

COMMODITY ETPS ARE EXPOSED TO FUTURES CONTRACTS NOT THE PHYSICAL SPOT. WHY DOES IT MATTER?

May 2020

An Exchange Traded Product's (ETP) performance is intimately linked to the performance of its underlying index. In turn, the performance of the underlying index is intimately linked to the performance of the underlying asset. It is therefore crucial to understand what this underlying asset is.

What is a Commodity ETP tracking?

When a buyer and a seller agree to switch ownership of a commodity immediately in exchange for a price, the agreed price would be called a **Spot price** and would tend to represent the value of the commodity at present. A **Futures price**, on the other hand, specifies the pre-set price for which the commodity underlying a **Futures contract** will be exchanged between a buyer and seller at a set time in the future, called the "**contract expiry**", "**Futures expiry**" or simply "**expiry**" of the Futures. Since Futures contracts are traded on exchange, the Futures price supply and demand dynamics might be different from that of the spot.

WisdomTree Short and Leveraged ETPs are designed to enable investors to gain a short or leveraged exposure to a total return investment in futures contracts. This is done usually by tracking a collateral yield and:

- + an excess return index, whose performance is linked directly to the Futures contracts.
- + or directly with a given basket of Futures contracts.

To ensure a continual exposure to futures prices and avoid physical delivery of the commodity, the relevant Future Contracts must change on a regular basis. This is what is called rolling. For WisdomTree ETPs, the rolling is done under strict rules defined by the index methodology or the Prospectus: The Rolling Schedule.

The underlying asset of the ETP is therefore NOT the **Spot**, it is the **relevant Commodity Futures Contract**. Therefore, what is important to know is not just the commodity, but rather the specific Futures contract represented by the exposure of the ETP.

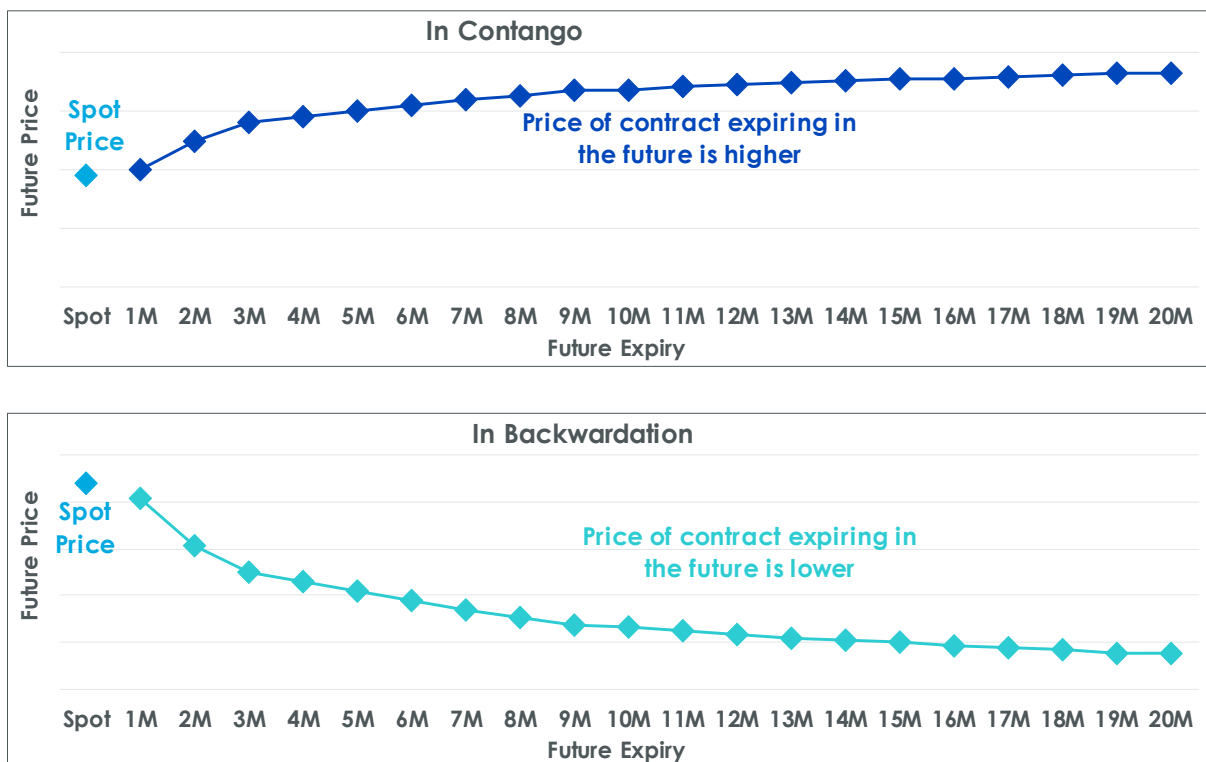
Why doesn't the ETP track the Commodity Spot Price itself?

