**Commodity Derivatives and Risk Management**
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**Week-08**
**Lecture 38**
**Gold as Asset, ETF, Gold-Silver Ratio**

Welcome to the 38th lecture on Commodity Derivatives and Risk Management. And today we are going to discuss gold as a strategic asset, different types of gold derivatives and how companies use different derivative instruments to hedge as well as de hedge or reverse the hedge. So, that is going to be our mandate for today's discussion. Please recall that in the previous session we had discussed how gold has different demand sources as well as supply sources. And among the demand sources besides jewelry and the industrial use and the central bank demand for gold, we had discussed that gold exchange traded funds are a significant consumer or user of the gold. Now let us understand what exactly an exchange traded fund is and how they contribute towards the consumption of gold. And gold exchange traded fund funds or ETFs are mutual funds and where the units are backed up by the physical gold. All of us know that in the case of a normal mutual fund let us say equity mutual fund, an asset management company will be raising money from people like you and me, we will be paying money to the fund manager. The fund manager will be investing that amount of money which the fund manager has collected from us and create a portfolio of security. And the units mutual fund units will be denominated in terms of the net asset value. In a similar way exchange traded funds which are gold ETFs, they are like mutual funds and the units are backed by physical gold. And each ETF unit gives the owner a specific amount of a gold ownership and this list ETFs are listed and traded in the exchange. So, if I want to buy gold ETF or I want to sell a gold ETF then I will be buying and selling the same ETF much like the way we are buying bonds and shares on a regular exchange. And ETFs are more liquid than the physical gold holding because we can go to an exchange platform and buy and sell these ETF units. And the NAV or net asset value of the ETF units are governed by the current price of the gold. And please note that the ETFs are not directly sold to the investors and there is a via media or another interim party between a mutual fund house or a asset management company. And those via media entities are known as authorized participants or large investors or institutions. So, a mutual fund unit will be contacting these authorized participants and will be creating the ETFs as part of the creation units. Now let us understand how what do we mean by a creation unit. So, for example, let us take axis gold ETFs, the creation unit is for 100,000 or 1 lakh ETFs and these 1 lakh ETFs have a underlying of 1 kilogram of gold. So, an authorized participant will be depositing 1 kilogram of gold with the axis mutual fund and that mutual fund will be in turn issuing 1 lakh ETF to the authorized participant. And this each unit of this ETF will represent 0.01 gram of gold because 100,000 ETFs are equivalent to 1 kilogram of gold. And if prices per gram is let us say 5750 then each of the units should have an NAV of 57.50. And if I want to buy one of these ETF units, I can go to an exchange platform and I can buy the ETF at the prevailing price. And please note that the AMC the mutual fund or the asset management company keeps the gold with the gold ETF. The asset management company will be keeping the gold which is backed by the gold ETF with the custodian of the AMC. Every asset management company has to have a custodian and that custodian will be keeping physical custody of the gold, whichever gold whatever amount has been deposited by the authorized participants. Otherwise instead of giving exactly 1 kg of gold the authorized participant can give the equivalent cost of 1 kg of gold to the asset management company. The asset management company in turn will buy 1 kg of the gold and give the same to the custodian. And the asset management company will in turn also issue 100000 ETFs to the authorized participant. And this particular table which I have taken again from axis bank mutual fund website as you can see the number of units comprising one creation unit which equal to your 1 lakh units of ETFs. And NAV per unit is going to be 40.64. Please note that this particular ah ETF has been in existence for quite some time hence we are able to get to see the NAV. The day an ETF comes to existence for the first time the NAV will not be there. Because this table has been taken from a document which explains how new authorized participants can join the ah gold ETF that is why we have the NAV available for the existing ETF units which has been issued by the axis gold ETF. So, a current NAV per unit is 40.64. So, value of one creation unit is going to be 1 lakh into this 40.64. Please note that the closing price per gram of gold is 4675. So, on that day let us say the cold closing price of gold spot price in India is 4675. So, the value of the portfolio deposit should be 46,75,000. Now this particular asset management company will be requiring the authorized participant to deposit 1 kg of gold or has to deposit46,75,000. So, any one of the two has to be done by the authorized participant and the asset management company in this case axis mutual fund will be issuing 1 lakh ETF to the authorized participant. And this particular diagram shows the whole issuance process of the ETF. As you can see this diagram, I have taken from the NSE website national stock exchange website, the detail that image source is given here. As you can see, this ETF sponsor is the asset management company, in this case we have the access