CHAPTER 1

INTRODUCTION

1.1 ABOUT GOLD

Gold is one of the most ductile, malleable, conductive, non-destructive, bright, and fine-looking of metals. Gold is a chemical element with the symbol Au (Latin: Aurum) with an atomic number of 79 is the highly sought after precious metal. It is used for currency, jewellery, and other arts since the beginning of recorded history. The unique set of qualities of gold has made it a desirable object for most of human history in almost every civilization. Many papers have been written about gold viewing it as money, as investment, and as a store and source of value. The gold metal occurs as nuggets or grains in rocks, veins and in alluvial deposits. Pure gold has a bright yellow colour and luster traditionally considered attractive, which it maintains without oxidizing in air or water. The weight of gold is usually measured in troy ounces (1 troy ounce = 31.1034768 grams) and the purity or fineness of gold is measured in different ways like part fine, % of gold and karats. Where karat refers to the ratio of gold found in a sample and the common abbreviations used are K, k, KT, kt and CT. The 24 karat gold contains 99.9% pure gold; 22 karat gold has 91.3% pure gold; 18K gold has 75% pure gold, 14K gold is pure by 58.5% and 10K gold contains only 41.7% pure gold.
Hallmarks originated to show the purity of gold in a piece of gold jewellery and included the mark of the assaying office that certified the purity, fineness or caratage of the gold certified. Later, trademarks that showed which goldsmith had manufactured the product were added.

As of 2009, a total of 161,000 tons (one ton is equal to 32150.7 troy ounces) of gold have been mined in human history. A single gram of gold can be beaten into a sheet of one square meter, or an ounce into 300 square feet. Gold leaf can be beaten thin enough to become translucent. The transmitted light appears greenish blue, because gold strongly reflects yellow and red. Such semi-transparent sheets also strongly reflect infrared light, making them useful as infrared (radiant heat) shields in visors of heat-resistant suits, and in sun-visors for spacesuits. Gold readily creates alloys with many other metals. These alloys can be produced to modify hardness and other metallurgical properties, to control melting points or to create exotic colours.

Gold is a good conductor of heat and electricity and reflects infrared radiation strongly. Chemically, it is unaffected by air, moisture, and most corrosive reagents, and is therefore well suited for use in coins and jewellery and as a protective coating on other, more reactive, metals. Common coloured gold alloys such as rose gold can be created by the addition of various amounts of copper and silver. Alloys containing palladium or nickel are also important in commercial jewellery as these produce white gold alloys. Less commonly, the addition of manganese, aluminum, iron, indium, and other elements can produce more unusual colours of gold for various applications.
1.2 HISTORY OF GOLD

Egyptian hieroglyphs from as early as 2600 BC mention gold, and King Tushratta of the Mitanni (c. 1365–c. 1330 BC) claimed that gold was "more plentiful than dirt" in Egypt. Egypt, especially Nubia, had the resources to become a major gold-producing area for much of history. The legend of the Golden Fleece may refer to the use of fleeces to trap gold dust from placer deposits in the ancient world. Gold is mentioned frequently in the Old Testament, starting with Genesis 2:11 (at Havilah) and is included with the gifts of the magi in the first chapters of St. Matthew in the New Testament. The Book of Revelation 21:21 describes the city of New Jerusalem as having streets "made of pure gold, clear as crystal." The southeast corner of the Black Sea was famed for its gold. Exploitation is said to date from the time of Midas, and this gold was important in the establishment of what is probably the world's earliest coinage in Lydia around 610 BC.

From the 6th or 5th century BC, the Chu (state) circulated the Ying Yuan, a kind of square gold coin. The Romans developed new methods for extracting gold on a large scale using hydraulic mining methods, especially in Spain from 25 BC onward, and in Romania from 150 AD onward. One of their largest mines was at Las Medulas in León (Spain), where seven long aqueducts enabled them to sluice most of a large alluvial deposit. The mines at Roșia Montană in Transylvania were also very large, and until very recently, were still mined by opencast methods. The Mali Empire in Africa was famed throughout the old world for its large amounts of gold. Mansa Musa, ruler of the empire (1312–1337) became famous throughout the old world for his great hajj to Mecca in 1324. When he passed through Cairo in July 1324, he was reportedly accompanied by a camel train that included thousands of people and nearly a
hundred camels. He gave away so much gold that it depressed the gold price in Egypt for over a decade.