Because, generally speaking, it is very difficult to get exposure to the Spot price of a commodity. Buying commodities directly is not simple. Physical commodities are not homogenous and therefore don't have one price. An investment in physical commodities would involve delivering the commodity (e.g., delivering barrels of oil), safekeeping (e.g., keeping gold in vaults), maintaining it (e.g., cattle give birth and get sick), incurring depreciation (e.g., grains eventually expire), insuring it, etc. Futures contracts are designed to solve all these issues as you can choose to avoid delivery and is how most investors invest in commodities.

How does referencing a Futures Contract Price impact investors' returns?

Futures contracts can be purchased for a set of different expiries. It is possible, for example, to buy Crude Oil for delivery next month, for delivery in 6 months, for delivery in a year and so on. The collection of Futures Contract prices for available Futures contracts of different expiries is called **the Futures curve**, or the **Futures term structure**. This can be drawn on a chart representing each futures' expiry and price (see Figure 1).

FIGURE 1: EXAMPLE FUTURES CURVE IN CONTANGO AND IN BACKWARDATION



The set of available Futures contracts for each commodity varies but the overall concept is the same.

A commodity is said to be in contango when the price of a distant Futures contract is higher than the price of a nearer future, and it is said to be in backwardation when the price of a distant Futures contract is lower than the price of a nearer future.

The shape of the Futures curve is very important for an ETP investors because the performance of the Futures contract that is the underlying asset of the ETP depends on it. **The total return performance of the ETP is related to the 4 elements below:**

- + **Spot Return:** movement of the Spot Price of the physical commodity.
- + **Roll Return:** generated yield due to the rolling of one futures contract to the next designated contract by ensuring a continual exposure to futures prices and avoiding physical delivery and contract expiry. The roll return is mainly impacted by the shape of the Futures curve and the way it changes over time.

The roll return can result in a loss or profit to the investor. In certain market scenarios the Roll Return can create heavy losses for investors unrelated to the moves of the Spot price itself.

- + **Collateral yield:** the interest earned on the cash value of the investment.
- + **Fees & Costs** associated with investing in the ETP.

In other words, the performance of the ETP is related to the move in the **Spot price** of the commodity but also the **Roll Return** (or **Roll Yield**) of the exact Futures that the ETP is exposed to. For Short & Leveraged ETP the impact of the Spot Return and the Roll Return on the performance of the ETP would be multiplied by the Leverage Factor for each recommended holding period (i.e. one day). For example, every day, a 3x leverage ETP's performance would be impacted by 3 times the Spot Return and 3 times the Roll Return.

It is also very important to understand that the Futures curve and its shape is always evolving. The Futures curve is a market equilibrium that depends on many parameters such as for example

- + the cost of transporting and storing the physical commodity.
- + the expected demand for the physical commodity at a given point in time in the Futures (think demand for heating oil in winter and in summer).
- + the expected supply for the physical commodity...

Those parameters change over time and can do so drastically from one minute to the next. When the curve's shape changes, the price of all the Futures Contracts that form it also change (even though the Spot Price may not move) impacting directly the performance of ETP exposed to those Futures Contract.

How impactful is the Roll Return?

In Contango

A commodity will be in contango when it is expected that there will be a net cost to owning the underlying commodity such as transporting, storing, or insuring the physical commodity. For a commodity in contango, a Futures price is higher than the Spot. Assuming that the shape of the curve remains unchanged, as time passes and the future's expiry nears, the net cost to owning the underlying commodity until expiry diminishes, and the Futures price draws closer to the (lower) Spot price. The roll return in contango therefore tends to have a negative price impact on the Futures return.

