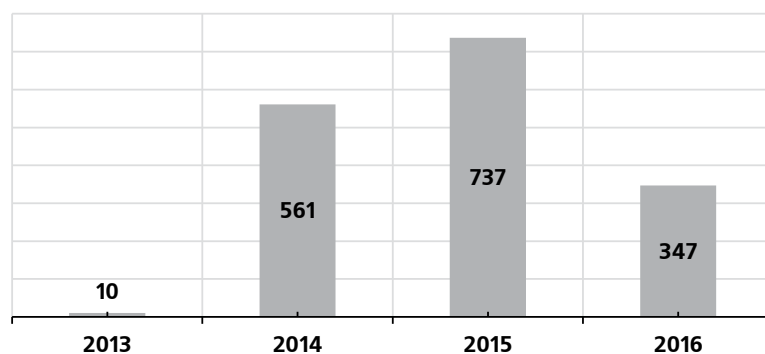
Source: Mongolian Customs

After 2013, Mongolia exported its gold to other countries such as Great Britain and Switzerland. In particular, Mongolia exported 21.8 tons of gold to Great Britain for the last three years, which accounted for 75 percent of the total amount of gold export.

Overall, in the total Mongolian mining export revenue, copper concentrate represented 48.1 percent, coal 11.9 percent, and gold 11.6 percent. The mining sector as a whole accounted for 91 percent of total export revenue.

Gold concentrate

Oyu Tolgoi is the sole exporter of gold concentrate whose main destination is China. It is indeed one of the largest copper-gold mine projects in the world and the company's gold export was 11.9 tons of gold in 2016. The graph below demonstrates the number of Oyu Tolgoi's gold exports between 2013 and 2016. In 2015, the amount of gold exports was the most massive, at 737,000 ounces.

FIGURE 1-12. OYU TOLGOI GOLD EXPORT, THOUSAND OZ 2013-2016

We will discuss about OT production and its prospective on supply side of this report.

Local purchase of gold

The Bank of Mongolia (the Central Bank) is the main gold buyer.

Generally, Mongolian gold's main local consumer is the Bank of Mongolia. Since the country has single buyer, the local demand will be determined by the local production of gold.

The BoM purchases the gold for its foreign reserve purposes and it carries out following activities with regards to selling the gold onwards.

- Purchasing of gold
- Sending gold abroad for refining

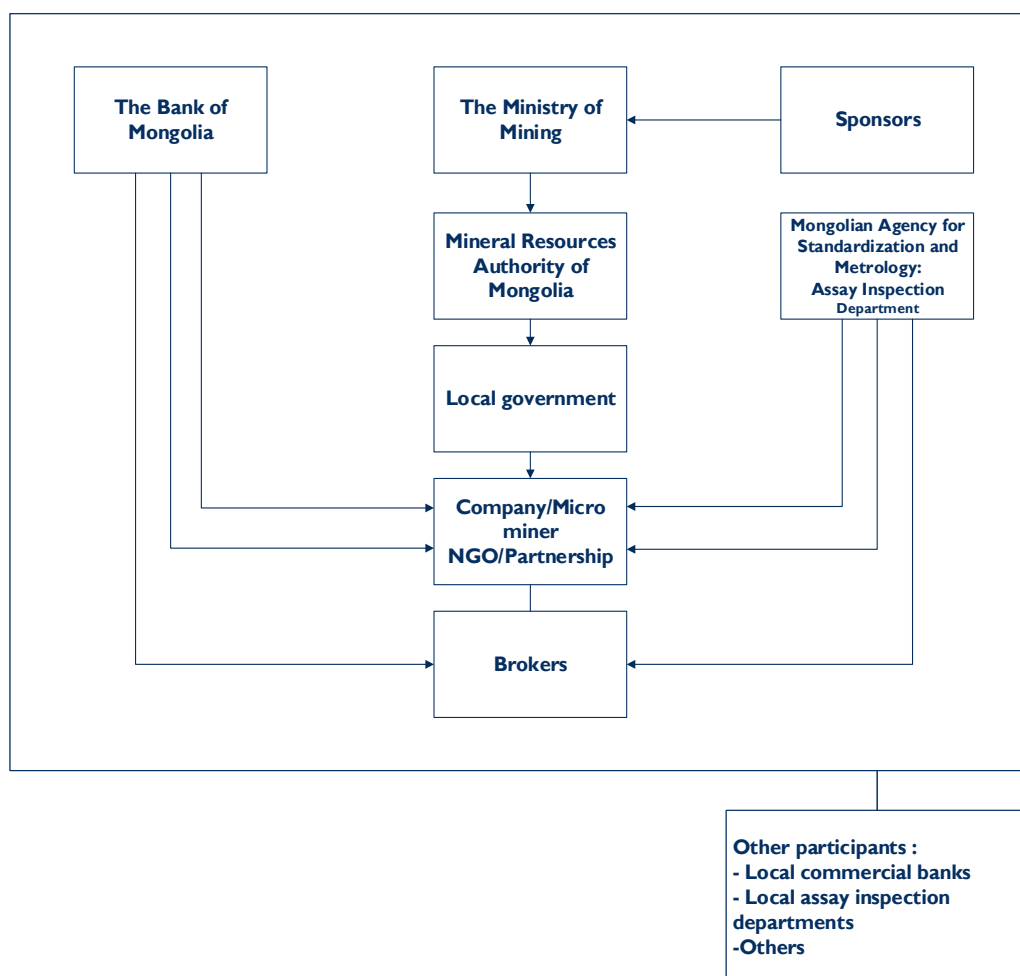
- Storing gold bullion bars
- Supplying the domestic gold manufacturing sector.

Gold bullion consist of stocks of gold bars of international standard held in foreign banks. It represents a part of international reserves. Also, it is recorded in physical weight in troy ounces and is valued in Mongolian Tugrik at the official exchange rate of the BOM. The official exchange rate is calculated based on information on gold prices determined (fixed) by participants of the London Bullion Market Association in U.S dollars translated into Togrog at the BoM official Togrog/US dollar exchange rate. Apart from holding gold as gold bullion, the BoM purchases unrefined gold from producers and companies in Mongolia.

In addition, gold bullion and silver bars of international standard are measured in the statement of financial position at their fair value and revaluation is performed daily. (The Bank of Mongolia, 2016)

The BoM is constantly working on increasing the reserve by purchasing gold from domestic gold miners, artisanal/micro miners and citizens and further refining and monetizing the gold to meet international standards. (The Bank of Mongolia, 2016)

FIGURE 1-13. THE PARTICIPANTS IN GOLD PRODUCTION AND TRADE



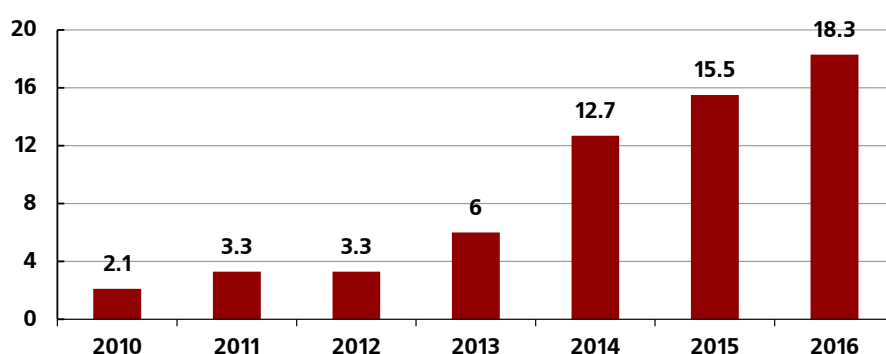
Source: Mongolian Customs

The above scheme illustrates how parties participate in the gold market. About 70 percent of total small miners are working in the gold industry, and the majority of them are operating gold placer mines.

In the past six years, gold purchase by the BoM dramatically increased. The graph below shows amount of gold purchased by the BoM between 2010 and 2016.

In 2015, the BoM has purchased 15.5 tons of gold, which is a 15 percent increase compared to the year of 2014, and the BoM did refinement of 13 tons of gold, which has resulted in an increase of 396.0mln USD in state foreign currency reserve. Eventually, Central bank gold purchase skyrocketed, at 18.3 tons, in 2016.

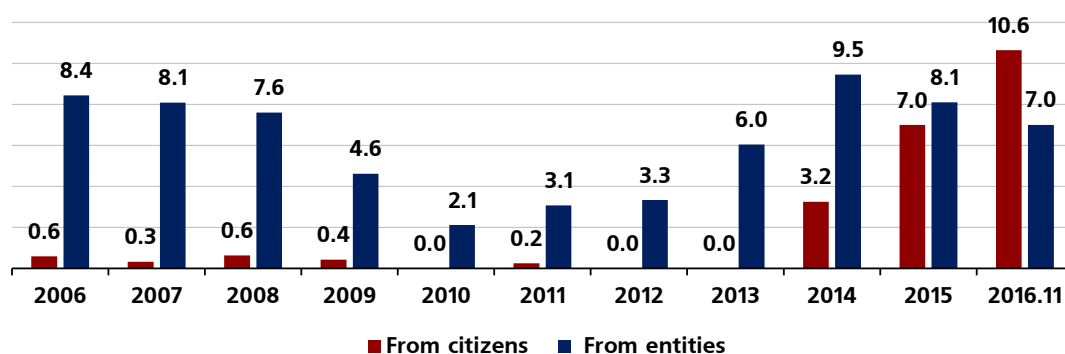
FIGURE 1-14. THE BANK OF MONGOLIA'S GOLD PURCHASE, TONS 2010-2016



Source: Mineral Resource Authority of Mongolia

In 2014, with the approval of amendment to "the Minerals Law", gold submission to the BoM intensified and it purchased 12.7 tons of gold from domestic gold producers, more than double increase. Surprisingly, in 2016 the BoM spent 650 mln USD for the purchase 17.6 tons of gold of which 10.6 tons was purchased from 2,973 private citizens (Munkhzul.B, 2016) towards the end of 2016. In comparison, the BoM was purchasing only from 87 entities and 141 citizens in 2014, the below Figure 1-15 shown. (The Bank of Mongolia, 2016)

FIGURE 1-15. PURCHASED GOLD BY THE BOM, TONS



Source: The Bank of Mongolia

In 2016, gold accounted for 65 percent of the foreign reserve as a direct result of further amendments in the Minerals Law, which reduced royalty to 2.5% on gold proceeds from the Bank of Mongolia and commercial banks.

Gold impact on the budget revenue

Most government revenues from the mineral and oil sectors are centralized. While the national government collects all major taxes, local governments collect smaller taxes and fees, such as immovable property taxes, land use fees, vehicle taxes, water use fees and royalties on common minerals. Mineral licenses are issued by the national government; however, provinces/aimags and soums are consulted during the licensing process.

