Commodity Derivatives and Risk Management

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Lecture 37

Gold as Asset, LBMA Spot Price Fix

Welcome to the 37th lecture on Commodity Derivatives and Risk Management. And today we are going to discuss gold as a strategic asset and also, we will be discussing how the London Bullion Market Association finalizes or fixes the spot price. In the previous session please recall that we had discussed how gold acts as a hedge against inflation. Continuing with that discussion let us understand some other benefits of gold as a strategic asset. Please note that gold is also considered as a safe haven asset. So, an asset will be treated as a safe haven asset which gives a better return when all other assets are performing poorly. So, when the economy is in a difficulty situation no other asset classes in terms of equity, in terms of real estate, in terms of debenture. So, no other asset classes are providing a better return, gold tends to perform better during those periods of time. And safe haven assets tend to have a negative or a very low correlation with most other asset classes. So, to test this property whether gold as a safe haven asset or not I have considered the daily data for May 2018 to May 2023. This data corresponds to the spot gold price in the USA and S&P 500 index return. And for the same period, I have also considered the data for the spot gold which is reported by the multi commodity exchange in Indian context and then Nifty 50 index return. And based on the return of these two pairs of data sets I have plotted the rolling correlation one year rolling correlation. So, as you can see from the first panel the top panel shows the rolling correlation between the gold spot USD and S&P 500 correlation data. As you can see, it has moved from negative to again turn positive and again negative and positive. And the same almost similar kind of image emerges out of the relationship between MCX spot and the Nifty return correlation calculation. And just to put into bring to this discussion to a concise form. So, this particular table shows the average correlation during this period of time between the spot gold USA and S&P 500 return is 0.05 which is nearly very close to 0. And the maximum value is 0.3 and the minimum value corresponds to -0.35. I want all of you to please pay attention to these three numbers because we will be using these three numbers to do some other calculations within coming 3 to 4 minutes. Exactly in the similar manner the correlation average for the MCX spot and Nifty return is -0.09 with a maximum value of 0.18 and minimum value of negative of 0.34. And from here just this particular calculation simple calculation over a period of 5 year indicates that gold has a low positive or nearly negative correlation and hence provides significant portfolio diversification benefit. We know that any asset will be providing portfolio diversification if that particular asset has a 0 or negative correlation or very low positive correlation with other asset classes. So, this discussion also points towards gold as a safe haven asset. Now coming back to the diversification benefit of the gold. In fact, all of us know in our household almost some amount of gold each of us we have not only for the jewelry purpose many of us are holding gold for purely from the investment purpose because holding gold provides a diversification benefit. Now how exactly we measure the diversification benefit that diversification benefit is major through a portfolio risk. So, as you can, as you remember we have also discussed this aspect in greater detail in some of the earlier sessions. The risk of a portfolio is a combination of the individual component risk. So, this sigma represents the risk of individual component, and the correlation is the correlation between the return series of each pair of assets which we are considering. So, in this case we are only considering two assets, that is the gold and the underlying index equity index return. So, we have used this formula we have calculated the risk associated with the portfolio. Please note that the risk or the standard deviation of the gold spot USD return only USD gold spot USD return when we have not combined with any other asset it is coming to 0.92 percent on a daily basis. So, we have found out the standard deviation based on the daily data. So, that is coming to your 0.92 percent for the gold and 1.37 percent for the S&P 500 return. And please recall that in the previous session a previous slide we had discussed that the correlation between gold spot USD return and S&P 500 return had an average value of 0.05, had a maximum value of 0.3 and had a minimum value of -0.35. So, based on these data let us create the combination of portfolio and find out what is going to be the portfolio sigma or portfolio risk. So, what are the combinations we have taken here. So, both having 50 percent weight and another portfolio we have taken gold as 20 percent weight and S&P has 80 percent weight and the reverse combination where gold has 80 percent weight and S&P 500 as a 20 percent weight. And based on the calculation as you can see the portfolio standard deviation when we are combining 50 percent gold and 50 percent S&P and when both assets let us say assume