Under the assumptions of an unchanged Future curve over time, it is possible to calculate the **Implied Roll Return** by comparing the current price of the Future Contract that the ETP is exposed to at this moment and the expected price of that same Future Contract at the next roll date. This Expected Price is directly observable on the Future Curve by moving down the curve by the amount of time remaining before the roll (see Figure 2). We can approximate this Implied Roll Return in currency with the formula:

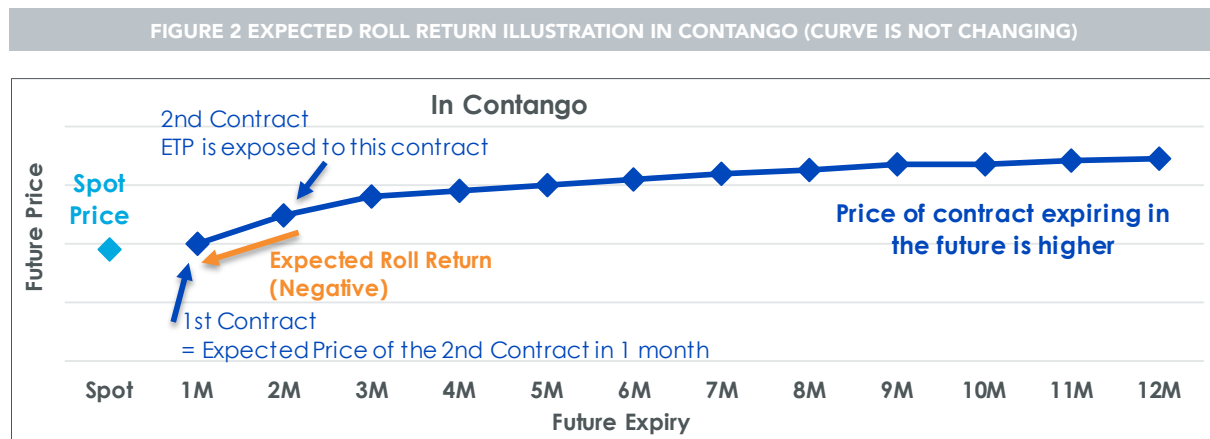
Price of Future Contract Held - Price of Previous Future on the Curve

Or in percentage with formula

Price of the Futures that expires before the one held / Price of Futures Contract Held - 1

For example, in the below:

Implied Roll Return for the 2-month (2M) contract = 1-month (1M) Futures Price / 2-month Futures Price - 1



When ETPs offer leverage positions in the underlying assets, the impact of the Roll Return (as well as Spot Return) is multiplied accordingly. Over the recommended holding period, i.e. one day, the below impact would then apply.

FIGURE 3: DAILY ROLL RETURN IMPACT FOR LONG AND SHORT POSITIONS IN CONTANGO

Roll Return in Contango	
Long x3	Approximately 3x Negative
Long x1	Negative
Short x1	Positive
Short x3	Approximately 3x Positive

In Backwardation

A commodity will be in backwardation when for example there is a temporary increased demand on the physical commodity increasing its price. For a commodity in backwardation, the Futures price is lower than the Spot. Assuming that the shape of the curve remains unchanged, as time passes and the future’s expiry nears, the net benefit to owning the underlying commodity until expiry diminishes, and the Futures price draws closer to the (higher) Spot price. The roll return in backwardation therefore may have a positive price impact on the Futures return.

Under the assumptions of an unchanged Future curve, it is possible to calculate the **Implied Roll Return** by comparing the current price of the Future Contract that the ETP is exposed to at this moment and the expected price of that same Future Contract at the next roll date. This Expected Price is directly observable on the Future Curve by moving up the curve by the amount of time remaining before the roll (see Figure 4). We can approximate this Implied Roll Return in currency with the formula:

