Commodity Derivatives and Risk Management
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Lecture 39
Gold Price Risk Management, De hedge, Zero Cost Derivatives

Welcome to the 39th lecture on Commodity Derivatives and Risk Management. And today we will be continuing with the discussion related to gold price risk management and the concept of de-hedging as well as zero cost derivatives. Please recall in the previous session we had discussed how gold mining companies, gold producing companies are closing their existing hedge positions, because in the last 10 to 12 years gold price is increasing continuously or indicating a secular upward direction. In this context we had also discussed how Kinross Gold Company has explicitly mentioned in its annual report that the company is not in a business of hedging the gold price as you can see from this particular detail which I have taken from the annual report of Kinross Gold as of December 31, 2022 there were no metal derivatives or financial instrument outstanding. So, in this context we had also discussed how a company called Newmont eliminated its gold hedge which it had entered into sometime before 2007 and during 2007 it paid about 578 million dollars to eliminate its entire 1.85 million ounce of price cap forward sales contract. In this context let us understand what is the meaning of de-hedge and how companies go about de-hedging the existing hedging position. So, the concept of de-hedging means that many gold mining companies are eliminating their hedge or reversing the existing hedging contracts. So, reversing forward sale contracts which they had taken earlier. So, if a gold mining company which has entered into a forward sale contract earlier, they are now reversing that derivative position by either entering into long forward position with the same counterparty or taking long futures position which is basically to neutralize the short forward contract which the gold mining companies have taken earlier. Now, let us understand this small numerical example of how the companies go about de-hedging. Now, let us say a particular company in the year 2003, let us say a gold mining company has already entered into a forward sale agreement basically has taken a short forward contract to deliver let us say 1000 ounces of gold at every 6 months during December 2007 to December 2008. So, this particular block shows that concept let us say in the year 2003 a gold mining company entered into a forward sale agreement for delivering 1000 ounce of gold at a price of 440 dollar per ounce. Similarly, the other two periods, that is June 2008 and December 2008 will deliver 1000 ounces of gold each at a price of 480 and 520 dollar. Please note that during the year 2003, when the gold price was probably hovering around 320 dollars per ounce entering into that kind of contract price of 442, let us say 520 seem to be a very good

business decision. Now, let us move forward, let us say we are at the 2007 and let us say we are standing on a date which is 5th July 2007 and on that date spot date the gold price is 600 US dollars. Now, as you can see a company which has already committed to deliver gold for 1000 ounce at a price range of 440 to 520 you can see the amount of loss this particular company is incurring by a green to deliver price deliver gold at 440 to 520 when the spot price is 600. Now, if the company wants the company will be able to de hedge by paying money to the counterparty. Please note that this particular company has entered into a short forward position and to de hedge or close the position the company will be entering into a long forward position. Now, let us use this particular table to understand how much money will be paid by this particular company to close the position. So, as I have mentioned, the spot date is 5th July 2007 let us assume that the gold price is 600 dollar per ounce, let us say applicable interest rate the continuous compounding interest rate is about 4 percent. And based on this figure that is 600 spot price and continuous compounding rate of 4 percent at a different t, that is different number of days that is 163 days, 346 days and 529 days, the forward price based on the cost of carry model should have been 610.81, 623.19 and so on so forth. Now without the hedge this particular company probably would have received this amount of money. Now, the forward price this particular company which is receiving is mentioned at 440 to 520. Now, for each payment period the company has committed 1000 ounces of gold from that we can calculate what is going to be the loss due to hedge and the next column shows the present value of the loss. So, 1,70,814 when we have calculated the present value that is on 5th July based on the 4 percent continuous compounding rate that is coming to about 1,67,790 and some total of these 3 present value losses is equivalent to your 4,14,938. Now to close this hedge position the gold mining company will be paying about 4,14,398 rupees or dollars to the counterparty to close the hedge position. So, please note that the derivative contracts are zero sum game and if this party is incurring the loss of 4,14,398 dollar that means, the other party is benefiting, and this gold mining company will be paying this amount of money to compensate for the opportunity lost. Now instead of calculating the forward price both parties may agree to use the prevailing future price in December 2007 to June 2008 and December 2008 to calculate the payment. Basically, here we have used the cost of carry based model price to calculate the value of the forward gold forward price instead of that the prevailing futures rate futures price rate on maturing on futures contract maturing in December 2007 to December 2008 can be used to calculate the present value of the total loss. Now please note that in addition to closing the hedge position by entering into a long forward position, many a times companies have to enter into a futures contract. Please note that if the counterparty does not agree to receive these 4,14,390 dollars to close the hedge, then the gold mining company can de hedge itself, but it will be able to de hedge by entering into long futures position. Because it cannot force the counterparty to take a one-time payment and close the deal and that is a precise reason for any kind of a forward sell