that both assets have only 0.05 as a correlation the portfolio risk is coming to 0.84 percent. So, let us compare this 0.84 percent with the 1.37 percent or 0.92 percent. So, by combining two assets even if these assets have positive correlation even though very low positive correlation, we are able to see the reduction in the portfolio risk. If somebody invests 100 percent in gold total risk is going to be 0.92 percent, if somebody invest 100 percent of its wealth in S&P 500 its risk is going to be 1.37 percent. But when somebody is combining the portfolio with 50 percent gold and 50 percent S&P the portfolio return is portfolio risk is coming to your 0.84 percent with the correlation value of 0.05. And when the correlation increases positively of course, the standard deviation risk has increased a little bit, but as you can see if the correlation is negative between these two asset classes the portfolio risk is declining significantly. In fact, it’s almost half here, in this case 1.37 it is going down to 0.68 percent. Similarly, the other combinations of 20 percent gold and 80 percent S&P 500 and 80 percent gold and 20 percent S&P 500 standard deviation has been calculated and reported and as you can see almost all these numbers are less than 1.37 percent. When we are combining let us say we are combining 20 percent gold we are also getting a significant reduction in the risk as compared to somebody holding or investing only in S&P 500. So, this calculation goes on to indicate that holding gold provides a significant amount of diversification benefit. Please note that this is again a mistake here the correlation minimum value is minus 0.35 it is not the average value. So, to summarize combining gold with S&P 500 is reducing the portfolio risk and not only with the negative correlation, but also with positive correlation as we discussed at 0.05. So, when we have a 0.05 the portfolio risk is coming to 0.84 it is much lesser than point 1.37 even when the gold and the S&P 500 is having a 30 percent correlation or 0.3 correlation, the portfolio risk is 0.93 which is again much lesser than your 1.37 percent. So, combining gold with a traditional asset class does provide significant amount of diversification benefit. Now coming to other aspects of gold as an asset gold also tends to have a negative or low beta. We have we have not discussed the concept of beta till date of course, any one of you who have done a corporate finance subject is very well aware of a capital asset pricing model and where we calculate beta for any risky asset and the formula for calculation of any risky asset formula for calculation of beta of any risky asset is given by the covariance of the return of the market index and the return of the asset divided by the variance of the return of the market. And because we are here in this case, we are finding out the beta of the gold we are replacing the return of the gold in place of any other asset. So, beta of the gold is nothing, but the covariance of between the return of the market index and the return of the gold divided by variance of the return of the market. So, going by this formula we have used S&P 500 daily index value to calculate the market index return and of course, gold price daily return has been used to calculate the covariance between the return of the index and the return of the gold. So, we have the same thing we have calculated or replicated in case of in Indian case where the market index we have taken Nifty Fifty daily values and gold price we have considered the MCX gold spot data. So, as you can see these two panels again almost near identical, we are able to see the rolling beta based on US dollar and S&P 500 and this is the rolling beta based on MCX spot data and Nifty Fifty daily return. So, as you can see the beta is almost remaining on the negative range with a very sometimes it has again gone positively, but mostly it is remaining at a at a very low the average beta value is very low. So, from here we can also say that gold as an asset class is providing significant amount of diversification benefit because gold is exhibiting negative or low positive beta. Now, let us understand little more on about the gold, purity of the gold is measure in carats and 24 carat gold is considered to be the finest or purest which has a 99 percent pure, and this particular table shows the carat of the gold and the fineness or the purity of the gold. So, a gold will be considered as a 24 carat when the gold content in any piece of jewelry or gold bar will be 99 percent and that correspond to a fineness of 990 and similarly 22 carat gold will have a 91.6 percent carat is or 22 carat will have a gold content of 91.6 percent or fineness as 916. So, what exactly does this 91.6 mean if we are buying a gold jewelry which the seller is claiming to be a 22-carat gold. Let us say we are buying a 10 gram of gold jewelry, and the seller is saying it is a 22-carat gold that means, 9.16 gram has to be gold remaining 0.84 gram could be silver or copper or any other alloy which the company jeweler can mix to make the piece of jewelry. So, 10 grams of gold of 22 carat should minimum have at least 99.16 gram of gold. So, in this context in India we are hearing a lot of discussion related to hall marking convention. The Hall