The European exploration of the Americas was fueled in no small part by reports of the gold ornaments displayed in great profusion by Native American peoples, especially in Central America, Peru, Ecuador, and Colombia. It is estimated that 75% of all the gold ever produced has been extracted since 1910. During the 19th century, gold rushes occurred whenever large gold deposits were discovered. The first documented discovery of gold in the United States was at the Reed Gold Mine near Georgeville, North Carolina in 1803. The first major gold strike in the United States occurred in the small north Georgia town called Dahlonega. Further gold rushes occurred in California, Colorado, the Black Hills, Otago, Australia, Witwatersrand, and the Klondike.

Gold is one of the oldest ways to store wealth. In 3000 BC goldsmiths in Samaria were already working gold into various forms of jewellery used even today. Excavations at the royal cemetery of Ur (founded about 2500 BC) showed that gold had already become a store of wealth by this time, as well as being utilized as money by traders. Since at least 1400 BC, gold has had an impact on the everyday economic activities of ordinary people in Egypt, where it was the standard of money. Perhaps the most important and wide-spread use of gold was as money under various gold standards.
1.3 DEMAND AND SUPPLY OF GOLD

1.3.1 Demand of Gold

While gold does have industrial uses its demand mostly originates from investment demand and jewellery. Jewellery production represents the most stable long-term source of demand for gold and was one of the earliest uses for gold. In China and India, demand for gold jewellery centered on the socio-cultural factors and constituting the largest markets in the world. This long term demand for precious metals in Asia filled the boats of the East India Company in the late 17th and 18th centuries on their outward journeys from Europe. Demand from industrial fabrication arises mainly from dentistry and electronics, which are declining in volume terms. Gold's high price has been a significant incentive to find in both the industries cheaper methods that would allow gold to be replaced. In electronics, gold is primarily used in bonding wires, but advances in technology has led to the precious metal getting increasingly replaced by copper. In dentistry, gold is being replaced by cheaper non-metallic substrates such as plastics. In 2013, the total demand from dentistry was 36.3 tons, the lowest level ever recorded by GFMS. Gold in electronics has also declined due to subdued economic activity, falling below its 2005 level to 278 tons in 2013, from a previous high of 321 tons in 2007.

With the jewellery demand stable and industrial demand declining, demand for gold as retail investment has increased. In the run-up to the financial crisis, the popularity of retail investment of gold bars and coins increased dramatically, tripling between 2006 and 2013 to 1377 tons. Much of this investment has occurred outside of western markets, as gold has flowed to Asia following a long-run historical pattern. But the attraction of rising prices and increased concerns about the riskiness of other investments following the
2008 financial crisis also saw increased demand in the western world. A major change in 2003 was the creation of the first gold Exchange Traded Fund (ETF), the Gold Bullion Securities ETF backed by the World Gold Council. It seems to have been at least partially responsible for the consistent rise in gold prices from about this time, with ETF gold stocks rising up. The unwinding of ETF positions in 2012–13 and its effect on gold prices has similarities to events in the Chinese re-hypothecation market. Re-hypothecation involves the use of inventories of commodities, such as gold or copper, as collateral for loans in the form of the carry trade. Renminbi is used to buy gold, and this is in turn used to borrow dollars. This sets up a natural but partial hedge against dollar risk while allowing for borrowing at lower dollar rates and avoiding some of the capital controls that China has in place. The World Gold Council (WGC (2014)) estimates that China had 1000 tons of gold tied up in financing deals in 2013 roughly equal to about one year of Chinese gold imports. This overhang creates the concern that, if these financial deals were suddenly unwound a large flow of gold would flood the markets and drive down prices. The volume of gold being used as collateral in this arrangement also calls into question how much of the physical Chinese gold demand discussed above is an investment in gold (as a speculation or a hedge) and how much is solely for use as collateral.