agreement that contract document does mention about a buyback provision. So, this buyback provision is a part of a forward sell agreement, and this provision will allow companies to close a forward sell agreement before the maturity of the contract. In fact, in this situation when gold price has increased the gold mining companies are interested in closing the hedge or de hedge. If another situation would have prevailed that is if gold price would have gone down in that case the counterparty to the gold mining company would be interested to de hedge or then close the position. So, by default almost all long term forward sell agreement has a buyback provision. Without the buyback provision this particular company gold mining company has to enter into a long futures contract for contract maturing on 2007 December 2007 January sorry June 2008 and December 2008 for 1000 ounce as underlying. And if gold price increases it would incur this gold mining company would incur loss from its forward sell position but benefit from the long futures position. Of course, for the futures contract issues related to daily mark to market margin, initial margin etcetera also needs to be taken care of by the gold mining company. So, that is the precise reason most of the forward sell agreement, companies would like to close the position by de hedging rather than entering into long futures position. So, this let us understand a little more about the derivative contracts available on gold at different exchanges. Different commodity exchanges offer futures contracts and option contracts on gold of varying sizes. So, these are the details of some of the commodity exchanges which offer gold and silver contract with the underlying size. For example, Comex offers gold futures contracts having an underlying of 1000-ounce, 50-ounce, 10 ounce and they name it as gold futures mini gold and micro gold. Similarly, other commodity exchanges offer different kinds of different types of gold futures contract of varying underlying size. And please also note that gold is an investment asset and predominantly people hold gold not for any consumption, but for as an investment asset. And gold does not have any supply constraint at any point in time. If anybody is interested in buying gold there will already be somebody who is willing to sell gold at that price. So, gold futures are never backwardation. So, as I have mentioned here gold being an investment asset without any supply constraint, the gold futures market does not exhibit backwardation. And this is basically a contango market where futures price is greater than the spot price. And this particular block shows the futures curve for various points in time as you can see almost all points in these 5 snapshots. This particular block I have taken from the Bloomberg data. As you can see, the gold forward curve is always upward sloping that means, the future price is greater than the spot price and per month future price is greater than the near month future price. Please note that the backwardation is a property or futures market exhibit backwardation when the commodity underlying is in short supply and gold is never in short supply. As I mentioned, at any point in time if we want to buy gold if we have money, we will be able to go, buy gold or gold jewelry from neighborhood shop or we can go and buy gold bar or gold coins from the banks. So, gold is never in short supply and gold never exhibits backwardation. In the context of gold futures traded