On average, mineral revenues accounted for 27.6 percent of fiscal revenues from 2006-2011, before declining to just over 16 percent from 2012-2014. (IMF, 2015)

The following table shows contribution of major mining products to the state budget.

TABLE 2. BUDGET REVENUE BY MAIN COMMODITIES, BLN TOGROG

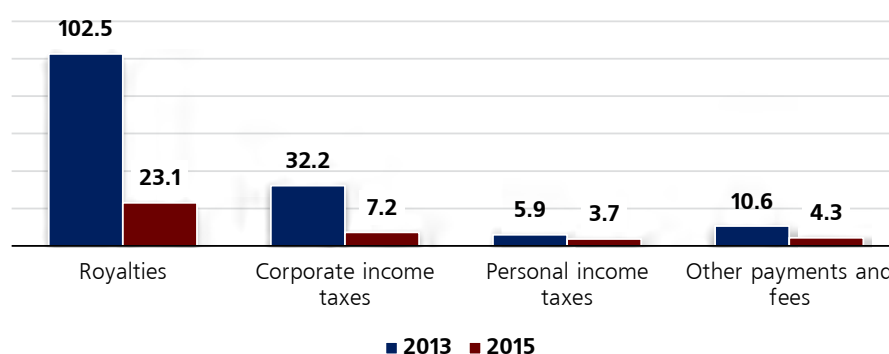
	2012	2013	2014	2015	2016
Budget revenue from mining sector	863.1	1,096.5	1,097.8	665.8	797.0
Copper concentrates	435.3	573.3	661.5	448.3	584.4
Coal	223.8	295.2	284.1	91.8	109.9
Gold	118.1	151.2	52.7	38.7	32.2

Source: Mineral Resource Authority of Mongolia

Gold mining contribution to the central government budget peaked at 13.8% of total budget revenue in 2013 or 151.2 bln Togrog. Of which, gold companies paid 102.5 bln Togrog in royalty (67.8%), 32.2 bln Togrog for corporate income taxes (21.3%), 5.9 bln Togrog for personal income taxes and 10.6 bln Togrog in other fees. However, these numbers greatly declined afterwards. In 2016, gold companies contributed only 32.2 bln Togrog to the budget.

The following figure shows the composition of taxes and royalties gold companies pay to the state budget. From this chart, we can see that royalties are the major source for budget revenue.

FIGURE 1-16. TAX REVENUE COMPOSITION OF GOLD COMPANIES, BLN TOGROG



Source: General Department of Taxation

The reason why royalty revenue in the gold sector dramatically decreased is because government reduced royalty fee from 10 to 2.5 percent. This reduction in royalties led to substantial support for the gold production, submission to the BoM as well as gold exports.

It should be noted that Oyu Tolgoi alone paid US\$315mln in taxes, fees and other payments to the Government of Mongolia in 2015, an increase of about US\$248mln paid in 2014. (Oyu Tolgoi LLC, 2016) In the first quarter of 2016, Oyu Tolgoi paid 126 mln USD in taxes and fees and spent 136 mln USD for purchases.

Gold demand-impacting policies

Mongolian Parliament carried out several policy measures in the gold sector. For instance, parliament made amendments in the Minerals Law which reduced royalty to 2.5% on the gold proceeds from the Bank of Mongolia and commercial banks. This had positive result in terms of increased domestic gold production.

Gold production in Mongolia faced severe challenges since 2013 in terms of depressed gold price, declining Foreign Direct Investment and credit crunch in the banking sector.

In response to these challenges the BoM, the Ministry of Mining (MOM) and former Ministry of Economic Development (MOED) passed "Program for fine-tuning financing system in the gold industry" on April 30th, 2014 and agreed to implement it in 2 stages, which was aimed at resolving financing issues in the gold industry, reducing the risk by introduction of financial derivative instruments for increasing gold mining. (The Bank of Mongolia, 2015)

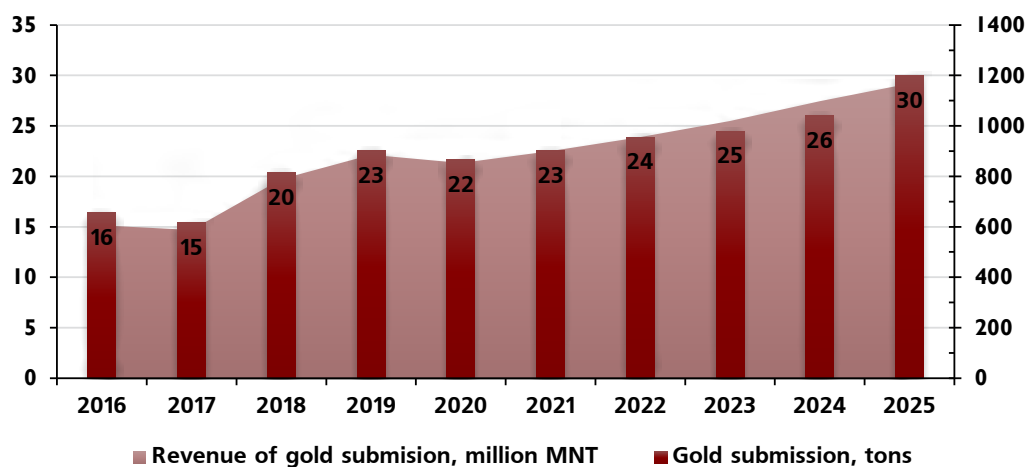
In order increase foreign currency reserves through supporting gold mining, the Parliament of Mongolia approved the program within the general policy framework titled "Measures to overcome economic difficulties", which was adopted in 2015. Through this program gold mining enterprises were provided with working capital financing.

Prior to this program, windfall tax burden for gold mining entities encouraged avoiding taxes by illicitly smuggling gold through the border and hiding and storing the extracted gold. Windfall tax on gold significantly reduced the amount of gold sold to the Bank of Mongolia and banks.

Outlook of Mongolian gold demand

From 2017 central budget projection, the Ministry of Mining planned to collect 1 trillion Togrog from major minerals, which includes gold, coal, copper, zinc and iron ore. In particular, it is estimated that gold sector's contribution will reach 56 bln Togrog (about 7 percent) of which 8.4 bln Togrog from entity's income tax, 28.5 bln Togrog from royalties and 19.2 bln Togrog from other fees.

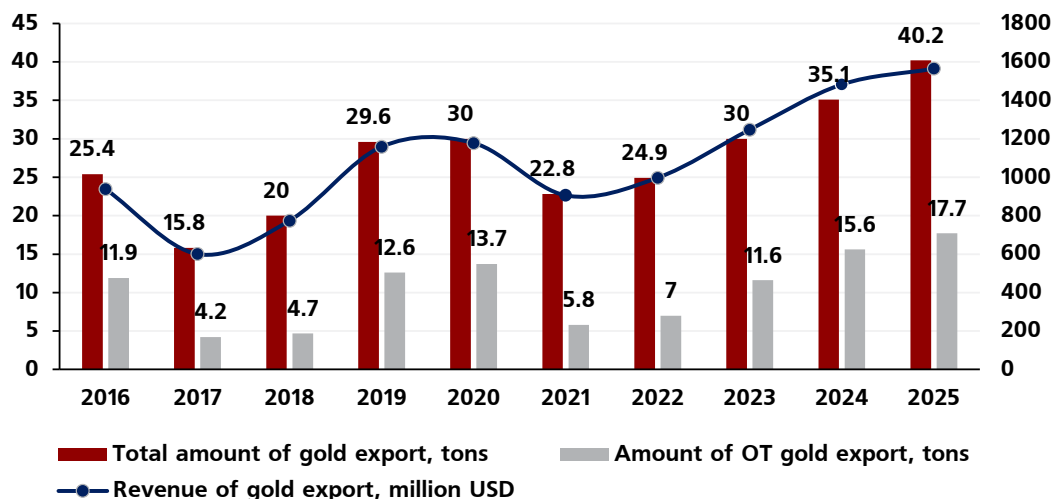
The following chart shows that outlook for upcoming 10 years' local gold production. In this estimation period, expected amount of local gold demand will be around 15.5-30 tons.

FIGURE 1-17. GOLD SUBMISSION PROJECTION

Source: Mineral Resource Authority of Mongolia

According to this projection, which was provided from the Mineral Resource Authority of Mongolia, gold production will steadily increase and reach 40 tons by 2025, and proceeds from the gold will reach 1.6 bln USD.

It should be noted that Oyu Tolgoi project will be a key producer of gold in the country in the future. After sharp drop of production of gold until 2021, it is expected the project will increase its production of gold and reach 17.7 tons by 2025. The following graph shows projections of gold production including Oyu Tolgoi and gold export revenue.

FIGURE 1-18. GOLD EXPORT PROJECTION

Source: Mineral Resource Authority of Mongolia

Conclusion of Mongolian gold demand analysis

Overall, Mongolian gold export revenue reached 600 mln USD at its peak in 2008, which was equivalent to 11 percent of GDP. However, gold export dramatically declined after 2011. By 2015 gold accounted 8 percent of total export revenue (420.6mln USD). It should be noted that for pure gold Great Britain was the major buyer of Mongolian gold, whereas China was the main importer of gold in concentrate.

We emphasized that gold sector is an important sector for the central budget. However, due to multiple policy changes such as imposition of windfall taxes and lowering of royalties, the contribution of gold into the budget revenue was decreasing.

The Bank of Mongolia (BOM) is the sole buyer of gold from the entities and micro miners. The BoM bought 42.9 tons for gold between 2010 and 2015. In particular, since 2014 the number of micro miners and gold companies who sell their gold to the BOM dramatically increased as the royalty was reduced from 10 to 2.5 percent.

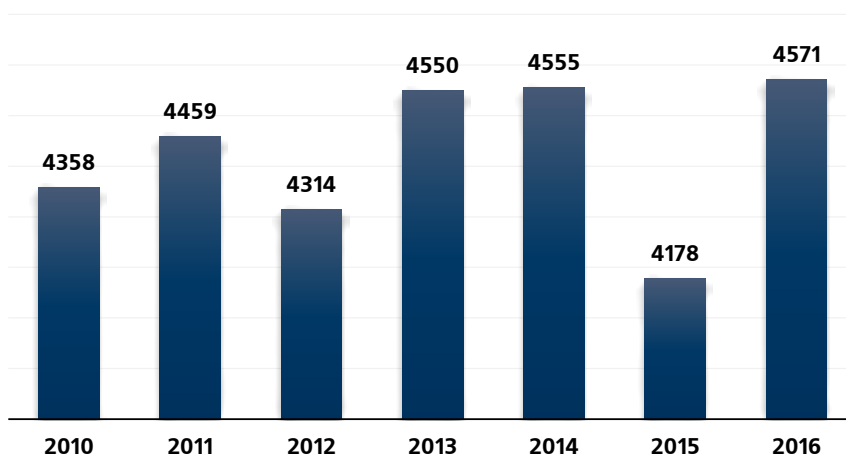
According to the central budget outlook, the government planned to collect 1 trillion Togrog from the mining industry of which 56 bln Togrog will be collected from the gold sector. In the next 10 years MRAM projects that production will increase and reach 40 tons of gold by 2025.