Price of Future Contract Held - Price of Previous Future on the Curve

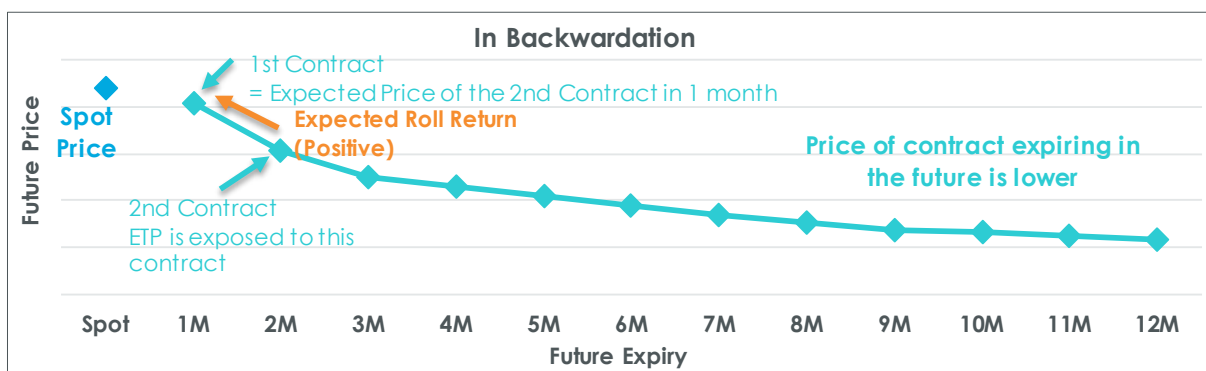
Or in percentage with formula

Price of the Futures that expires before the one held / Price of Futures Contract Held - 1

For example, in the below:

Implied Roll Return for the 2-month (2M) contract = 1-month (1M) Futures Price / 2-month (2M) Futures Price - 1

FIGURE 4 EXPECTED ROLL RETURN ILLUSTRATION IN BACKWARDATION (CURVE IS NOT CHANGING)



When ETPs offer leverage positions in the underlying assets, the impact of the Roll Return (as well as Spot Return) is multiplied accordingly. Over the recommended holding period, i.e. one day, the below impact would then apply.

FIGURE 5: DAILY ROLL RETURN IMPACT FOR LONG AND SHORT POSITIONS IN BACKWARDATION

Roll Return in Backwardation	
Long x3	Approximatively 3x Negative
Long x1	Positive
Short x1	Negative
Short x3	Approximatively 3x Positive

What happens when the Future curve changes?

For clarity of language, in the rest of the document, when talking about changes in the Future Curve Shape, we will talk about:

- + Curve steepening when the difference in price between two consecutive Futures contracts is getting bigger.
- + Curve Flattening when the difference in price between two consecutive Futures contracts is getting smaller.

If the Spot and the Future curve are unchanged the Implied Roll Return and the Roll Return are the same. However, if the Curve steepens or flattens over time during the investment period, then the Roll Return impacting the performance of the ETP will be different from the Implied Roll Return, sometimes dramatically. The Implied Roll Return is, at the end of the day, is a broadly accepted estimate of the potential roll cost/benefit that the investor in the Future Contract will incur but it cannot predict future moves in the Commodity Market.

A few scenarios: What is the Investor outcome?

Let’s look at a few theoretical examples to better understand the impact of Spot returns and Roll Returns on the performance of a long only ETP.

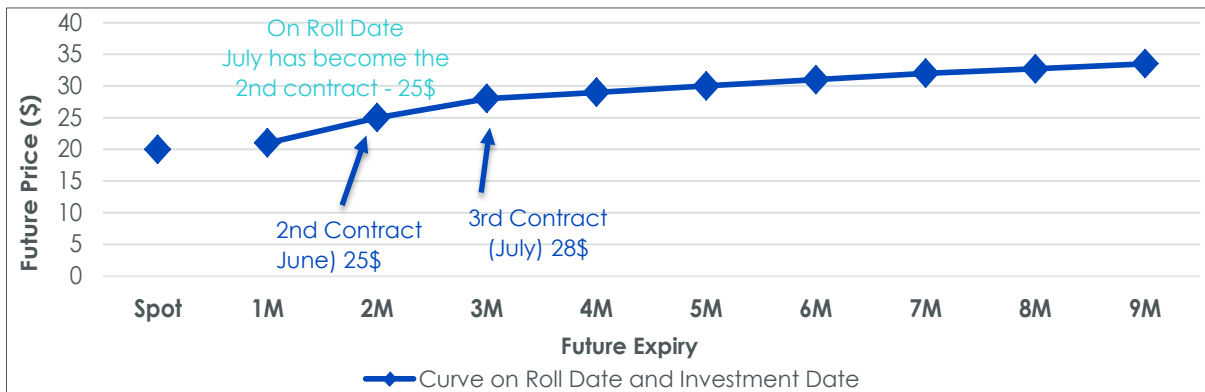
We will consider a 100\$ investment in a long only ETP exposed to a unique Futures contract. For the sake of simplicity, we will consider the collateral yield to be 0% and the fees and costs to be 0 as well. The ETP’s exposure is identical to investing at the end of every month in the 3rd Futures contract.