bank is the sponsor or the asset management company. You can see a group of authorized participants. So, they are paying gold or paying equivalent amount of rupees and in turn getting the ETF units. So, these authorized participants will be buying or selling these ETF units to people like you and me through the whole stock exchange secondary market platform. The way we buy and sell shares, the same methodology will be used to buy or sell the ETF units by the retail investors. And please note that the authorized participants also have to give two-way quotes that at any point in time these authorized participants have to give a bid and ask quote. So, what is the meaning of the two-way quote? Two ways quote indicates that they stand as a seller for every buy order, and they stand as a buyer against any sale order. Please note that the bid and ask price which authorized participant would be giving, it will be always following this relationship bid price will be less than the ask price. I have just given a snapshot of how a bid and ask price may look. So, the bid price is 50.55 and ask price is 56.2. So, what is the meaning of 50.55? The 50.55 means that the authorized participant will buy or bid on a unit from an investor and pay 50.55 rupees. And what is the ask? In this case the authorized participant will sell a unit to an investor and receive 56.2 rupees. So, as you can see this bid price and the ask price will enable buyers and sellers of the ETFs to go to the exchange platform and if they want to buy a gold ETF, they will be able to do so or if they are holding a ETF they will be able to sell the ETF to the authorized participants. And please note that the authorized participant assures liquidity of the ETF units and AIMS is normally on board many authorized participants to provide more liquidity to the market. And in this context, it is very important to know that every time new gold ETF units are created gold is bought to be back by these units. As we discussed that whenever ETF units are created the authorized participant have to deposit the gold with the asset management company and asset management company in turn will be keeping those gold with a custodian asset as part of a safe custody. So, every time new gold ETFs units are created gold is bought to back these units hence with the increase in the ETF gold ETF by people like you and me. So, obviously, a significant amount of gold demand is coming from the gold ETFs. And this is again a snapshot of the secondary trading of gold ETF as you can see on June 15, 2023, this gold ETF which has an underlying value of 0.01 gram, it opened at a price of 50.65 high, low, close and on that day 1,16,912 ETFs have been traded. Similarly, to the previous day as you can see 6,11,187 ETFs have been traded at the national stock exchange. And here I would like to pay attention to this particular diagram. This diagram shows the movement of the price of the ETF axis bank gold ETF with the MCX gold spot. Please note that ETF prices are supposed to be moving in tandem or in relationship with the underlying gold price. But as you can see the blue line indicates the price or a NAV of the access bank gold ETF, the grey line shows the mutual grey line shows the MCX spot gold price. So, now, the question one may ask that why there is going to be a difference in these two prices. Let us understand this aspect and this difference is known as the tracking error. So, please note that every exchange traded fund will have some amount of tracking error. And why this will happen let us understand that ETFs normally do not invest 100 percent of the asset under management in gold. As per the SEBI guideline, gold ETFs will have to hold gold or gold related instruments such as gold futures for a minimum of 95 percent with cash component can be maximum of 5 percent. So, if a particular ETF is holding 2 to 3 percent of the cash because of the everyday they will be redeeming those units and new units will be bought from the authorized participants. So, authorized participants have to receive cash or pay cash as part of the buy and sale of the ETF units. So, at a given point in time, 100 percent of the assets under management can never remain invested in gold. And that is the precise reason SEBI has also allowed gold ETFs to hold a minimum of 95 percent of the assets under management in gold and gold related instruments. And a maximum of 5 percent of total assets under management can be held in the form of cash. So, the amount of cash which an ETF holds will not be giving the same return as that of the gold. Hence, all exchange traded funds return will be different than the underlying asset return in this case underlying gold price movement. So, every ETF will have some tracking error and how do we measure the tracking error? We measure the tracking error through a concept of the standard deviation of a fund return minus the benchmark return. In this case the fund return is going to be the Axis Bank gold ETF return minus the MCX gold or any spot gold return. Now, let us understand a simple example exercise through which we can identify the tracking error associated with two exchange traded funds. So, this particular table shows the price of MCX gold 1 gram gold over a 10 period of 10 days. Please note that these are all hypothetical example this is not the real actual data. So, the MCX 10 days gold price has been given here and we also have the daily NAV or daily price associated with two exchange traded funds that is your fund A and fund B. This detail is given from here this second block shows the return associated with the MCX gold, return of ETF A and ETF B. And this next panel shows the difference