GOLD SUPPLY

World Gold Supply

The total supply of gold has been volatile in the last six years.

FIGURE 2-1. WORLD GOLD SUPPLY, 2010-2016



Source: Bloomberg

There are three major supplies of gold: gold mine production, recycled gold and net producer hedging. As of the end of 2016, the composition of gold supply was as follows.

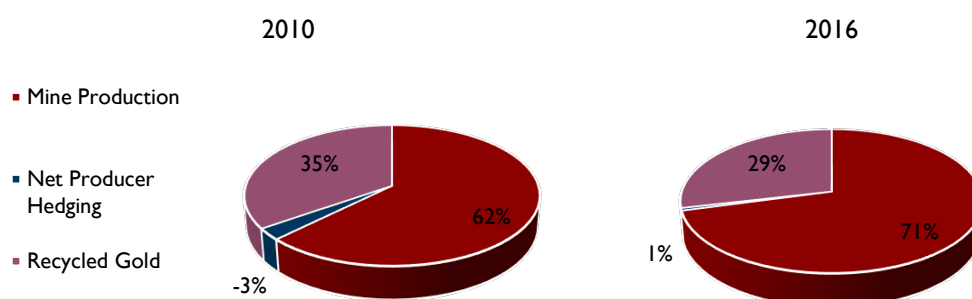
TABLE 3. THREE MAJOR SUPPLIES OF GOLD

	2010	2011	2012	2013	2014	2015	2016
Mine Production	2765.0	2849.0	2938.0	3073.7	3152.6	3221.4	3236.0
Net Producer Hedging	-118.4	32.3	-47.3	-25.6	104.5	13.5	26.3
Recycled Gold	1531.7	1674.0	1658.9	1266.3	1202.1	1123.2	1308.5

Source: Bloomberg

Although gold mine production is the major source of supply, recycled gold supply plays crucial role in the supply and it has been that case for the past 6 years.

FIGURE 2-2. THREE MAIN SOURCES OF GOLD SUPPLY

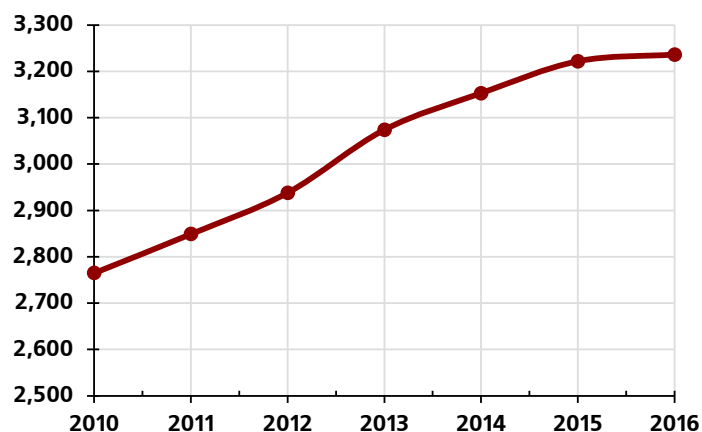


Source: Bloomberg

Gold Mine Production

Gold mine production is the major source of gold supply and it increased steadily over the past six years.

FIGURE 2-3. GOLD MINE PRODUCTION, 2011-2016



Source: Bloomberg

However, historically, it was not the case. From the graphs below we see that up to 2011, the gold sector was under pressure both from increasing operational and exploration costs, which affected negatively the return in the sector. At the same time the sector was also struggling to find new discoveries, which put pressure on the supply of gold.

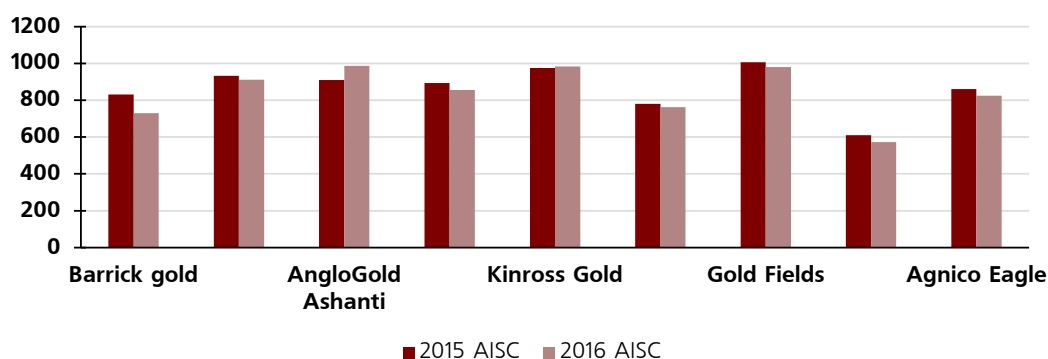
After 2011, gold production significantly increased and we see that the mine production is stabilizing at levels just above 3,000 tons. Despite volatile prices in the world gold market, producers were able to increase their production levels by implementing series of cost cutting measures.

For 2016, several big projects are maintaining the level of production of gold. For example, increase in production in projects in Guyana are expected to intensify whereas gold project in Grasberg in Indonesia is expected to raise the production level. "Merian project" in Surinam is one of the new projects developed and is reaching its commercial production level.

On the other hand, there are delays in other projects that are slowing down the supply of gold. For instance, after multiple delays Mongolia's OyuTolgoi project is dealing with lower grade ore which led to dramatic reduction in gold production.

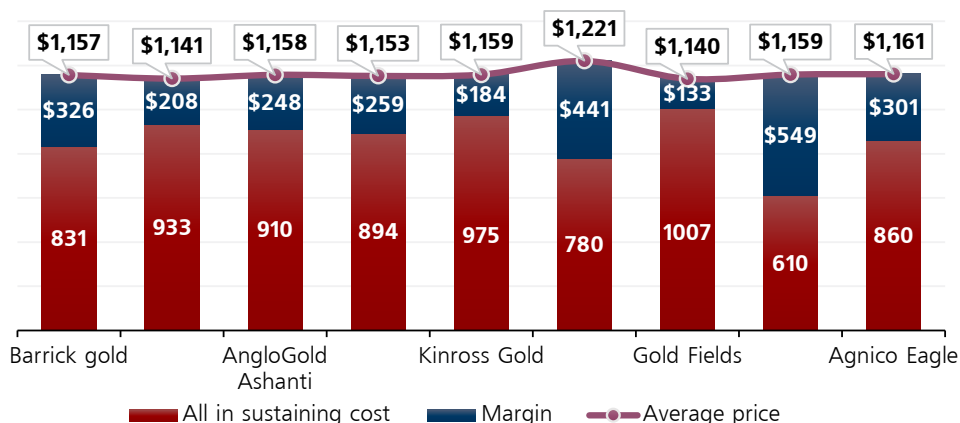
However, it should be noted that the major development in the mining production is the cost cutting measures mining companies started undertaking. As a result, we will see below that the cost of project management remained at low levels.

Moreover, gold companies are increasingly concentrating their attention towards developing their existing mines further rather than developing new projects and are becoming increasingly hesitant to spend. From the Figure 2-4, we see that since 2015 mining companies are curtailing their all in sustaining costs (AISC) per ounce of gold.

FIGURE 2-4. TOP COMPANIES ALL IN SUSTAINING COSTS, IN 2015 AND 2016

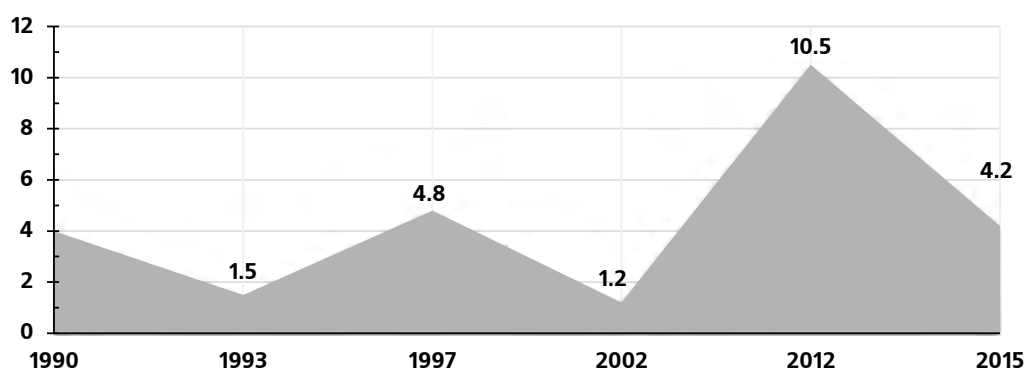
Source: Companies' website and their annual reports

Mining companies were able to make positive margin from each ounce of gold produced as well as from scaling up the production level. For instance, Polyus Gold International company was able to gain significant margin in 2015. (Figure 2-5) Although it is applicable only to the focus group companies, from the graph below we see that all in sustaining costs are lower than the prices of gold in 2015.

FIGURE 2-5. 2015 TOP COMPANIES AISC AND PRICES, USD

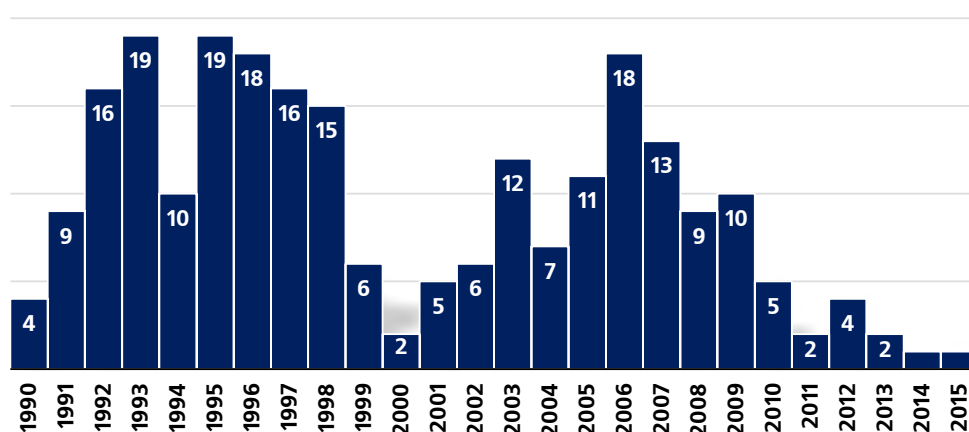
Source: Companies website and their annual reports

Cost cutting measures however, did not translate into greater expenditure on explorations. In fact, from Figure 2-6 below, we can see that expenditure on exploration significantly decreased in the last three years. Moreover, since companies are scaling back their exploration expenditure, from Figure 2-7 we see that the number of discoveries of major gold deposits with reserves of 6 million ounce or more started decreasing.