If the primary driver of Chinese physical inflows is re-hypothecation rather than investment demand, then it is questionable how much price support this might offer in the medium term. In developing countries, gold consumption rises with falling income pointing a precautionary motive. The fact that the development of credit markets decreases the demand for gold in these countries reinforces this view. In developed economies, gold demand rises with per capita GDP, possibly gold is viewed as a discretionary expenditure. India is world’s largest consumer of gold, as Indians buy about 25% of the
world's gold which amounts to approximately 800 tons (25,720,000 troy ounces) every year.

1.3.1.1 Jewellery

The biggest consumer of gold is the jewellery industry. This activity constitutes about 70% of the whole demand for gold. In 2007, 2,423 tons, out of the total use of 3,527 tons, was utilized by the jewellery industry. Which is less than the 2005 figures, but more than the 2006 figures. There is good potential for the jewellery industry to grow. The selling of gold jewellery is strongly correlated with ethnicity and nationality. The biggest consumer of gold jewellery is India constituting 23% of the whole industry. This is due to historical and cultural factors and perceptions. In 2006, they used 522 tons of gold to produce jewellery in India alone. With a population exceeding 1 billion people and a good potential of economic growth, the demand in India is expected to grow. The same situation is found in China, which is the second biggest gold jewellery market, which just overtook the consumption threshold of the long time second, USA, in 2007. The Middle East and Turkey are also big players on the gold jewellery market. Around 12% of gold market demand is generated by the producers of electronic components, with little left to other areas such as dental applications, medicine and interior decoration. Around 7% of the gold market demand is generated by the producers of dental applications, most of which is in North America, Western Europe and East Asia. This industry, while developing, is very sensitive to changes in economic conditions, especially in East Asia. Around 3% of the industrial use of gold is for medical products and dental alloys. The demand generated by the dental applications is slowing down. Also around 3% of gold market demand goes to decorations of various instruments and objects. The industry has sure-fire developing
potential, because research and development departments are finding new uses for gold in electronics as a catalyst.

1.3.1.2 Bar and coin retail investment

One of the options available for investing in gold is buying gold bars or gold coins. It is also the largest investment category in the gold market which is slowly increasing. Bullion coins and small bars offer private investors an attractive way of investing in amounts of gold. In many countries - including the whole of the European Union - gold purchased for investment purposes is exempted from Value Added Tax. The other reason for investing in bullion is anonymity. Of the total market demand of 3,547 tons, these markets consume close to 13 %. Players who are investing in bullion gold are generally long-term investors. The reason for this is obvious - buying and selling bullion gold is inconvenient.

1.3.1.3 Exchange Trade Funds

A second method to own and invest in gold is by acquiring gold Exchange Trade Funds (ETF). The mechanism was created in March 2003 in Australia, now widely used also in France, Mexico, Singapore, South Africa, Switzerland, Turkey, the United Kingdom and the United States. The reason for trading in ETFs is simple. Owning a share in a form of securitized gold on the stock market follows the price of gold almost perfectly. Gold ETFs are different from financial derivatives of gold, because they are 100 % backed by physical gold. The gold ETFs have proved very successful in terms of the tonnage they have attracted. “By the end of December 2007, gold ETFs had nearly 870 tons of gold in holdings, with the market value of 23.3 billion dollars.” This is easiest and fastest way to buy and resell gold investment. Gold ETFs constitute
around 8% of demand in the gold market. In 2007, 251 tons of gold was required for ETF transactions, although it was a bit less than the demand of the previous year. It is still approximately 25% more than the 2005 demand, when the quantity required was 208 tons.