Scenario #1 – Nothing Changes

At the beginning of the month, the index is exposed to the 3rd contract (i.e. the July contract). The commodity curve is in contango as shown in Figure 6. With an investment of 100\$, the ETP is exposed to the performance of 3.57 Futures contract valued at 28\$ each.

The Curve is in Contango and the Implied Roll Return is $3.57 \times (25\$ - 28\$) = -10.7\$$ or $25/28 - 1 = -10.7\%$

FIGURE 6: COMMODITY CURVE ON INVESTMENT DATE AND ON NEXT ROLL DATE



A month goes by and nothing changes i.e. the Spot is unchanged and the Future Curve has not steepened nor flattened. The ETP is still holding 3.57 July Futures contracts but the July contract is now the 2nd contract because time has passed, and July is now 2 months away (not 3 months away like last month). So, since the curve is unchanged, the price of the contract is 25\$. The ETP price is $3.57 \times 25\$$ i.e. 89.3\$.

Nothing has changed but the ETP has lost 10.7\$. This is the Roll Return that we described previously. The curve is in contango, so the performance is impacted negatively by the roll return.

At this stage, it is important to note 2 things:

- + The realised Roll Return (10.7\$) is equal to the Implied Roll Return calculated at the beginning of the month.
- + The Roll Return has not materialised on Roll Date. Every day of the last month, the 3rd Futures contract has been getting closer to its expiry and with each passing day its price has moved slowly from 28\$ to 25\$. In other words, the roll cost is paid a little bit every day.

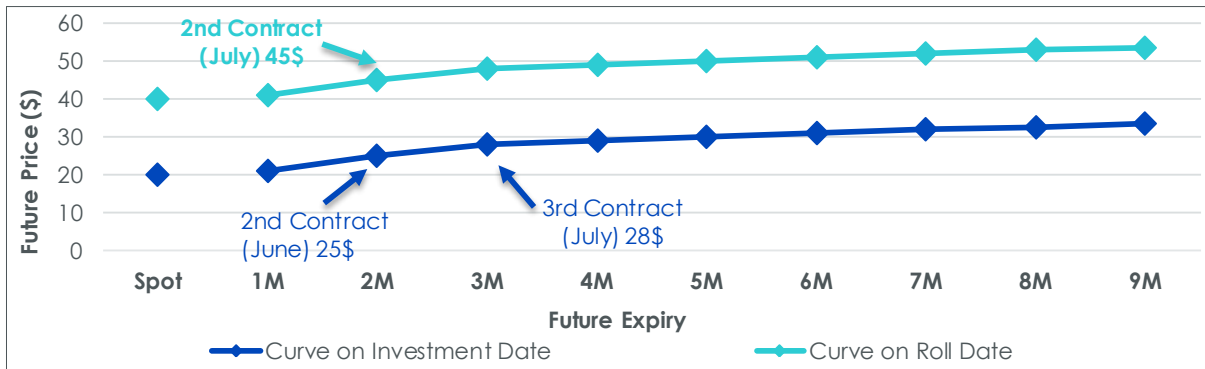
On the roll date, the index needs to sell the July contract (which is now the 2nd contract just because time has passed) and buy the third contract i.e. August to follow its investment strategy. The August contract is worth 28\$ so the ETP invest in $3.19 (89.3/28)$ contracts and it starts over.

Scenario #2 – The Spot goes from 20\$ to 40\$

At the beginning of the month, the index is exposed to the 3rd contracts (i.e. the July contract). The commodity curve is in contango as shown in Figure 7. With an investment of 100\$, the ETP is exposed to the performance of 3.57 Futures contract bought at 28\$ each. The Curve is in Contango and the Implied Roll Return is $3.57 \times (25\$ - 28\$) = -10.7\$$ (or -10.7%). So, everything is the same as in Scenario #1.

In this scenario the Spot increase but the curve does not steepen nor flatten.

FIGURE 7: COMMODITY CURVE ON INVESTMENT DATE AND ON ROLL DATE



At the end of the month, the ETP is holding 3.57 July contract (the 2nd contract on the light blue curve) is worth 45\$. So, the ETP is worth 160.7\$. A nice gain of 60.7\$.