at different exchanges please note that the delivery of gold and silver have to be done as per the good delivery list prescribed by the exchanges. Please note that in case of a futures contract all futures contract are compulsorily deliverable that means, all futures contract on gold are compulsorily delivery deliverable that means, if somebody wishes to take delivery or somebody wants to give delivery of gold they will be able to do so, but whatever gold bars or in gold coins whatever is being delivered they have to be as part of the good delivery list. And this good delivery list is prescribed by the exchanges and in the case of a gold and silver the London Bullion Market Association (LBMA) provides a good delivery list. Now, let us understand what is the meaning of good delivery list. So, as you can see the exchange contract explicitly mentioned the list of good delivery producers or refiners whose gold bars or coins can be delivered. So, as part of the futures contract if somebody wants to deliver gold or somebody would like to take delivery of the gold that means, a party who is interested to deliver the gold that party must be delivering gold and silver which are produced by refiners whose gold coins or gold bars or silver coins or silver bars are approved by the exchange or London Bullion Market to be as part of the gold good delivery list. So, this right-side block which I have taken from the LBMA website this shows the list of gold refinery, please see the name of this particular gold refinery, which is your ABC refinery Australia private limited, this particular company is the name of the refinery and this date which is your 4th December 2015. So, this particular company is part of the LBMA gold good delivery list from 12th April 2015 onwards and this particular company's location is at refining location is at Sydney. So, all over the world there are many hundreds of refiners and gold producing companies which are part of the LBMA good delivery list and if any buyer or any seller wants to deliver gold or silver then they must be delivering gold and silver bars which are part of the good delivery list. Like LBMA we also have MCX, multi commodity exchange which is one of the predominant commodity exchanges focusing on base metal and precious metal, commodities and as per the MCX go gold and silver delivery quality specification as you can see for this gold somebody has to deliver gold it has to be 995 purity and it should be serially numbered gold bars. So, any gold bars which the short futures holder will be delivering have to be serially numbered and the serial numbers have been supplied by the LBMA approved suppliers and MCX also is now certifying certain other refiners on their own and whose gold bars or silver bars can be also delivered as part of the exchange platform. In this context, let us understand to what extent gold and silver are delivered at multi commodity exchange. This is again a snapshot of the delivery details which have been done in the last two months at multi commodity exchange as you can see the gold delivery at multi commodity exchange at different dates. So, this shows the location of the warehouse where the gold has been delivered and the quantity of the gold which has been delivered as part of the futures contract delivery. Similarly, the details for silver delivery have been mentioned here and here it is very important to understand that compared to any other commodities gold and

silver have a higher percentage of delivery based on the traded contracts. So, a lot of long futures position holders would like to take delivery or lot of short futures position holder would like to give delivery of gold and silver as part of the exchange. Hence, the percentage of futures contract resulting in delivery is higher as compared to any other commodities. Now coming back to the good delivery list of LBMA, London Bullion Market Association. So, the London Bullion Market Association does an audit process before approving a particular gold producer or refiner to be part of the good delivery list. So, I have taken again this particular snapshot from the LBMA website this detail exactly the image sources are very categorically mentioned. And this audit certificate is related to single gold refinery operating in India which have been LBMA approved. The name of the refinery is MMTC PAMP India Private Limited as you can see different details about this particular refinery being part of the LBMA good delivery list is mentioned here. And if you visit this particular website, you will be able to understand more details about the audit process and other interesting dimensions related to LBMA good delivery list process. In addition to auditing a particular refinery and checking whether the gold and silver being produced is as per the good delivery list, LBMA is also issuing responsible gold certificate. So, this responsible gold certificate is given to a particular refiner if that particular refiner is abiding by the refining gold mining principle as prescribed by the international council of mining and metals. So, this international council of mining and metal has prescribed certain governance principle related to responsible gold and silver mining and that particular principle is whether a particular refiner is abiding by those principles are not the LBMA audit also checks that and if the LBMA is satisfied with all these requirements then it issues a responsible gold certificate to this particular refinery or gold producer. And in this context, I would also like to share that world gold council is investing has recently invested in a blockchain based gold traceability startup and this startup intends to use blockchain or a distributed technology to develop and implement a secure or secure and digital supply chain for the precious metal industry to immutably document gold from the mine to the end user. So, through this blockchain technology anybody will be able to identify if a particular gold bar somebody is holding if or if a gold coin somebody is holding or an even probably a piece of jewelry somebody is holding from where this which mine this particular gold has come and whole value chain process from the gold producing company or gold mining to the gold bar or gold coin or jewelry form. So, blockchain technology aims to create a transparent information sharing with respect to gold from the mind to the end user. Now with this let us come to very interesting aspects how ah different ah gold value chain partners use option contracts to mitigate the price risk. In this context there is a concept called zero-cost hedging. So, please note that many gold value chain partners enter into OTC option contracts, but mostly zero cost options. Please note that we have also discussed many a times that if a company is producing an asset that company is a long on asset and it will be able to mitigate that risk by entering into long put option. Similarly, any company which is a