marking convention is an international treaty which requires the member countries to maintain the purity and quality standard of the gold. So, all of us know that whenever we have gone ahead and bought gold jewelry from some shops, we have paid a price of a 22-carat gold, but maybe when we are selling at a later point in time we realize that gold is either 18 carat or 19 carat. So, to avoid this kind of unscrupulous behavior by the seller of the gold many countries have been part of the hall marking convention and it is an international treaty where the member nations require the sellers of the gold to maintain the purity and quality standards of the gold. And please note that the hall marking convention follows no negative tolerance policy for example, if a gold or bar coin has 98.99 percent of the gold, but not 99 percent of the gold it cannot be hallmarked as a 24-carat gold. So, there is no negative tolerance policy. So, even a slight deviation from the carat will not be categorized as a hall marking hallmarked gold and hallmarked ah hall marking is a process in which the one unique ID HUID which is a 6-digit unique identifier alpha numeric code is given to every piece of jewelry or gold bar which is or gold coin which is being bought and sold. And this unique identifier gets stamped to the jewelry or the bar or coin at the time of hall marking and this stamping is done at the assaying and the hall marking center. Now, coming to who are the major producer of the gold in the world, as per the 2022 gold production China holds the distinction of producing the maximum amount of gold followed by other countries Russia, Australia, Canada, United States and so and so forth. Now, which are the major consuming nations gold demanding or gold consuming nations, China ranks the first followed by India, USA, United Arab Emirates and so and so forth. Now, coming to which are the major companies which produce ah gold this ah again this particular snapshot which I have taken from this ah gold.org website ah the company is named as Newmont Barrick Gold, Agnico Gold, Anglo Gold, Asante Goldfields, Kinross, Newcrest, Polymetal, Northern Star these are important gold mining companies as per the ah 2022 quarter 3 report. And Indian households hold about 22,000 metric tons gold unofficial number, it is no authentic statistics have ever been compiled that how much of gold Indian household ah people hold, but unofficial statistics is about 22,000 metric tons of gold. And we have specific days in our calendar where people go and buy gold. These are Dhanteras and Akshaya Tritiya these are two specific auspicious days in which people buy gold. In addition to the household trust and various religious bodies also hold significant amount of gold in Indian context. In this context I have listed out some of those religious temple or temple trust who are major holder of the gold. The largest temple trust which holds the maximum amount of gold is the Tirumala Tirupati Devasthanam trust which holds about 10 tons of gold. About 500 kgs of 24 karat gold has been used for plating the gold temple and Lord Jagannatha Puri ah also ah the Puri trust also they have about 150 tons of ah gold. And there is a special day called Suna Besa which is held every year ah with large Jagannatha, Lord Balabhadra and Maa Subhadra are running massive gold jewelry pieces. And of course, three Sai Baba temple has also about 200 kgs of gold. So, this ah kind of gives an indication to the ah importance of gold not only in central banks, not only by individuals but also lot of religious trust have started investing in gold. Of course, they do not invest, they get lot of this gold as a donation. And in this context, I would also draw your kind attention to ah something very ah unique about India. The ah Sri Padmanabha Swami temple treasure ah had a massive ah amount of gold and precious metal which was unearthed and ah more details about ah the extent of gold jewelry and extent of precious stones and diamond etcetera which were ah available at this particular temple. So, that detail is available on this website and there are many YouTube videos. And I would also like to draw your attention to something very nice and very unique about ah this ah Padmanabha Swami temple treasure. This the image of a Maha Vishnu idol with the which one can see the finest workmanship of Indian jewelry maker. And this particular ah idol of Sri Maha Vishnu which weighs about 32 kilograms of gold. And in addition to this particular idol, they also they have on earth 17 kgs of gold coins precious metal diamond ruby and many other interesting many other interesting pieces of ah gold bars and gold coins ranging from ah ranging from 1000 years of old ah heritage. Now coming to the most important aspect of the spot price of the gold, who decides the spot price every day whenever we go to a jewelry store, or we are reading a financial newspaper we see that the prices are changing. In fact, the prices change even if somebody goes to a jewelry shop in the morning one gets to see one price and by afternoon the price changes. So, now the question comes who sets this price? Please note that we have discussed this aspect though India and China are the largest consumer of the gold, but they are not the price setter, or they