But hold on, the Spot is up from 20\$ to 40\$ and the ETP owned 3.57 contracts. Why isn't the ETP up by $3.57 \times 20\$ = 71.4\$$? It is because the ETP still paid 10.7\$ of roll cost over the period (the curve's steepness has not changed). $71.4\$ - 10.7\$$ is indeed equal to 60.7\$. So, the ETP has benefitted from the Spot move but has suffered from the roll cost. Because the curve has not steepened nor flattened (it has just translated with the Spot price), the Implied Roll Return is identical to the realised roll return.

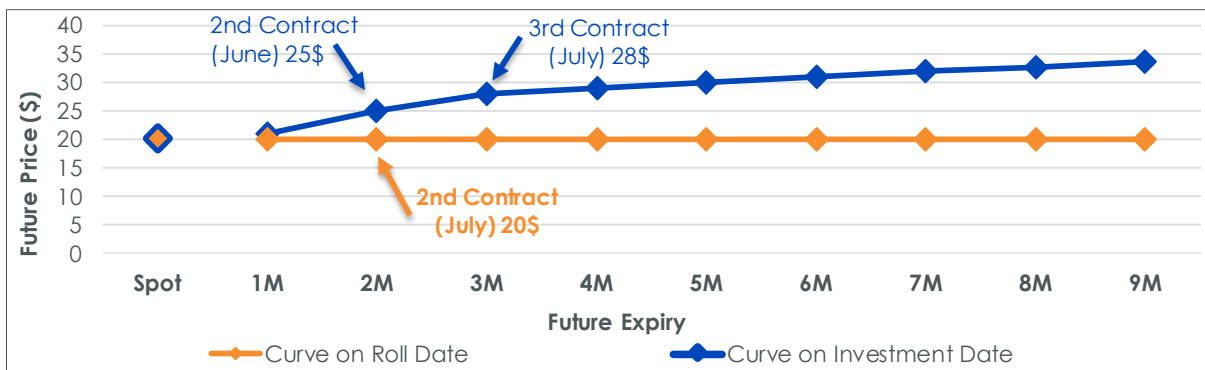
On the roll date, the index needs to sell the July contract (which is now the 2nd contract just because time has passed) and buy the third contract i.e. August to follow its investment strategy. The August contract is worth 48\$ so the ETP invest in 3.35 ($160.7/48$) contracts and it starts over.

Scenario #3 – The Futures curve flattens, and the Spot is unchanged

At the beginning of the month, the index is exposed to the 3rd contracts (i.e. the July contract). The commodity curve is in contango as shown in Figure 8. With an investment of 100\$, the ETP is exposed to the performance of 3.57 Futures contract bought at 28\$ each. The Curve is in Contango and the Implied Roll Return is $3.57 \times (25\$ - 28\$) = -10.7\$$ (or -10.7%). So, everything is the same as in Scenario #1.

In this scenario the Spot remains at 20\$ but the curve flattens completely (all Futures contract have the same price).

FIGURE 8: COMMODITY CURVE ON INVESTMENT DATE AND ON ROLL DATE



At the end of the month, the ETP is holding 3.57 July contract (the 2nd contract on the orange curve) worth 20\$. So, the ETP is worth 71.43\$. A loss of 28.6\$.

But hold on, the Spot has not moved, and the Implied Roll Return was only 10.7%! What happened?

As discussed earlier, the curve is not carved in stone and can change dramatically and unexpectedly over time. When it happens, it changes the roll cost that is incurred by Futures contract holders and therefore ETP investors. In this case, the curve flattens and that increased the loss of Futures holders above and beyond the Implied Roll Return at the onset of the investment.

Those 3 scenarios illustrate that the performance of the ETP is impacted by multiple effects:

- + Spot moves impact the performance of an ETP on the upside and the downside.
- + The shape of the curve when investing impacts the performance of an ETP on the upside (backwardation) or the downside (contango) through the roll cost (as estimated by the Implied Roll Return).
- + Changes in the shape of the curve (steepening or flattening) over the course of the investment also impact the performance of the ETP on the upside or the downside through the Roll Return.

What those scenarios have shown as well is that the Implied Roll Return can give an indication on the roll return but changes in the steepness of the curve can add to or subtract from that roll increasing the uncertainty on its final value.

How sensitive is the ETP performance to change in the Spot or in the Future steepness?