FIGURE 2-6. WORLD GOLD EXPLORATION EXPENDITURES, BLN USD

Source: GFL/MinEx Consulting

The lack of new discoveries will negatively affect the total supply in long term. Currently, not many new projects are coming through the pipeline. Major new projects are struggling to get off the ground due to various difficulties arising from political, environmental issues as well as operating environment and lack of fresh investment.

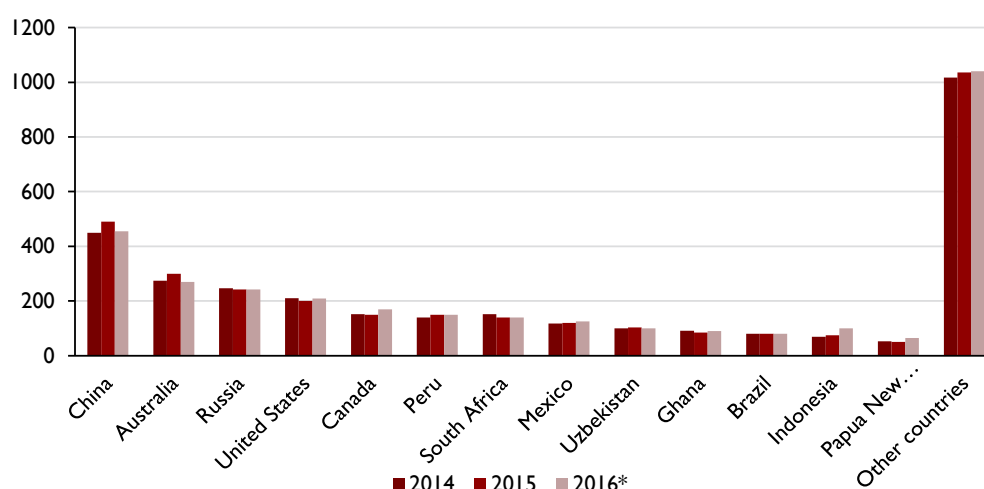
FIGURE 2-7. NUMBER OF MAJOR GOLD DISCOVERIES IN THE WORLD

Source: GFL/MinEx Consulting

Mining production by countries

Gold mining production is not concentrated in a few countries. From the graph below we see that biggest producers are China, Australia, Russia and USA. But, other countries contribute significantly to the world supply of gold.

FIGURE 2-8. MINING PRODUCTION BY COUNTRIES



Source: Bloomberg

The world's largest producer is China. As of 2016, gold production in China accounts for more than 14% of total world supply. In 1980, the country was producing only 4% of world total and after ramping up the production rapidly in following years, in 2007 the country became the largest producer in the world.

Production of gold within China is not concentrated. As of 2010 over 700 small scale companies produced gold and they tend to supply its products to local gold market.

Australia is the second largest producer of gold in the world. Western Australia is the major gold producing region and as of 2015, the sector employed 23,417 workers. (Government of Western Australia, Department of Mineral and Petroleum, 2016) Gold is the fourth largest exporting commodity of this country in terms of revenue and mostly the production is achieved through open pit mining.

Russian federation is the third largest producer of gold in the world and the production is concentrated in the eastern part of Russia's vast land. In terms of revenue generation, gold does not play big role in the country's export accounting for less than 1% of export revenue.

In the USA and Canada gold production is concentrated. In the USA it is mainly produced in Nevada, whereas in Canada it is mainly produced in provinces Ontario and Quebec. Production of gold in these countries dramatically decreased after 2008 and starting from 2014 it stabilized at today's levels.

Production of gold is facing new challenges throughout the world. According to the Factiva literature survey, many new gold mining projects are being delayed or cancelled as of 2014. For example,

- Anglo Gold Ashanti's \$3.5 bln gold project in Colombia is delayed
- 135 projects of \$7.5 bln are delayed in Peru
- 11 copper and gold projects of \$39 bln are delayed in Chile
- Mongolia's \$10 bln copper and gold project is delayed
- PNG copper and gold project delayed
- Xstrata's \$6 bln copper-gold project is delayed

These delays and cancellations are happening because of country's instability, high cost of new projects, declining equity prices and low margins in the sector.

Major mining corporations and their projects

The following table illustrates top ten gold producing companies in the world. These companies mined 19 percent of world total gold production in 2016, whereas in 2010 they used to produce 29 percent. Admittedly, as shown below, these companies' ranks changed during 2010-2016 period as some companies expanded mining capacity. For instance, Kinross Gold and Newcrest Mining ranked higher in 2016, and their ranks advanced from 7th and 8th to 5th and 7th respectively. In contrast, Navoi Mining and Metallurgical Combinat, Russia's state-owned company, and Gold Fields, located in South Africa, fell in the rank from 5th and 4th to 6th and 8th respectively. In addition, these companies' share in the world production shrank by approximately 3 percent as well. In other words, the sector is becoming more segmented and that number of medium or small mining companies are increasing.

TABLE 4. GOLD PRODUCTION BY TOP COMPANIES, 2010 AND 2016

Company name	Country	Established date	2010		2016	
			Gold production (000s oz)	Rank	Gold production (000s oz)	Rank
Barrick Gold	Canada	1983	6418.0	I	5517	I
Newmont Mining	USA	1921	6418.0	I	4900	II
AngloGold Ashanti	South Africa	2004	4515.0	III	3650	III
Goldcorp	Canada	1994	2466.9	VI	2873	IV
Kinross Gold	Canada	1993	2352.8	VII	2800	V
Newcrest Mining	Australia	1921	1762.0	VIII	2439	VII
Navoi Mining and Metallurgical Combinat	Uzbekistan	1958	3174.6	V	2500	VI
Gold Fields	South Africa	1998	3497.0	IV	2146	VIII
Polyus Gold International	Russia	1921	1386.0	IX	1968	IX
Agnico Eagle	Canada	1953	988.0	X	1663	X
Share of the companies in world production			22%		19%	

Source: Annual Reports of companies-2010 and 2016

Operational capacity of these companies and the number of mines they operate are not similar to each other, and hence, their production levels are not the same. Following table 5 shows these companies' mining projects and production level as well as their total revenue. In general, revenue tends to increase with the production.

In addition, other companies, excluding Barrick Gold, Newmont Mining and AngloGold Ashanti, increased gold production during the 2013-2016 period.

TABLE 5. LIST OF MINES, AND THE COMPANIES' PRODUCTION AND REVENUE IN 2016

Company name	Number of segments/mines	Production (000s ounces)				Total revenue, 2016, mln USD
		2013	2014	2015	2016	
Barrick Gold	10.0	7166.0	6249.0	6117.0	5517	8560
Newmont Mining	10.0	6463.0	5231.0	5707.0	4900	6700
AngloGold Ashanti	6.0	4113.0	4420.0	3950.0	3650	-
Goldcorp	14.0	2502.9	2777.3	3453.0	2873	3510
Kinross Gold	8.0	2658.6	2739.0	2620.3	2800	3472
Newcrest Mining	6.0	2110.0	2396.0	2423.0	2439	3295
Navoi Mining and Metallurgical Combinat	-	-	-	2291.0	2500	-
Gold Fields	4.0	2022.0	2219.0	2159.0	2146	2750
Polyus Gold International	8.0	1652.0	1696.0	1763.0	1968	2429
Agnico Eagle	18.0	1099.3	1429.3	1671.3	1663	-

Source: Annual Reports of the companies-2015

Moreover, the following Table 6 shows top 10 gold mines in the world. There are different ways we can rank them. Commonly, a top 10 list can be compiled by annual production or by the size of proven and probable reserves. In this table, however, we ranked them based on deposit size and reserves. Except for Grasberg and Oyu Tolgoi projects, these biggest mines are owned by major players of world gold market.

TABLE 6. THE TOP 10 GOLD MINES, AND THEIR OWNERS AND RESOURCES

Mines	Country	Owner	Started date	Reserve, mln oz
Grasberg	Papua, Indonesia	Freeport McMoRan; Rio Tinto	1980's	106.23
South deep	Johannesburg, South Africa	Gold Fields	1961	81.41
Lihir	Niolum Island, Papua New Guinea	Newcrest Mining	1997	64.10
Muruntau	Kyzyl Kum Desert, Uzbekistan	Newmont Mining	1960's	50.00
Olympiadi	Central Siberia, Russia	Polyus Gold International	1996	47.50
Oyu tolgoi	South Gobi Desert, Mongolia	Rio Tinto (34%); Turquoise Hill (32%); Mongolia (34%)	2013	46.34
Pueblo viejo	Dominican Republic	Barrick (60%); GoldCorp (40%)	2006	40.09
Mponeng	Johannesburg, South Africa	AngloGold Ashanti	1996	39.56

Cadia east	New South Wales, Australia	Newcrest Mining	1994	37.60
Obuasi	GHANA, Western Africa	AngloGold Ashanti	approx. 1900	29.83

Source: (Andres, 2013) and Annual Reports of the companies-2015

In contrast to other commodity prices, price of gold stabilized or moderately increased lately for the period since 2014. Of course, increasing trend in gold price will encourage new gold mining projects in the near future. Currently, there are several up-and-coming open pit and underground mines of gold, which can influence world gold supply and production in the future (Poirier, 2016). The following table shows these new projects.

TABLE 7. THE LIST OF UP-AND-COMING GOLD MINES

Projects	Country	Owner	Commercial production	Reserve, mln oz	Gold Quality	Production, koz, annually
Open Pit Mines						
Koka Mining	Eritrea	Chinese Zara Mining Share Company (60%); ENAMCO (40%)	2016	0.76	5.5 g/t	110.88
South Arturo	US	South Arturo Mine (40%); Barrick Gold (60%)	2016	2.50	4.t g/t	200.00
New Liberty	Liberia	Avesoro Resources	2016	0.86	3.3 g/t	119.00
Ad Duwayhi	Saudi Arabia	The Saudi Arabian Mining Company (50%), Barrick Gold (50%)	2016	1.82	3.2 g/t	180.00
Yanfolila Gold	Mali	Hummingbird Resource	2017	0.71	3.0 g/t	132.00
Underground Mines						
Brucejack	Canada	Pretivm Resources	2017	7.30	14.1 g/t	404.00
Yaramoko	Burkina Faso	Roxgold Mining Convention	2016	0.76	11.8g/t	99.50
Hope Bay	Canada	TMAC Resources	2016	4.50	9.2 g/t	-
Eastern Dragon*	China	Yintai Resources	-	0.75	7.7 g/t	-
Charter Tower	Australia	CitiGold		1.1	12.3 g/t	220

* Note: this project was sold to Yintai Resources Co. Ltd. For US\$600 million in cash in May 2016, and hence, its commercial production date is uncertain till now;
Source: (Ministry of Energy and Mines, the State of Eritrea, 2014); (Khudeira, 2002); (LionGold Corp Ltd, 2014); and official websites

According to the Table 6 above, Barrick Gold, the largest gold company in the world, will actively participate in these projects. Furthermore, most projects started commercial production in 2016, and hence, most companies expect that their production will reach their full capacity in 2017.