1.3.1.4 Gold Futures and Options

Currently the price of gold is determined, to a considerable extent, by gold futures and options. These financial instruments are derivatives that change significantly in response to the daily fluctuations in gold prices. Although these instruments have not been the biggest player in the gold market, they have been the most influential. They are largely used by mining companies and jewellery producers, who are looking to hedge the fair value risk of gold. But futures and options are also tools for speculators, who wish to manipulate the price of gold. Gold future contracts are firm commitments to take delivery of a specified quantity of gold of specific purity standard on a prescribed date at an agreed price. The initial margin - or cash deposit paid to the broker - is only a fraction of the price of the gold underlying the contract. This means that investors can achieve notional ownership of quality of gold worth considerably more than their initial cash outlay. While this leverage can be the key to significant trading profits, it can also give rise to equally significant losses in the event of adverse movements in gold prices. Futures prices are determined by the market's perception of the current price and capital costs, which include the interest cost of borrowing gold plus insurance and storage charges. The futures price is usually higher than the spot price for gold.

A gold option is a derivative, which gives the holder the right, but not the obligation, to buy ('call' option) or sell ('put' option) a specified quantity of gold at a predetermined price at an agreed date. The cost of such an option
depends on the current spot price of gold, the level of the pre-agreed price (the 'strike price'), interest rates, the anticipated volatility of the gold price and the period remaining until the agreed date. The futures and options of gold are regulated by commodity exchanges. The most significant are the New York Stock COMEX division of the New York Mercantile Exchange, the Chicago Board of Trade and the Tokyo Commodity Exchange. These gold future markets have substantial volume and volatility, which gives them huge influence over the price of gold.

1.3.1.5 Seasonality

There are seasonal patterns regarding jewellery demand, although the pattern varies from one country to another. Global demand is usually the strongest during the fourth quarter of the year, followed by first quarter demand. The main factors that govern this trend are the seasons of festivals, wedding and tourism: in Western world it is Christmas, in the Islamic world it is Eid Al Fitr at the end of Ramadan, in India it is the wedding season, in China and East Asia the Chinese New Year, and in Turkey, the tourist season. The effect of a holiday on gold sales would normally show up earlier than the season, since people purchase in advance. Retail or wholesale prices do not reflect the price of gold because they have different margins.
Table 1.1  World Gold Supply and Demand from 2004 to 2013

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<td>Jewellery</td>
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<td>320</td>
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<td>Industrial fabrication of which dental and medical</td>
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<td>61</td>
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<td>Industrial fabrication of which other industries</td>
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<td>Net official Sector</td>
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<td>-365</td>
<td>-484</td>
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<td>Retail investment</td>
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<td>427</td>
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<td>825</td>
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<td>3809</td>
<td>4512</td>
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<td>4957</td>
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<td>1081</td>
<td>536</td>
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<td>321</td>
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<td>Net balance</td>
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<td>225</td>
<td>67</td>
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<td>-381</td>
<td>418</td>
<td>100</td>
<td>-182</td>
<td>-129</td>
<td>277</td>
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Source: GFMS, Thomson Reuters, (Net producer hedging is the change in the physical market impact of mining companies gold loans, forwards and options positions.)
Table 1.2  Gold Supply and Demand in 2013 and 2014.

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<thead>
<tr>
<th></th>
<th>2013</th>
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<tbody>
<tr>
<td>Mine Production</td>
<td>3060.3</td>
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<tr>
<td>Scrap</td>
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<td>Net producer hedging</td>
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<tr>
<td><strong>Total Supply</strong></td>
<td><strong>4282.2</strong></td>
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<tr>
<td>Demand</td>
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<td>Jewellery</td>
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<td>Industrial fabrication</td>
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<td>Total bar and coin demand</td>
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<td>1004.4</td>
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<td>ETF and similar products</td>
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<td>Central banks and other institutions</td>
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<td>Gold Demand</td>
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<td>Surplus/deficit</td>
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<td>173.9</td>
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<tr>
<td><strong>Total Demand</strong></td>
<td><strong>4292.2</strong></td>
<td><strong>4410.0</strong></td>
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Source: Metals Focus, GFMS, Thomson Reuters, ICE Benchmark Administration, World Gold Council
Source: GFMS, Thomson Reuters, (Net producer hedging is the change in the physical market impact of mining companies gold loans, forwards and options positions.)