between the return of fund A with the MCX gold and fund B with the MCX gold. And, from this different series we have calculated the standard deviation of the difference for fund A and fund B and as you can see the fund A has a higher standard deviation which is 0.369 percent as compared to 0.271 percent. So, we will be able to say that the fund A has a higher tracking error as compared to the fund B. However, understanding tracking error concept is not that important in today’s discussion series. Our importance was to understand how ETFs are contributing towards the gold demand. If there are a greater number of gold ETFs created and more people are investing in gold ETFs then the demand for gold will also increase by that amount. Now, let us come to another interesting aspect related to these gold and precious metal derivatives. And that interesting or important aspect is that silver an asset and the gold silver ratio. Please note that in addition to gold silver is also considered as a precious metal and an important commodity as an asset class. Lot of people invest in silver the way we are investing in gold just to get some investment return. However, there exists some differences between gold and silver. Please note that silver has many industrial applications, about 50 to 60 percent of the silver is used for industrial application as compared to 10 to 15 percent of the gold. The majority of the gold investment is either for jewelry purposes or purely held in the form of gold bars and gold coins as an investment purpose. But in the case of silver, silver has a large amount of industrial application. Also, another difference between gold and silver is silver prices respond positively to economic cycles unlike gold. Please note that because silver has a significant amount of industrial application, whenever the economy improves silver price also increases. Whenever there is a lot of industrial activity happening there is a demand for silver which leads to an increase in the price of silver. And silver performs better in times of economic recovery when industrial demand peaks up, while gold performs better during the period of economic uncertainty. We have discussed in the previous session gold as an asset which is a safe having asset that is whenever no other asset class is performing gold tends to perform better. Hence gold's performance is better during the period of economic uncertainty. However, even though there are some differences between gold and silver, the underlying factor influencing the gold and silver may vary, but both are also considered as investment asset. Hence gold and silver prices are highly correlated and gold silver price ratio also remains range bound. So, these particular two panels which you are seeing, this shows the price movement of spot gold expressed in dollar terms and spot silver expressed in dollar terms for per ounce. So, this is again period for 5 years starting from May 2018 till May 2023. As you can see gold price has remained almost it has gone up almost nearly in a in a linear manner and silver price is exhibiting some amount of volatility nevertheless silver price has also gone up. And based on this two period data series correlation between gold and silver prices as is comes to 87 percent or 0.87. So, you can see from here that even though gold and silver may have some different fundamental factors which are influencing the gold silver price, but gold and silver price tend to move in a close proximity as one can see from the high correlation values. And not only gold silver prices are correlated gold silver price ratio also remains range bound. So, what is the meaning of gold silver ratio? This is a ratio of price of gold divided by the price of silver based on the based on the ounce prices. So, now let us understand the concept of gold silver ratio in little greater detail. So, as one can see the gold silver ratio is nothing, but the price of gold divided by the price of silver per ounce of gold as well as per ounce of silver. And for our discussion for the same period of May 2018 to May 2023 based on the daily prices I have calculated the gold silver ratio and I have plotted on a daily basis and this as you can see this particular trend line is going up and going up and down. And this the ratio has an average value of 83 and it does the maximum value of 124 with a minimum value of 64. Now, if this ratio is high then one would expect that this ratio is going to decline gold silver prices normally remains a range bound. So, if the gold silver ratio has reached high one would expect that yes market forces is going to drag down the same ratio and the ratio is going to fall. Now, how the ratio will fall? The ratio can fall when the gold price falls more than the silver price percentage wise or gold price increases less than the silver price percentage wise. Let us take a simple example to understand this concept. Let us say gold price is 100 rupees and silver price is 20 rupees going by that gold silver ratio is 5 rupees. Let us take scenario 1 where gold price falls to 70 rupees silver price falls to 17 rupees, but which is leading to your GSR value of 4.12. And in this case why the GSR has fallen because the decline in gold price percentage wise is much lesser compared to the decline in the silver price. Similarly, in the second case gold price has gone up silver price has gone up, but obviously, the GSR ratio has gone down because the price increase in gold percentage wise is much lesser compared to the silver price increase percentage wise. Now, market participants keep a very keen eye on the gold silver ratio and if the gold silver ratio has moved beyond the normal range one