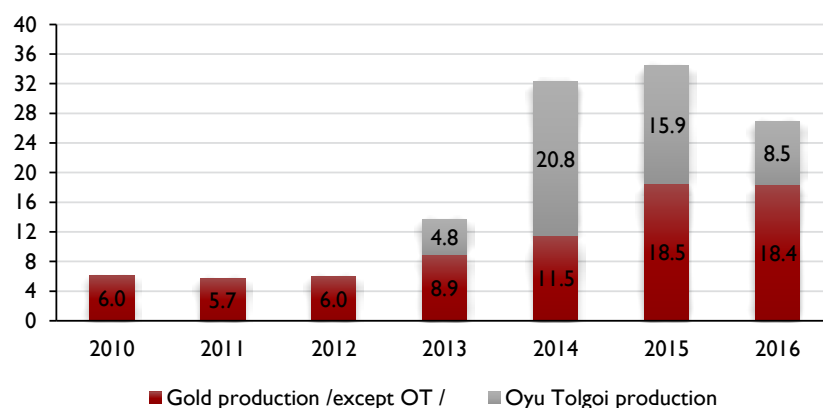
Mongolian Gold Supply

According to the Mineral Resource Authority of Mongolia, there are 95 mineral deposits in the country of which 43 deposits are gold deposits. Of these deposits 37 are placer deposits and the remaining 6 are the quartz vein deposits.

In the past, gold production reached 24.1 tons in 2005 and it constituted 31.1 percent of total exports. Currently, Mongolian gold production increased for the last three years. By 2016, the total amount of gold output reached 26.9 tons of which 8.5 tons were produced from OT and 18.4 tons from other gold companies.

As we can see from bar chart below, gold production stagnated at very low levels of around 6 tons for the period between 2010 and 2012. Gold companies produced only 5.7 tons of gold in 2011, and this was the lowest level of production since 1996. Reasons for the fall in gold production and export are unstable and unclear regulations and lower foreign direct investment.

FIGURE 2-9. MONGOLIAN GOLD PRODUCTION, TONS



Source: Mineral Resource Authority of Mongolia & OT website

As shown in table below, there are five major companies that are producing gold. Altan Dornod Mongol produced around 1.04 tons and 0.6 tons of gold and Centerra Gold's "Boroo Gold" mine produced around 1.64 tons and 0.4 tons of gold in 2014 and 2015, respectively. In recent years, many companies started production. In 2016, 15 companies' gold mines received permission from the national committee to start operations. More detailed information on new mines are shown in Appendix **Error! Reference source not found.** below.

TABLE 8. MONGOLIAN MAJOR GOLD MINING COMPANIES' PRODUCTION (TONS)

Nº	Gold production/ Companies	2014	2015
1	Altandornod Mongol LLC	1.04	0.60
2	Bayan Airag exploration LLC	0.04	0.29
3	Centerra Gold's Boroo gold mine	1.63	0.4
4	Mondulaan trade	0.97	-
5	Monpolymet Group	0.51	0.21
	All companies' gold production	11.50	14.7

Source: Mineral Resource Authority of Mongolia

Oyu Tolgoi

As we discussed above, Oyu Tolgoi produces copper-gold concentrates. Oyu Tolgoi (OT) which is one of the world's largest copper-gold mines, started producing and exporting copper and gold concentrate since 2013.

Historically, Oyu Tolgoi's sales revenue was 1,635 mln USD in 2014 and 1,736 mln USD in 2015 of which 20.8 tons (736.6 thousand ounces), 15.9 tons were gold. Sales revenue decreased in 2015 despite higher sales volumes as gold prices declined from 1199 USD per troy ounce at the end of 2014 to USD 1062 per troy ounce at the end of 2015 (Oyu Tolgoi LLC, 2016). Moreover, Oyu Tolgoi's gold concentrate production increased by 11 percent in 2015 compared to 2014.

In 2016, Oyu Tolgoi produced 300,000 oz of gold, which was markedly higher than the projection of 175-195 thousand oz even though it registered 54.1 percent decline compared to the previous year. The company collected USD 226.3mln from its gold sales in revenue.

Major gold deposits

Currently, Mongolian total quartz vein gold reserves accounted to be 69,500 tons. Moreover, reserves of placer gold accumulated 336 tons historically. Until today, the most of the companies often use placer gold resources.

TABLE 9. LOCAL GOLD RESERVES, TONS

New gold reserves	2010	2011	2012	2013	2014	2015	2016.x	Total
Quartz vein Gold	307.1	55.7	41.1	30.1	95.4	28.0	33,8	69,500
Placer Gold	8.3	4.0	7.7	4.7	4.9	6.1	6.0	336.0

Source: Mineral Resource Authority of Mongolia

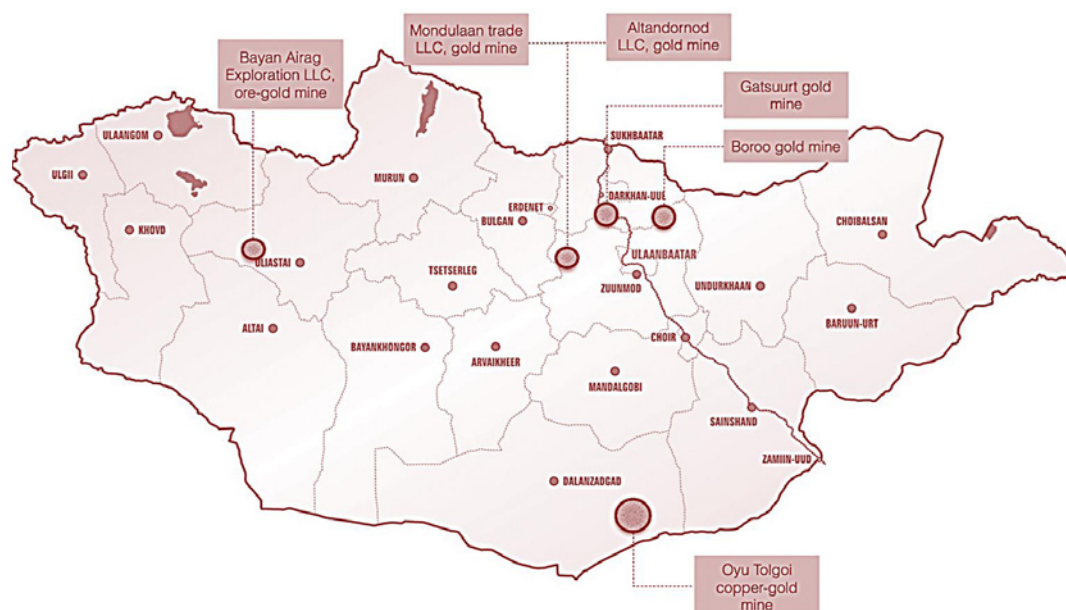
Mongolian major gold deposits' capacities and governance information are shown in the table 10 below.

TABLE 10. MAJOR GOLD DEPOSITS AND THEIR RESERVES

Strategic Deposit	Type of Mineral	Resources & Reserves	Company	State or Private
Oyu Tolgoi	Copper & Gold	Copper 44.6mln tons, Gold 1,914 tons	Turquoise Hill Resources, Erdenes Oyu Tolgoi	State & Private
Boroo	Gold	Gold 24.5 thousand tons at 1.6g/ton	Centerra Gold	Private
Gatsuurt	Gold	Gold 50.0 thousand tons	Centerra Gold	Private

Source: <http://www.mining-leaders.com/mongolia13/mongolia-gold/>

The following Figure 2-10 shows Mongolian major gold projects and their geographical locations.

FIGURE 2-10. MAIN GOLD PROJECTS, THEIR GEOGRAPHICAL DISTRIBUTION

Source: Researchers' evaluation, Companies' websites

Selenge region

Northern Mongolia is a home to other major gold deposits. The Selenge province, 100 kilometers north of Darkhan-Uul (in the map above), contains nearly two-thirds of all gold discovered in Mongolia. In this Northern region of Mongolia, Boroo deposit was discovered through a joint exploration effort between Mongolian and East German geologists in 1982. Since 2004, when Boroo finally entered production, until the end of 2011, it produced 1.5 mln oz of gold, in the early years accounting for over 5% of Mongolia's GDP.

Just to the east of Boroo deposit, Centerra Gold's Gatsuurt mine is located, which has reserves of 50 thousand tons and is awaiting to conclude an agreement with the Government. In the same region, Australian junior Mongolian Resource Corp. is operating.

The north Khentii region

A promising region for future gold projects is the north of Khentii province, which is located to the east of the Selenge province. Meritus Minerals' Gutain Davaa project is estimated to have 62.8 tons of gold and has drilled samples with gold grades of over 40g/t. (Meritus Minerals, 2016)

Towards east, Centerra Gold's exploration on the Altan Tsagaan Ovoo (ATO) project focused on three pipe-like structures visible from the surface. The company estimated that the deposit has 24 tons of gold as of the end of 2014. (Centerra Gold, 2015)

Oyu Tolgoi

The discovery of the Oyu Tolgoi deposit by Ivanhoe Mines (now Turquoise Hill Resources) was the major development in the mining sector. Oyu Tolgoi confirmed geologists' long-held belief that the country has major copper and precious metals potential. Oyu Tolgoi is located in the South Gobi region of Mongolia, approximately 550 km south of the capital Ulaanbaatar, and 80 km north of the Mongolia-China border (see map below). Oyu Tolgoi LLC is 66% owned by Turquoise Hill Resources Ltd and 34% owned by Erdenes Oyu Tolgoi LLC. Rio Tinto owns 50.8% of Turquoise Hill Resources and Erdenes Oyu Tolgoi LLC is wholly

owned by the Government of Mongolia. Rio Tinto is appointed by Oyu Tolgoi LLC to provide strategic and operational management to Oyu Tolgoi project.