**Chart 1.1** World gold supply and demand (in tonnes)
1.3.2 Supply of Gold

A key feature of gold is its difference from other storable commodities, such as copper, as new gold supply is small relative to its existing stock at about 1% annually. This creates a very large stock of gold relative to its flow. Total supply plateaued in the year 1999 has remained around an annual level of 4000 tons, surpassing that level only in 2008 and 2009. Even significant increases in scrap supply after the financial crisis, during record nominal gold prices, barely pushed the level above its previous peak. New gold is supplied to the market through two main sources like mining and scrap. Gold is also released to the market through official sector (central bank) sales and producer hedging. New supplies of gold come to the market in a very different way from those of other financial assets such as equities or bonds. While both
of the latter are essentially derivative claims on future cash flows or assets, gold represents what can be referred to as a real asset. Thus, unlike most assets, it is not a simultaneous a liability for another market participant. A metal, gold at its most basic level is a chemical element, and therefore it cannot be cancelled out of existence as is possible in the case of most other financial investments. Its life span is infinite unless destroyed at an atomic level.

1.3.3 Mine supply

Though gold supply as depicted above peaked in 2010, barely above the previous peak of 1999, annual gold mine output rose from 959 tons in 1980 to 3022 in 2013. This was at a time when the concentration of production had been lessened dramatically. South African output had declined from 675 tons annually to 174 over the same period; while China had increased production from 112 to 438 tons annually between 1992 and 2013, making it the new largest producer of gold. The 2013 distribution of producing countries was as shown in the chart no.1.1. The volume of gold produced from mining a given quantity of ore, depends on the average grade of ore processed. Some mines, such as Agnew in Australia, give about 6 g of gold per every ton of ore processed (GFMS gold mine economics database). This represents about 98% of the gold present in the ore, and is extracted using a process called leaching, which uses a cyanide solution that is environmentally damaging. The product is then smelted to remove impurities and turned into bullion for further processing into electronics, jewellery etc., or for storage in bar form as an investment. In order to be held in many official vaults as investment, gold bars must be certified as coming from a refinery on the Good Delivery List maintained and monitored by the LBMA. The majority of these bars will then be melted down to create jewellery or smaller bars and coins for investment.
1.3.4 Scrap supply

The supply from scrap gold comes from individuals recycling old jewellery and to some degree electronics. Some gold is now being lost permanently from the total stock, as it is present in such a small quantities in electronic goods that it is not economically viable to recover it. The rate of recovery however is still above 50%. An analysis of the data suggests that, there appears to be a correlation between high prices around the financial crisis and jumps in scrap supply. As prices declined after 2011 so too did scrap supply. There has, however, been no significant academic research to date in relation to the supply of gold from scrap. A study on recycling by Graedel et.al (2011) outlines some detail on the metallurgical aspects of gold (and other metal) recycling. The Gold Fields Minerals Surveys carried out annually (and providing the bases for this and the previous section) provide a similar but more detailed analysis of individual countries scrap supply. GFMS also believe that
scrap supply changes are based on the price level. However we do not know if a base level exists which is insensitive to price. Gold is an indestructible metal. This means that all the gold ever mined is still in circulation, unless lost. This unique attribute leaves the option to reinvest into industrialized gold products, which simply entails smelting and refining. This includes melting dental gold, electronically used gold and the vast majority of jewellery gold. In oriental countries, it is common practice to trade gold jewellery, and re-melt it for new usage. The supply of old gold scrap has increased over the past decade reaching its peak in 2006, when 1,107 tons of old scrap gold was sold. The supply of old scrap gold was last at this level in 1998, just before the Asian financial crisis, when South Korea single-handedly sold around 300 tons of old scrap gold to ease problems regarding foreign exchange. But this was only a crisis outburst. In 1999, the supply of old scrap gold went back to around 600 tons per year with a normal increase every year up until 2006. In 2007, the supply of old scrap gold dropped a little to 937 tons. The reason for this might be increasing gold prices and people’s belief that it might be better to hold the commodity for use during a crisis situation, in economic conditions, which might arise given the potential slowdown in the world economy.