do not decide the price. The price of the gold is fixed or set or arrived at by a body which is known as your London Bullion Market Association. This particular institution is fixing the price from 1919 onwards. The history of this London as a major trading center for precious metal and all that lot of detail is available if some of you are interested to learn more about the relevance of London as a major trading center for gold and silver that you can go through this particular link and read more on it. And every day twice daily London Bullion Market Association informs the price of gold, and the price of the gold is given in the form of 1 troy ounce and that 1 ounce is equivalent to 31.1035 gram and this price setting which is called as a fixing of the price is done twice daily. Now earlier there were only 5 members belonging to the committee which are participating in the process of price fixation, these 5 important banks. Since 2015 this particular process has been computerized but let us understand how this price fixation happens the same thing is now shifted to a more to an online process, but the concept and the logic behind the price fixation remains same. So, how exactly does the spot price arrive? So, every day whenever we see the price is changing the this is the first point when the spot price changes. So, how exactly fixing of spot price happens? Please note that at 10.30 AM London time, the chairman of the gold fixing committee starts with gold price and solicits the amount of gold each member would like to buy or sell at that price. So, there is a chairman of this particular gold fixing committee that chairman gives a price and for that price how much of gold each member is going to buy or sell. Now this price is known as a trying price. This is the starting price is known as the trying price and thus each member is then relaying this price to its customer and collect the buy and sell volume at that price. Now if the volume of the gold to be bought and sold by these 5 members do do not match the price given by the chairman. The chairman suitably reduces the increases or increases the price depending upon whether there is more demand for the gold or there is less demand for the gold. And this process of fixing the price goes on till the volume to be bought and sold matches of course, with a tolerance limit of 20000 ounce. And the same step is undertaken in the afternoon fixing at 3 PM and once the price is fixed in US dollars the price is reported in also in GBP and euro. The price is always fixed in US dollars, but simultaneously the LBMA converts this US dollar price to GBP and that is your Great Britain pound and euro. And the same process is also followed by the LBMA to fix the silver price and the platinum and palladium price is fixed twice daily at 9.45 PM and 2 PM in London time, but instead of LBMA the London metal exchange fixes the price for the palladium and platinum. Now let us take a simple example of how exactly the price fixing is done. Let us say on a given day let us assume that the trying price which the chairman announces starts with 1,278 dollar per ounce. Now once this 1278-dollar ounce is announced these members these 5 members will be conveying that particular information to major buyers and sellers of the gold. Let us say the collective buy volume from the customers of the bank of Nova Scotia is 8091 tons. Similarly, the collective sale volume which the customers of the bank of Nova Scotia want is 81,075 tons. Similarly, all other for other members the buy volume and sale volume are collected, and this information is given by these members to the chairman of the committee. Now what the chairman checks, whether the cumulative difference between the net buy volume and sale volume is less than 20,000 or not. As you can see the cumulative buy and sale volume is 22,939. So, it is much more than the 20,000-limit set by the LBMA. So, what the chairman will do is that as you can see the demand for the sale is much lower compared to the demand for the buy more people are interested to buy than the sale. So, what the chairman will do chairman will increase the price. Let us say the chairman revised the price to 1285 please note that earlier price was 1278. Now the chairman is revising the price to 1285. Once the chairman revised this price the same banks again will be relaying the new price information to the customer and collect the different buy and sale data. And the same process again will be done and as you can see the now the collective difference between the buy and sale is less than 20,000 then the price is fixed. In the case of the previous price, which is 12,078 dollars per ounce, the price was not fixed. Now the chairman increases the price and chairman increase the price because there are a greater number of buyers than the sellers had it been the other situation that is a greater number of sellers is number of sellers more is more than the buyers, chairman would have reduced the price. And this process will go on as long as the difference between total buy demand and sale demand is within 20000. Now once the price is fixed, the total volume to be exchanged between these buyers and seller is going to be the minimum of the total buy volume and the total sale volume. So, the buy sale imbalance is