The project has vast resources of gold and copper concentrates. As of the end of 2015, Oyu Tolgoi has confirmed deposit of 20.4 mln tons of copper and 23.5 mln ounces (666.2 tons)¹ of gold. In terms of inferred estimates, the project has 23.4 mln tons of copper and 36.0 mln ounces (1,020 tons) of gold. In either case, Oyu Tolgoi boasts impressive amount of gold reserves.

FIGURE 2-11. OYU TOLGOI COPPER- GOLD MINE GEOGRAPHICAL DISTRIBUTION



Source: Company's website

Artisanal miners

Mongolian gold production shows a steady decline from its 2005 peak of 850 toz (24 tons). Interestingly, the country's artisanal miners have been out in force in recent years. Artisanal miners often sell their gold on the black market, bypassing the 10% royalties. Similar to other countries with a large number of artisanal miners, artisanal, which is locally known as ninja miners, can often lead junior firms to new discoveries but they also frequently encroach on their mining licenses. According to the Terence Bates, President and CEO of Meritus Minerals, there are many well organized ninja miners and they use compressors, underground guiding machinery, floodlights, and work with geologists and GPS systems. They even follow company press releases to obtain information on exploration progress.

In 2009, a law was adopted prohibiting mining activities in forested areas and within 30 meters of river basins, gave mining firms clarity over the areas in which they could and could not operate. However, the lack of enforcement capacity means that ninja miners will be able to enter these prohibited regions relatively uninhibited. Fortunately, the government cut

¹ Here, 1 ounce = 0.000028349 tons

royalties to 2.5 from 10, many ninja miners started to sell their gold to the BoM. But still, there are several numbers of ninja miners working near to the major deposits.

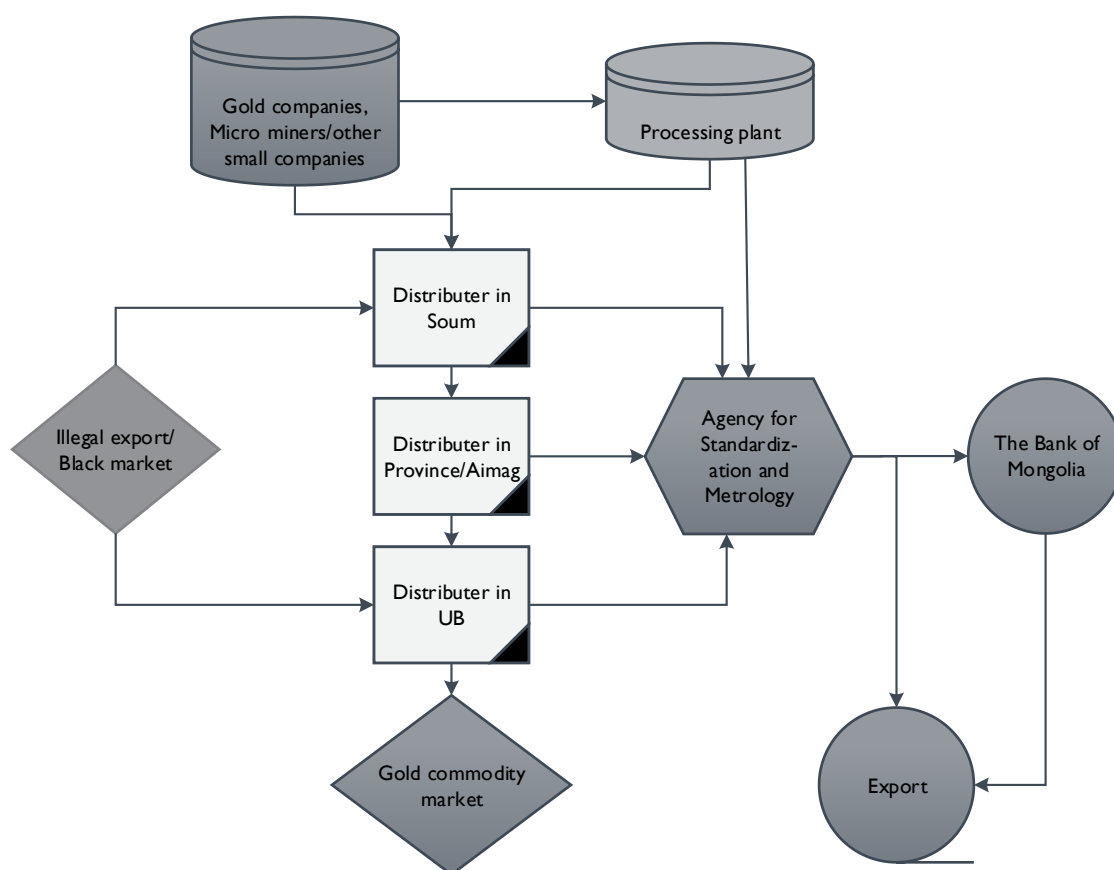
Supply distribution, contracting and delivery

Pure gold

The following diagram depicts the current local supply distribution in the gold market. In local supply distribution, basically, mining companies supply their gold to the BoM or directly to the International market. Before they sell their gold output, it needs to be processed and inspected by the Agency for Standardization and Metrology.

In some cases, miners can also sell their unprocessed gold products to local distributors at soum, aimag levels of in the city of Ulaanbaatar. These distributors process and submit the gold products to the Agency for Standardization and Metrology for inspection and sell it to the BoM. Other than Oyu Tolgoi LLC and Centerra Gold LLC, it is very rare for miners and distributors to sell the product directly to the world market.

FIGURE 2-12. PURE GOLD SUPPLY DISTRIBUTION



Source: Mineral Resource Authority of Mongolia

Oyu tolgoi supply distribution

Oyu Tolgoi processing plant is located 2.7km from the open pit. The concentrate is transported in two-ton bags. Mongolian custom clearance occurs at the marshalling yard (16 trucks-chain) at the Oyu Tolgoi site (Ilderkhantai, 2016). Chinese customs clearance occurs at the bonded warehouse. The current logistic model involves road transport from the mine to the bonded warehouse, located in China, 14 to 21 days' storage in the warehouse for customs clearance, and then a mix of road and rail from Ganqimaodao to the customer.

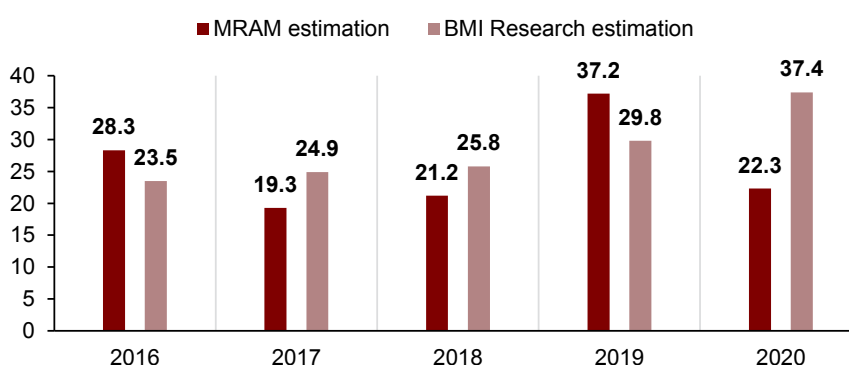
Oyu Tolgoi is responsible for transportation up to the bonded warehouse, and customers are responsible for transportation thereafter.

At present, border operating hours and schedule are limited, and the border is subject to sporadic closure. Weather, communications, and energy failures all contribute to this situation.

Outlook of Mongolian gold supply

It is estimated that Mongolian gold production will be 0.88 moz (24.9 tons) by the end of 2017. According to the BMI research of FitchGroup company, gold production forecast will reach 1.3moz (37.4 tons) by 2020 (Business Monitor International Ltd, 2016).

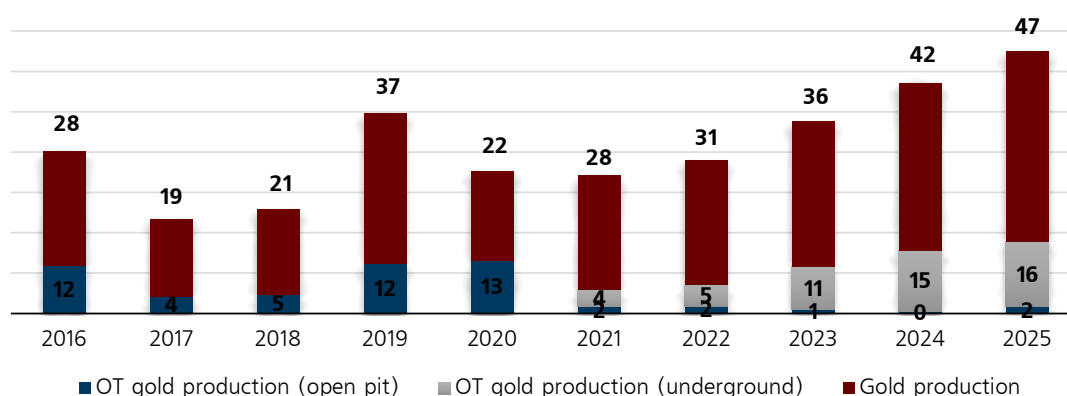
FIGURE 2-13. GOLD PRODUCTION OUTLOOK (MIDTERM 4 YEARS), TONS



Source: Mineral Resource Authority of Mongolia, BMI Research

In the next 10 years, Mongolian gold production is expected to reach 47 tons. (Mineral Resource Authority of Mongolia, 2015) It also expected that Oyu tolgoi will produce 13.1 tons of gold from the open pit for the next 4 years. In 2025, it will reach 16 tons.

FIGURE 2-14. GOLD PRODUCTION OUTLOOK (LONG TERM 10 YEARS), TONS



Source: Mineral Resource Authority of Mongolia

The OT gold production will account for about 30-50 percent of Mongolian total gold production. OT's underground mining will significantly increase its gold production between 2021-2025. The project will play a strong role in the future Mongolian economic growth.

Oyu Tolgoi is planning to produce 100-140 thousand oz of gold concentrate from the OT mine by the end of 2017.

Related supply-impacting policies

To develop gold sector, Ministry of Mining, Mineral Resource Authority of Mongolia and the Parliament conducted several programs and regulation amendments. (Mineral Resource Authority of Mongolia, 2015) Implementations of the main programs and policies shown in the table below.

TABLE 11. RESULTS OF POLICY IMPLEMENTATIONS (1992-2015)

Program-1 (1992-2000)	Program-2 (2000-2010)	Government policy in mineral sector (2014-2015)
<ul style="list-style-type: none"> • Average gold production increased from 0.7 to 11.0 tonnes, thus it made tax revenue growth in the state budget. • Many new micro miners started their operations in several gold deposits. • Mining companies conducted rehabilitation and environmental valuation. 	<ul style="list-style-type: none"> • Mongolian gold production reached its peak (24.1 tonnes) for the first time. • However gold production declined between 2008-2012 due to implementation of "Tax policy in some products' price growth"-regulation. 	<ul style="list-style-type: none"> • Intensified operation of Assey inspection department of Mongolian Agency for Standardization and Metrology". • Reduced royalty fee on gold proceeds from 10 to 2.5 percent. Hence, it could increased both foreign and domestic investors.