1.3.5 Official sales/purchases

Much of the time period shown above saw central bank (official sector) sales of gold holdings. Feldstein (1980) argues that central bank sales should have a negative effect on gold prices, as they cause a sharp increase in supply, and this did seem to be the case. Central bank sales, which began in the 1990s, originated from central banks leasing gold through the bullion banks. Once they were in regular contact as a result of this market, central bankers saw an opportunity to slowly sell gold and reduce their holdings. When the Bank of England announced that it would sell the majority of its gold in 1999 it seemed
to have become a trend. Coupled with the rise in production volumes, this was a major driver of the gold bear market at the time. The Global Financial Crisis saw central banks becoming net buyers of gold again in 2010 for the first time since the 1980s. In 2013, central bank purchases were 409 tons, down on the previous year by over 100 tons but still very high by modern standards. The long term effect this might have on gold markets is unclear. Renewed purchases do however point to gold retaining its money-like characteristics, as it is held increasingly as a monetary reserve.

The official sector has a huge role in the level of gold supplies. Central banks still hold gold as a reserve to back up currencies as was the case during the gold standard era. On an average it makes up approximately 10% of their total monetary reserve. But, time to time they sell it on the open market. This gives central banks huge power over supply. According to World Gold Council, the central banks hold over 29,800 tons of gold. The major holders are the USA with approximately 8,100 tons, followed by Germany with approximately 3,400 tons, then France, Italy, Switzerland, and Japan. But also the IMF and ECB (European Central Bank) with 3,200 and 600 tons respectively are major holders. The yearly production of gold is only around 2,500 tons, which is close to 12 times less than the amount the Central Banks hold. This entails uncertainty and leads to fears about investing in gold, because Central Banks have historically sold their gold to ease their debt burden. On an average, “Gold mine production costs were up by 17% in 2006 while the output fell.” World Gold Council sold 527 tons a year between 2002 and 2006. This number has recently dropped below the previous average in 2007 to 485 tons. On September, the 1999 World Gold Council arranged for an agreement between central banks, which allows them to cumulatively sell up to 400 tons of gold a year. This Central Bank Agreement on Gold was renewed in 2004 raising the allowance for selling gold to 500 tons by central banks. The CBAG
reduces some uncertainty regarding the gold supply by regulating the sale of gold by central banks, which fosters the overall stabilization in gold prices.

1.3.6 **Producer hedging**

Hedging by miners (gold producers) can be a source of supply to the market in two ways, through forward sales and leasing. Hedging, as a significant tool of miners was first applied by Barrick Gold, and thereafter spread throughout the industry. It was a source of supply in 1990s as firms tried to remove their gold price risk. These also do not represent supply to the spot market as no gold is delivered until the end of the contract. Instead, it adds liquidity to the derivatives market and allows producers to lock-in now the prices of future expected mine output. For the same reasons it does not provide short-term cash for producers. In contrast gold leasing does provide spot market liquidity and immediate financing to the miners. It involves borrowing gold for a fixed period that can then be sold in the spot market for dollars. This gives miners a cheaper source of finance than dollar loans, as gold lease rates have typically been lower than dollar interest rates as shown below: Leasing only provides a net supply when more loans are made than repaid in a particular year.
1.4 GOLD AND CURRENCIES