would expect the gold silver ratio to go up or go down. Now, to help market participants to mitigate the risk associated with the gold and silver price ratio, Chicago Mercantile Exchange, CME offers a futures contract for the gold silver ratio. Please note that this future contract value is based on the price of gold futures divided by the price of silver futures, it is not related to the price of gold futures or silver future it is a ratio. And if one is expecting that gold to silver ratio to go down in future, one can enter into a short futures contract on this GSR futures contract. Let us take a simple example, let us say on day 1, the trader takes a short futures position on that day let us assume that the GSR value is 5. Now, after some point in time that is on the expiry day let us say the GSR has come down to 4.12 and exchanges also mention what is the equivalent amount of money associated with every point of GSR value. Let us say in this case CME has mentioned that every single point of GSR is equivalent to 5000 dollars. So, in that case the trader who had entered into a short futures position or with a GSR value of 5 and the same futures contract closed at a value of 4.12. Obviously, the traders will be earning money or benefiting from this decline in the futures price and that benefit is going to be 5- 4.12 into 5000 US dollar which is coming to your 4400 US dollar. And this 4400 US dollar will be paid by the long futures position holder to the short futures position holder. Similarly, if one is expecting that the GSR ratio has bottomed out and it is not going to fall any further and there is a chance or there is a high probability that the GSR ratio is going to go up, one may enter into a long futures position and if actually the GSR ratio increases that particular party will be benefiting from the increasing GSR ratio. So, this is an example of how futures contracts, how an innovative futures contract is used by market players of gold and silver to benefit from the movement associated with the gold silver ratio. Now, let us understand a little more on gold price risk management aspect. Please note that the gold price has been almost moving upward secularly for the last 5 to 10 years. And, because the gold price is not declining, or it is continuously on an upward trend, the gold producing companies are not interested to enter into any hedging program. Please note that when gold prices go down this is a risk associated with gold mining or gold producing companies. But the fact is that the gold price is continuously in an upward trend. So, that is not motivating gold producing companies to enter into any hedge. And, also companies which had earlier entered into certain hedge contracts are now reversing or closing that hedge contract and the same is known as your de hedging. So, in fact, recently many gold mining companies are eliminating their hedge or de hedging themselves. So, this particular news article, though it is little old which is in 2007 this article shows how a company named Newmont eliminated its gold hedge and it by doing so, it created the world's largest unhedged gold company. So, as per this particular news article during June 2007 the company spent about 578 million dollars to eliminate its entire 1.85-million-ounce price capped forward sales contract. I want you to pay attention to the word price capped forward sales contract and to the tune of 1.85 million ounces. So, some time before 2007 this particular company Newmont, had entered into an agreement to sell gold at a fixed price for 1.85 million ounces. However, after that contract and after entering into this kind of a forward sales agreement the company realized that it had made a mistake and it had spent about 578 million dollars to close or dehedge that hedge agreement. We will be taking some numerical examples to understand this concept and how exactly companies do de hedge the companies reverse the hedge or reverse the forward sale contract which they have taken earlier by entering into long futures contract or by raising fresh capital to reverse the forward position by paying for the loss. So, we will be taking numerical examples to understand this aspect. In this context I would also like to draw your attention that how companies are explicitly mentioning that they are not interested to enter into any kind of gold hedge program. So, this this block shows the hedging philosophy of a company whose name is Kinross Gold Company. So, the company explicitly mentions in its annual report that the company's earnings can vary significantly with the fluctuation in the market price of gold and silver. Kinross' practice is not to hedge long term metal sales. So, as you can see the company is explicitly mentioning that they do not want to enter into any kind of a long-term hedging program. And as of December 31, 2022, there were no metal derivative financial instruments outstanding. So, again very clearly the company has mentioned that neither do they believe in hedging the gold prices nor do they have any outstanding derivative financial contracts with respect to gold. And in addition, Kinross is not subject to margin requirement on any of the hedging lines. Basically, they do not have any hedging practice currently in place. Hence, they do not have to pay any daily mark to market margin or initial margin for those hedging contracts. So, with this we will be ending today's session, we will be continuing with the remaining part of the discussion related to de hedging and other aspects of gold hedging, gold and silver hedging in the next session. So, thanking all of you, I eagerly look forward to interacting with all of you in the next session.