Source: Researchers' evaluation

After these three rounds, the government proposed "Gold-2025" program in 2015, including three steps in order to fulfill its goal within next 10 years:

- The first step /2015-2017/: To support gold exploration and production, the government will improve tax and investment regulations.
- The second step /2018-2020/: To keep sustainable development of gold mining and its production, introduction of advanced technologies.
- The final step /2021-2025/: To increase contribution of the sector to the state budget, the government will improve volume of industrial process, and increase value added output.

However, the government changed the "Gold-2025" project into "Gold-2" program on 18th of January, 2017. In this new program, it will cover following 3 to 5 years instead of 10. Current parliament's plan on development policy will not just focus on developing gold, but it will include also "Mongolian copper", "Mongolian iron ore" and "Spar program" that will be conducted within next 4 years. Programs planned for 2021-2025 were removed from the agenda.

There are two main activities within Gold 2 program.

- Gold-2 near-term /2017-2018/ includes implementation on regulations of gold production and financial support for the gold mining companies. Also, illegal gold mining activities will be regulated.

- Gold-2 mid-term /2018-2020/ includes creating, monitoring and accounting system, and environmental and reclamation system as well. In particular, national gold processing plant will be built.

Analysts expect that Mongolian gold production will reach 25 tons by 2020 through steady increase of 2-3 tons annually. In addition, the government will support strategically important mines' operations such as Gatsuurt (2016-2017) and Oyu Tolgoi underground gold mine.

Conclusion of Mongolian gold supply analysis

In summary, Mongolian total gold reserve has 69,500 tons in quartz vein gold deposit and 336 tons in placer gold.

As of 2016, 43 mining companies produced 17.7 tons of gold. Oyu Tolgoi produced copper-gold concentrate and the project has about 662 tons of confirmed gold reserves. Oyu Tolgoi produced approximately 9.4 tons (300 thousand oz) of gold in 2016, and its sales revenue was 226.3 mln USD.

Estimation by the Turquoise Hill Resource stated that Oyu Tolgoi will produce about 4 tons of gold in 2017. Experts expect that Mongolian gold production will reach 37 tons by 2020 of which 37 percent will be produced by Oyu Tolgoi. Furthermore, total gold output is projected to reach 47 tons of which 33 percent will be produced by OT in 2025.

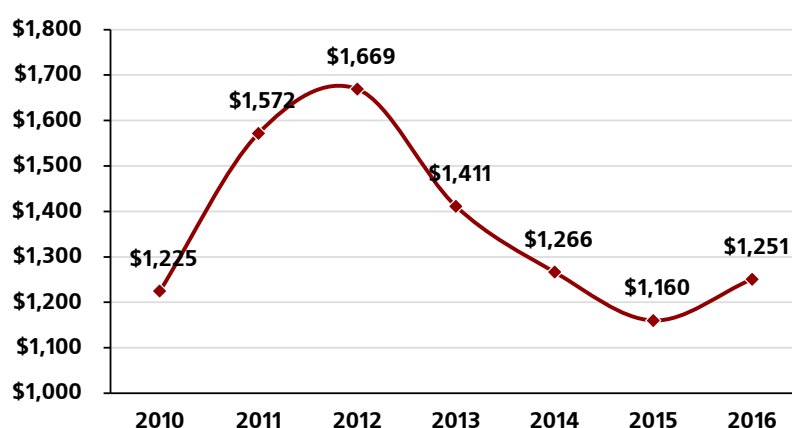
In addition, government consistently promoted the gold sector. Government programs are expected to increase total gold production, provide environmental solutions and at the same time will increase tax revenues for the state budget. Further, Gold-2025 program was changed into Gold-2 program, which focused more on near to medium term activities.

GOLD PRICE

Analysis of prices

As we discussed above, gold prices fluctuated significantly in the last 6 years. As we can see from Figure 3-1 below, for the period between 2010 and 2012, prices increased significantly from USD 1,225 to USD 1,669. This is consistent with the dynamics in total demand and supply for gold. In particular, between 2010 and 2012 the total demand increased from 4,141 tons to 4,706 tons, which affected prices of gold to increase. Moreover, total supply decreased for the year 2012 from 4,459 to 4,314 for this period, which put further upward pressure on the price.

FIGURE 3-1. GOLD PRICES, USD



Source: www.kitco.com Kitco Metals Inc

For the period between 2012 and 2015, the price of gold decreased from USD 1,669 to USD 1,160 or 30% decrease. This decrease is consistent with the fact that during this period total demand decreased from 4,706 tons to 4,259 tons. Thus weakening demand led to downward adjustment in gold prices. This price decrease was also consistent with the general increasing trend in gold supply. In particular, gold supply increased for the period between 2012 and 2014 by 5.6%, which put further downward pressure on prices.

However, behind these developments in gold demand and supply and as a result prices, there are various developments at play.

In 2014, demand for precious metals, investment of goods and industrial goods declined. Moreover, economic recovery in US strengthened USD and expectation for the Federal Reserve to tighten monetary policy resulted in lower investment in the gold market. Consequently, gold price declined by 1.4 percent in 2014. This price fall was continued for the next year.

As we discussed above and as analysts of Bloomberg agency have stated that the decrease in gold demand of China and India has affected the gold price considerably. As such, the price index of gold has decreased by 11 percent in 2015.

Recently, many new mines started their operations in the gold market, but most of them are waiting for gold prices to rebound, although World Bank estimated that upcoming years' gold prices are likely to decrease globally.

Generally, it should be noted that U.S dollar is the number one driver of gold prices. A strong U.S. dollar makes gold less attractive as an investment tool. This means that when the U.S. economy is on an increasing trend it makes US dollar to appreciate, which means that the gold price gets depressed. In other words, as we discussed above in section 1.1.3, for investors gold is an alternative investment tool to the vehicle currency.

Similarly, gold serves as a hedge against rising prices and therefore tends to respond positively to CPI inflation. In contrast, gold prices tend to decline in a deflationary environment with falling consumer prices.

Furthermore, countries' position in their economic cycle is important. Whether the country is in growth period or recession, it makes impact on investors' behavior and hence on gold prices.

World gold prices: Current developments

In the first half of 2016, gold prices soared due to fears of a global recession and uncertainty that U.K. voted to leave the European Union. In fact, between January and July, gold prices advanced more than 23% to around \$1,380 per ounce.

Moreover, one reason of gold prices soaring was stock market crash that sent investors flocking back into precious metals. The Fed introduced years of artificially low interest rates by lowering interest rates to zero, which made investment tools such as bonds, CDs, and Treasuries unattractive.

In the second half of the year, gold prices declined slightly on improving U.S. economic data, but rebounded after Donald Trump won the election. Gold ended the year up roughly 8.5%. However, it should be noted that world gold market remained quite volatile on the background of decreasing or weakening demand for gold.

Gold price projection

2017 gold price trend

Analysts expect gold prices to increase around 13% in 2017, which will be in the \$1,500 range. There are several factors that will affect gold prices in 2017. From the LBMA explanation, gold prices might increase in 2017 because

- investors will continue to hedge risk,
- negative real interest rates,
- limited mine supply and recycling
- central bank purchases,
- geopolitical issues and uncertainties.

In addition, each country produces the gold price forecast differently. For instance, according to the Bank of China study, China's for gold will be higher in 2017 and hence price is forecasted to stabilize around \$1300.

We discussed that US is an important player in the gold market since gold serves as an investment tool. Thus, gold prices will depend on how U.S economy performs in 2017.

There are many uncertainties surrounding the performance of the US economy in 2017. Current US government's economic policies will have an important impact on the economy. The country's policies towards global trade is also expected to have significant impact on the economy as well. The International Monetary Fund (IMF) forecasts that the U.S. economy will grow 2.2% in 2017 and 2.1% in 2018. Weak economic growth, increased

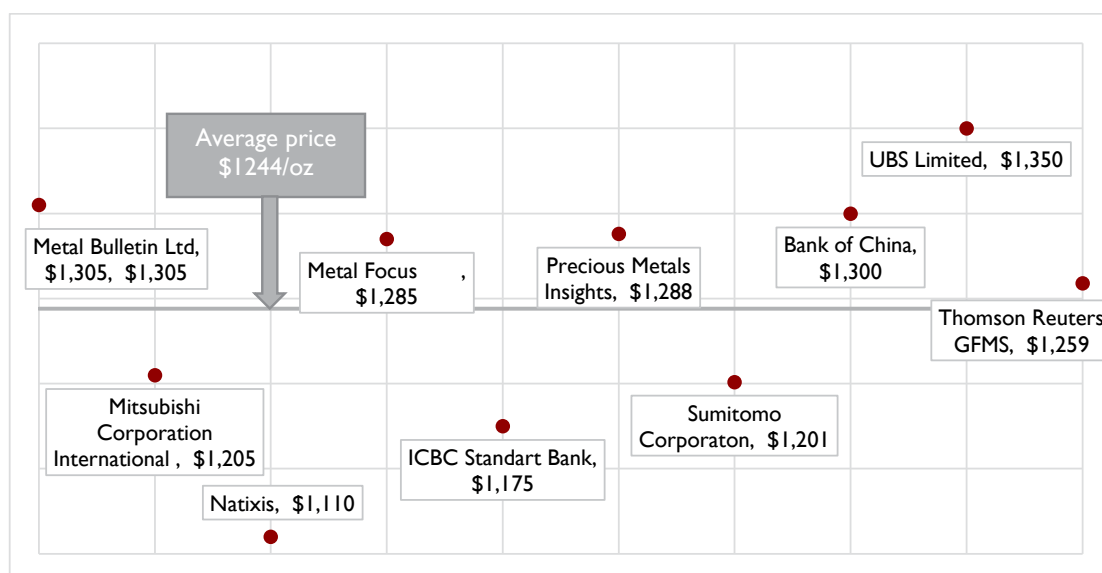
uncertainty and rising interest rates could negatively impact the U.S. economy, which could send gold prices higher in 2017.

We also discussed above that Europe is an important player in the gold market. UK voted to leave the European Union, which boosted gold price. Moreover, in Europe, there is an added uncertainty surrounding elections outcomes, which will be held later in 2017 in both France and Germany. These kinds of uncertainties adds upward pressure on gold prices. Experts in Europe expect that gold prices to rise up to 13 to 15 percent in 2017, which means gold prices will be around 1500\$.