It has been frequently argued that the US Dollar is one of, if not the primary driver of the gold price. The basis for this argument is that gold is traded primarily in dollars. A weaker Dollar (as measured by the dollars trade weighted exchange rate) makes gold cheaper for other nations to purchase, leading to an increase in demand. This then drives up the price of gold explaining their observed negative relationship. Conversely, when a currency, such as the dollar, is losing value on average against all major currencies, it is also losing value against gold. Viewing gold as a currency-like asset, it would be gaining value against the dollar when on average all other currencies are gaining.
1.5 GOLD AND INTEREST RATES

Many commentators view interest rates, regardless of currency, as representing an opportunity cost of holding gold, a benefit that could have been earned if investors had purchased a bond instead. In some theories then it is taken as following from this that there should be a negative relationship between the two, but it is a disputed point. It has been a common variable to include in gold price models in the literature. Fortune (1987) suggests an asset substitution channel through which gold and nominal interest rates are related, for a given level of expected future prices. He argues that increases in expected interest rates should encourage gold owners to sell gold, as it does not provide a cash flow, and buy interest bearing assets, as well as discourage new purchases of gold by investors. Both of these forces should cause gold prices to begin to decline, giving the expected negative relationship. Using quarterly data from 1973 to 1980 and long term US government bond yields, this paper estimates that the relationship between interest rates and inflation is negative and significant as expected.

1.6 MONETARY EXCHANGE

Gold has been widely used throughout the world as a vehicle for monetary exchange, either by issuance and recognition of gold coins or other bare metal quantities, or through gold-convertible paper instruments by establishing gold standards in which the total value of issued money is represented in a store of gold reserves. However, the amount of gold in the world is finite and production has not grown relative to the growth rate of the world's economies. As of 2010, gold mining output had been declining for several years. With the sharp growth of economies in the 20th century, and the increasing buildup of foreign exchange balances, the world's gold reserves and
gold trading markets have become a small fraction of the monetary value of trading in global asset markets and fixed exchange rates of currencies to gold became unsustainable. At the beginning of World War I, the warring nations moved to a fractional gold standard, inflating their currencies to finance the war effort. After World War II, gold was replaced by a system of convertible currency according to the Bretton Woods system. Gold standards and the direct convertibility of currencies to gold have been abandoned by world governments, being replaced by fiat currency in their stead. Switzerland was the last country to tie its currency to gold; it backed 40% of its value until 1999.

1.7 SCOPE OF THE STUDY

Investment in gold nowadays has become a part and parcel of the portfolio of any individual investor. The recent studies discuss a few factors mainly US specific factors for evaluating the gold price performance. This makes the investor under-informed and ignores the impact of numerous factors that can affect the performance of gold in different economic environments. A comprehensive and simple framework can provide the investor detailed information about gold and it will ensure a proper expectation on gold and its role in a portfolio. In this regard, the purpose of this thesis is to examine the impact of various factors that influence the gold market. These factors can be categorized to themes that will in turn influence the gold through the main sources of demand like jewellery, technology, central banks and investments, or the supply including mine production and recycled gold.

The results will be contrasted to findings of previous studies on the price of gold. Also, gold is one of the most liquid assets and probably more so in the war time, but investing in it can be quite difficult compared to other
equities. It is therefore interesting to dwell into the different methods of investing, and give the reader an idea on how one can invest in gold.

According to The World Gold Council, central banks hold gold reserves because of the following reasons.

1. Gold provides economical safety. Currencies are prone to bad decisions made by governments and their value change accordingly. Price of gold is unaffected by these decisions. Fiat money could also see some rough devaluation when its value as reserve money would collapse.

2. Gold provides physical safety. History has shown that many countries frequently impose exchange controls affecting the free transfer of their currencies or, at the worst, total asset freezes which prevents other countries accessing their cash or securities. Fiat money is a government issued note value, the value of which is not tied to any specie, but its value is backed by the creditability of the issuer.

3. Unexpected changes in the world monetary system could lead to a collapse in the value of the reserves. No monetary system can last forever. War, hyperinflation, worldwide currency crisis or any other major crisis could lead to full or partial collapse of the present system. In this case, gold acts as an option for uncertain future.