buyer of an underlying fears that the price will go up and it will be mitigating that risk by entering into a long call option. So, a producer will be entering into long put option and a consumer will be entering into the long call option, but what exactly is a zero-cost option? So, a company which is long asset position which has a long asset position basically a company which is a producer of gold which fears that price may decline should only take the long put option. As a normal course of action, they should only enter into long put option, but instead of taking long put option they take a zero cost option. So, what exactly is the meaning of zero cost option. So, the company enters into long put position as well as enters into a short call position. And why are we mentioning the word zero cost hedging or zero cost option that means, the premium to be paid as part of the long-put option will be compensated by the premium received to be the short call option. Here normal course of option in a normal course the gold mining company would have only entered into long put option and would have paid the premium, but this case the company is entering into long put option as well as entering into short call position and by doing so, the making or it is taking a zero-cost hedging. Now, let us understand how exactly zero cost hedging works in real life situations. Let us say the company enters into long put option for a 100 rupees exercise price and it pays a premium of 12 rupees. Similarly, it enters into a short call position exercise price is 130 rupees and the premium received is 12 rupees. So, premium paid and premium received is zero. So, upfront this particular company is not going to pay any premium. Now, let us see what will happen when the options expire. Please note that both long put and short call options have the same expiry. The company is owning the asset in this case the company is holding gold and it entered into let us say long put option at exercise price of 100 short call position at exercise price of 130. Now, let us move to the futures sorry let us move to the option expiry date on the option expiry date if the market price is less than 100. Please note that if the market price is less than 100 this particular company because it has a long-put option, will exercise and deliver the assets at 800 rupees. So, any price less than 100 rupees the company will be able to sell the underlying asset at 100 rupees. Now, let us say if the price is more than 130 rupees. So, if the price is more than 130 rupees, please note that this particular party has taken a short call position that means somebody has taken a long call position. So, that counterparty long call position will exercise the option and this party will be delivering the asset at 130. So, any price beyond 130 the company will be delivering the asset at 130 and in between a price which is greater than 100 or less than 130 the company will be neither party will be exercising the options and the company will be selling the underlying asset at the prevailing market price. So, as you can see the payoff, total receipt which is long put and short call as well as the long asset this particular company is owning gold or holding gold and it wants to sell that. So, combining the long asset long put and short call position the company's total receipt is going to be this position. Similarly, the other situation is a party who has a short asset. So, that party who is interested in buying assets at a later point in time that particular

company would be fearing that the price is going to increase. So, normally you should take only long call, but instead takes a zero-cost option. So, along with the long call it also enters into a short put position. So, in this case exactly the same process has been done in case of a in this case long call is at an exercise price of 90 and short put is at an exercise price of 65 and if the market price is greater than 90 please note that if the market price is greater than 90 here in this position this particular company will exercise the long call and will buy the asset at a 90 rupees and if the market price is less than if the market price is less than 65 the counter party who is a long put position will exercise and this particular party, the short put position holder will buy the asset at 65. So, the payoff will be also in this range. So, any price less than 65 this company will be buying the asset at 65 and any price higher than 90 the company will be buying the price buying the underlying asset at 90 and in between this particular company will be paying whatever the prevailing market price. Please note that both the diagrams look similar, but I would want you to please pay attention to the heading in this case the company is holding the asset and will be selling the asset and total receipt because of the long asset long put and short call will be in this manner. Similarly in the second case the company is wanting to buy the asset and total payment because of a long call short put and for buying the asset it is going to be based on this price this price movement. So, with this we will be ending our today's session on zero cost derivative and the concept of de hedging the remaining part as remaining part associated with different aspect of gold hedging, we will be continuing with the next session with this we will be ending our today's session and I eagerly look forward to interacting with all of you in the next session.