Current political developments such as Russia's influence in Ukraine, uncertainties surrounding North Korea's ballistic missile program and ongoing issues in the Middle East are all contributing to added uncertainties for 2017, which potentially may lead investors to seek safe investment in gold.

The following Figure 3-2 shows analysts' predictions of gold prices for 2017.

FIGURE 3-2. 2017 GOLD PRICE FORECAST BY MAJOR ANALYSTS



Source: The London Bullion Market Association

According to the The London Bullion Market Association (LBMA), there are 24 analysts who predicted 2017 gold price (The London Bullion Market Association, 2017) Majority of experts are predicting that gold price in 2017 will increase 5.3% or more in 2017, which means average gold price will reach \$1244/oz.

It should be noted that predictions vary significantly. Bernard Dahdah who is Natixis company analyst, is bearish with his forecast of \$1110/oz, whereas UBC Limited's analyst Joni Teves is the most bullish predicting an average price of \$1350/oz. While Bloomberg researcher estimated that gold prices are up 15.2%.

Gold price long term outlook

There is not many predictions about long term forecast in gold price. This is understandable as the market itself is notoriously difficult to predict. We discussed that ETF demand for gold and Central Bank purchases are highly dependent on current developments in the economy and investment environment. Nevertheless, there are few sources that predict gold prices in longer horizon.

For example, in BMI Gold Report, the firm forecasts an average of \$1,500 per ounce by 2020. Economic Intelligence Unit (EIU) projects that the total supply will outstrip the demand for 2017 and 2018 as follows.

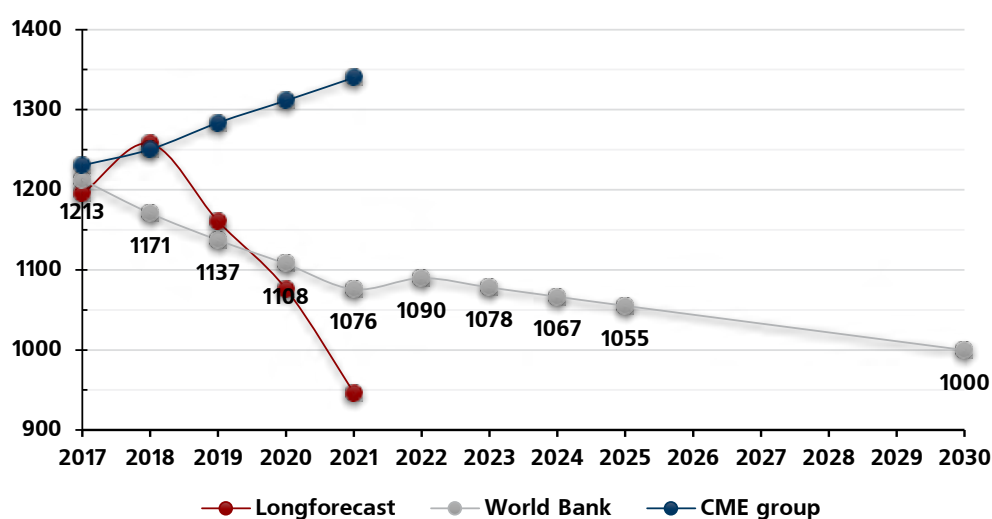
FIGURE 3-3. EIU GOLD DEMAND AND SUPPLY FORECASTS

	2016	2017	2018
Total Supply	4,536	4,644	4,676
Total Demand	4,643	4,340	4,257
BALANCE	-107	304	419
Official sector gold holdings	30,033	29,733	29,333

Source: Economic Intelligence Unit

Although the demand is expected to be sluggish in the near term, which will have downward pressure on gold prices, it is expected that the low interest rates in the US and other developed countries will support gold prices. Thus, EIU expects that gold prices will increase 6.2% in 2017 and reach USD 1,269 levels. For 2018, EIU expects further increase in gold prices and reach USD 1,385.

FIGURE 3-4. GOLD PRICE OUTLOOK



As we shown in graph above, World Bank Group predicts that gold prices will be on downward trend for the next 10 years both in nominal and constant U.S dollars. (World Bank Group, 2017). Namely, the bank predicts that by 2030 gold prices will be USD 200 lower than the current price.

Prices for Mongolian gold: Past trends and current state

Mongolian gold prices are strongly related to the world gold market. Locally, as we discussed above in section 1.2.2, the Bank of Mongolia purchases gold at London bullion market price.

Therefore, projections of gold prices coincide with global price projections. (The Bank of Mongolia, 2015/12). It should be noted, however, that the BOM purchases gold at current exchange rate in Mongolian Togrog. Thus, volatile nature of Togrog's exchange rate makes it more difficult to predict gold prices for companies.

Conclusion of gold price analysis

To sum up, world gold price is highly related to demand in China and India. The demand fall in these countries largely dictated fall in gold price, whereas gold supply remained volatile.

In 2016, gold prices rebounded somewhat but remained volatile as demand for gold was sluggish. However, it should be noted that ETF demand for gold increased significantly in 2016. But, uncertainties remain as to whether ETF demand and Central bank purchases of gold will remain at today's level.

Since gold production will not be decreasing significantly and the demand for gold is projected to be sluggish for foreseeable future, the price of gold are expected to decrease.

APPENDIX

TABLE 12. 2016 NEW GOLD MINES AND THEIR INFORMATION

Nº	Company	Location	Request date	Capacity /thousand m ³ /	Investment /million MNT/
1	Irmuun Bosgo LLC	Selenge province, Orkhontuul soum	2016.04.20	124	1550
2	MLG Resource LLC	Tuv province, Zaamar soum	2016.04.25	86.1	634.3
3	Tod Undarga LLC	Selenge province, Bayangol soum	2016.04.29	80	4300
4	Erdeniin Tsakhirmaa Tal LLC	Tuv province, Bayan soum	2016.05.06	50	1056
5	Ideal Systems LLC	Khovd province, Must soum	2016.06.07	200	369.7
6	SBF LLC	Tuv province, Zaamar soum	2016.06.08	80	1000
7	Pantaterra LLC	Selenge province, Bayangol soum	2016.06.09	76.7	1211.7
8	Altan Dornod Mongol LLC	Tuv province, Zaamar soum	2016.05.30	67.5	1400
9	Uuls Zaamar LLC	Tuv province, Zaamar soum	2016.06.13	150	6100
10	LMO Maining LLC	Tuv province, Lun soum	2016.06.16	100	1200
11	Altan Zaamar LLC	Tuv province, Zaamar and Bulgan province, Buregkhangai soum	2016.07.19	1691.1	10380
12	Orient Mining Investment LLC	Bulgan province, Buregkhangai soum	2016.07.25	100	3970
13	Shine Sansar LLC	Bayankhongor province, Bumbugur soum	2016.07.21	68.6	1000
14	Bolor Shur LLC	Dornod province, Bayan-Uul soum	2016.08.04	40	2200
15	Uguuj Bayan Khangai LLC	Selenge province, Orkhontuul soum	2016.08.11	90	1560

Source: MRAM annual report 2016

REFERENCES

- Andres, C. (2013, April 7). *Gold*. Retrieved from Mining Web site: <http://www.mining.com/web/worlds-top-10-gold-deposits/>
- Business Monitor International Ltd. (2016). *Mongolia Mining Report, includes 5-year forecasts to 2020*. London: BMI researcher.
- Centerra Gold. (2015). *Centerra Gold*. Retrieved from Centerra Gold web site: <http://centerragold.com/operations/ato/resource-estimate>
- G, I. (2016). Invest Mongolia UB, 2016. *Mongolian Mining Journal, September 2016*, 62-63.
- Government of Western Australia, Department of Mineral and Petroleum. (2016). *Statistics Digest 2015-16*. Western Australian Mineral and Petroleum.
- Iderkhangai, G. (2016). It is beneficial that Mongolia has one price "Tavantolgoi brand". *Mongolian Mining Journal, November 2016*, 20-21.
- IMF. (2015). *Mongolia: 2015 Article IV Consultation Staff Report*. IMF.
- Khudeira, B. (2002). *Ad Duwayhi Gold Deposit*. Melbourne.
- LionGold Corp Ltd. (2014). *Annual Qualified Persons Report for the Charters Towers Gold Project, Queensland, Australia*. Singapore.
- Meritus Minerals. (2016). *Meritus Minerals*. Retrieved from Meritus Minerals web site: <http://www.meritusminerals.com/projects>
- Mineral Resource Authority of Mongolia. (2015). *Research report of "Gold 2025" program*. Ulaanbaatar: Mineral Resource Authority of Mongolia.
- Mineral Resource Authority of Mongolia. (2016). *Mining industry's statistics: July 2015*. Ulaanbaatar: Mineral Resource Authority of Mongolia.
- Mineral Resources Authority. (2014). *Monthly Report*. Ulaanbaatar.
- Ministry of Energy and Mines, the State of Eritrea. (2014). Eritrea Mining. *Asmara Mining Conference*, (pp. 1-28). Asmara.
- Mongolian Customs. (2016). *Mongolian Customs*. Retrieved from Mongolian Customs: <http://www.customs.gov.mn/en/>
- National Resource Governance Institute, UNDP. (2016). *Natural Resource Revenue Sharing*. United Nations.
- National Statistics Office. (2016, November). *Home: National Statistics Office*. Retrieved from Statistical Database: www.1212.mn
- Oyu Tolgoi LLC. (2016, 12). *Oyu Tolgoi*. Retrieved from Oyu Tolgoi LLC: <http://ot.mn/>
- Oyu Tolgoi LLC. (2016). *Oyu Tolgoi "Year in review"-2015*. Ulaanbaatar: Oyu Tolgoi LLC.
- Oyu tolgoi LLC. (2016). *Oyu tolgoi local newsletter*. Ulaanbaatar: Oyu tolgoi.
- Poirier, M. (2016, April 03). *Mine & Quarry*. Retrieved from MIDWEST: <http://blog.midwestind.com/blog/top-10-gold-mines-to-watch/>
- The Bank of Mongolia. (2015). *Annual Report 2014*. Ulaanbaatar: The Bank of Mongolia.
- The Bank of Mongolia. (2015/12). *Inflation Report*. Ulaanbaatar: The Bank of Mongolia.
- The Bank of Mongolia. (2016). *Annual Report 2015*. Ulaanbaatar: The Bank of Mongolia.
- The Bank of Mongolia. (2016, 12 16). *Central Bank of Mongolia*. Retrieved from Bank of Mongolia: <https://mongolbank.mn>
- The London Bullion Market Association. (2017). *LBMA Forecast 2017*. London: LBMA.
- World Bank Group. (2017). *Commodity Markets Outlook, January 2017*. Washington, DC: World Bank Group.