less than 20000 at a price of 1285 per ounce. Actual volume to be transacted is the minimum of total buy volume and the total sale volume and in this case total buy volume was about 268000 and total sale volume was 240000. So, the total units will be transacted between the customers of these 5 banks is going to be 249325. And please note that the chairman of the fixing committee is not free to randomly increase price or decrease price there is a policy. So again, this I have taken from the website of course, this is this is related to the fixation of palladium price. So, if the if the imbalance is between 4000 to 6000 per ounce the price will be adjusted to 1 dollar up or down depending upon the net imbalance of buy or sell respectively. So, in that case let us the LBMA would say that if the imbalance is more than 20000 to 25000 then the price will be increased by 5 dollars if the imbalance is more than 25000 to 30000, price will be increase or decrease by 10 dollars. So that policy is also very clearly set, but it is also important to note that the chairman is not constrained by any policy related to the initial trying price. The chairman will be considering various supply demand situation, the macroeconomic situation, global events and will start the trying price. But once the trying price is not fixed subsequent increase or decrease in the trying price will be governed by the net imbalance volume. And in this context, I would also draw your kind attention that in the year 2014 Barclays bank was slapped with 44 million fines for manipulating the gold price fix. So, all details about this particular incidence related to Barclays manipulating the LBMA gold price fix is available here in this link you can read more on this particular this particular price manipulation. Now after that price manipulation from March 2015 onward ICE benchmark administration limited has become the administrator for LBMA gold price. The same process is being done, but it is no longer being done by LBMA, a new entity called ICE benchmark administration limited that has become the administrator for the LBMA gold. And earlier all this discussion related to conveying the price which was set by the chairman everything was done on phone. Now with the ICE benchmark administrator taking the becoming the owner of this particular process. Now the whole same thing is being done on an electronic platform which is known as the web ICE platform. And this picture again I have taken from the ICE website this picture very clearly shows the how the price fixing is done. So, price is displayed on the ICE trading platform, the participants enter the buy and sell order and the imbalance is calculated every 30 seconds. If it is balanced, then the benchmark price is published. If the supply demand balance is not with is outside this 20000-ounce limit, then that is imbalanced again new price is set and the same process is done. This is again quote unquote from the ICE benchmark website of course; this data could be a little older data because it mentions 45 seconds and this particular image shows 30 second. But this is as you can see, I have taken from the IBA website which is quote unquote nevertheless whether 45 second or 30 second that does not matter the concept remains same that how exactly the spot prices arrived. In fact, this is the process which is done in the morning session and this same process is done in the afternoon session. And let us understand a little interesting aspect with respect to LBMA gold fix. I have taken three events very important events. The first event is the Russian invasion of Ukraine on 24th February 2022. Of course, COVID pandemic outbreak during March 2020 and the third event which I have considered is the referendum for Brexit. The result was announced with 51.89 percent of the voters wanting to leave the European Union and that result was announced on 24 June 2016. As you can see the day Russia invaded Ukraine which is on 24th February 2022 you can see that how the gold price jumped significantly the price at which the morning fix was finalized. It was on the previous day it was 1904.7 in the afternoon fix and by the morning next day morning it was increased to 1968.35. Similarly, during the COVID period as you can see on 20th March price was around 1494.4 dollar per ounce and 23rd March morning fix not much change significant amount change happened in the afternoon fix and by next day morning fix you can see it price increase even significantly compared to the previous day it is more than a 100 dollar increase per every ounce. Similarly on the day United Kingdom (UK) decided that they will not be part of the European Union that is on 24 June 2026 you can see. On 23rd June the morning fix was 1265.75 and on 24 June morning fix increased to 1313.85 which is about 45 about 45 to 50 dollars increase per ounce. So, this goes on to indicate that gold safe haven rule that whenever there is a problem with the economy, people start flocking to the gold market and they do not mind paying a higher price because they are anticipating economic turbulence or economic downturn. So, with this we will end today's session we will continue with the remaining part of the gold and different aspect of gold derivative in the next session. So, thank you all of you.