4. Worldwide confidence towards gold is big. Public opinion polls show that if a country has gold in their reserves, their citizens have more trust in their money.

5. Gold offers diversification benefits to central banks portfolios.

6. Income from lending gold has been notable.
7. Gold acts also as a store of value against inflation.

The present study has taken up the international gold market and gold price behaviour. The motivation for this study arises from the excitement of predicting the future price of gold, and informing the investor about the impact of numerous factors that can affect the performance of gold in different economic environments. A comprehensive and simple framework can provide the investor with detailed information about gold and it will ensure a proper expectation on gold and its role in a portfolio. In this regard, the purpose of this study is to examine the international gold market and the gold price behaviour. Further, the interrelationship between the gold price, SENSEX, US$ and Interest rate will also be analysed. The present study raises the following research issues:

- What is the structure of International gold market?
- To what extent the financial markets like stock market, foreign exchange market, and money market influence the price of gold?
- How does gold price behave in International market?
- How the gold price will behave in future?

1.8 OBJECTIVES

In order to answer the above research questions, this study has set specific objectives.

1. To study the structure of International gold market, its sources of supply and demand and it’s functioning.
2. To study the interrelationship between SENSEX, US dollar rate, interest rate and gold price.

3. To forecast the gold price for the year 2016 to 2018.

1.9 SOURCES OF DATA

The present study is based on analysis of secondary data collected from World Gold Council, Bombay Stock Exchange, Reserve Bank of India’s data warehouse (database on Indian economy) for the period 1981–2015. RBI publishes the database on Indian Economy.

1.10 STUDY PERIOD

This study covers a period of thirty five years from January 1980 to December 2015.

1.11 METHODOLOGY

Summary statistics such as mean, Standard deviation, Coefficient of variation, minimum and maximum values are used to understand the variations in the Gold price, Dollar price and Interest rate. The F statistics examines the overall significance of the trend value. The correlation, path coefficient and regression for the three study period was conducted. Though the study period was from January 1980 to December 2015, in order to analyse the data, the time series data was divided in to three periods. Period 1 consists of January 1980 to December 1995, period 2 consist of data from January 1996 to December 2005 and the period 3 from January 2006 to December 2015. Multiple regression is done to explain the variations in gold price (depended
variable) with the set of independent variables such as SENSEX, Interest rate, and Dollar price. The correlation matrix examines the interrelations between the independent variables with the depended variable.

For forecasting purpose, statistical tools like seasonal autoregressive integrated moving average models (SARIMA) have been used. With five seasonal ARIMA models, the best model was chosen as the predictor model. This has been done after satisfying all the model assumptions. Through the use of a non-linear forecasting technique, the thesis examines the effect of fundamental economic variables and a model’s parameter selection on gold price forecasting. This helps to understand the possible advantages or disadvantages of gold price predictions in terms of forecasting, performance and accuracy.

This research specifically investigates the broad themes like currency market, stock market and money market. Hence from each market, one representative variable is selected for the analysis. From the currency market, US dollar exchange rate is taken, and the representative variable taken from stock exchange is SENSEX. Bank interest rate is taken as sample variable from money market. Through the use of a non-linear forecasting technique, the thesis examines the effect of fundamental economic variables and a model’s parameter selection on gold price forecasting.

The thesis also analyses how the combination of variables like interest rate, SENSEX, and dollar exchange rate improves gold price predictions. This study investigates the determinants of the price of gold using short run and long-run models for the price of gold, based on different macroeconomic factors.
1.12 LIMITATIONS

Though the analysis covers the investment side of gold, it does not compare gold’s return or risk to other instruments, but concentrates instead on explaining the kind of instruments available to an investor interested in investing in gold. Data series pose limitations on the chosen study period for our modelling process. The only factors considered which affect the price of gold were the dollar price, interest rate and SENSEX. Nowadays as the dollar weakens the gold price tends to strengthen, because investors are using gold to hedge the exchanges rates of USD.