In this final part, we look at the sensitivities of the Roll Return to those different parameters (Spot Price changes and Curve Steepness Changes). To do so in Figure 9, we look at the Roll Return after a 1-month investment in a variety of cases where the Spot and the Future Curve Steepness Changes. Figures 9 to 11 apply to an investment where the Futures Curve is in Contango at the start of the month. For simplicity sake we start from the Future Curve used in Scenarios 1 to 3 above. The rows illustrate possible moves in the Spot Price and the columns illustrate Curve steepening or Curve Flattening.

Figure 9 gives us several insights:

- + In the middle, of the matrix we recognized the Implied Roll Return of -10.7%. When nothing changes, the Roll Return affecting the performance of the ETP over the month is equal to the Implied Roll Return.
- + If the Spot Changes but the Curve does not steepen or flatten (i.e. we stay in the middle column +0%), then the Roll Return experienced by the investor is also unchanged and equal to the Implied Roll Return.
- + In all other scenarios, things get more complicated. when we are invested in a contract, we benefit from a steepening of the curve. Conversely, if the curve flattens, our Futures position gets hurt as the realised roll yield increases over the implied roll yield we measured when initiating the position (like in Scenario #3).

It is clear from the matrix that the lower roll yield can be found in the top right section of the table, where we have both an increase in Spot and a steepening. Counter-intuitively, the higher roll yields are in the top left section of the table, where we have both an increase in Spot and a flattening.

FIGURE 9: SENSITIVITY MATRIX OF THE ROLL RETURN TO SPOT PRICE AND FUTURE CURVE STEEPNESS (CONTANGO)

		← FLATTENING					STEEPENING →			
		Curve Steepening or Flattenning								
		-25%	-10%	-5%	-1%	+0%	+1%	+5%	+10%	+25%
Change in Spot Price	50%	-42.0%	-23.2%	-17.0%	-12.0%	-10.7%	-9.5%	-4.5%	1.8%	20.5%
	25%	-37.5%	-21.4%	-16.1%	-11.8%	-10.7%	-9.6%	-5.4%	0.0%	16.1%
	10%	-34.8%	-20.4%	-15.5%	-11.7%	-10.7%	-9.7%	-5.9%	-1.1%	13.4%
	5%	-33.9%	-20.0%	-15.4%	-11.6%	-10.7%	-9.8%	-6.1%	-1.4%	12.5%
	0%	-33.0%	-19.6%	-15.2%	-11.6%	-10.7%	-9.8%	-6.3%	-1.8%	11.6%
	-5%	-32.1%	-19.3%	-15.0%	-11.6%	-10.7%	-9.9%	-6.4%	-2.1%	10.7%
	-10%	-31.3%	-18.9%	-14.8%	-11.5%	-10.7%	-9.9%	-6.6%	-2.5%	9.8%
	-25%	-28.6%	-17.9%	-14.3%	-11.4%	-10.7%	-10.0%	-7.1%	-3.6%	7.1%
	-50%	-24.1%	-16.1%	-13.4%	-11.3%	-10.7%	-10.2%	-8.0%	-5.4%	2.7%

Focusing on the ETP Performance, without taking into account the collateral Yield, the Fees and the cost, we can build a similar sensitivity matrix. The Matrix is coloured in green to show positive performance for the investor after a month and in red to show negative performance. The effect of moves in the Spot and changes in the Future Curve’s steepness are self-evident in this matrix.

The best scenario in term of performance is represented by the top right section of the matrix, where we have both an increase in Spot and a steepening. Both Spot return and roll yield are increasing. This time, the worst scenario is in the bottom left section of the table, where we have both a decrease in Spot and a flattening. Both Spot return and roll yield are decreasing.

We recognized the performance of the ETP is scenario #1 in the middle of the Sensitivity matrix. Scenario #2 would sit in the central column and above the middle point (i.e. Spot is up but the Curve is not steeper). Finally, Scenario #3 is in the middle row, left of the middle point (i.e. Spot is unchanged, but Curve has flattened).

FIGURE 10: SENSITIVITY MATRIX OF AN ETP PERFORMANCE TO SPOT PRICE AND CURVE STEEPNESS (CONTANGO)

		← FLATTENING					STEEPENING →			
		Curve Steepening or Flattenning								
		-25%	-10%	-5%	-1%	+0%	+1%	+5%	+10%	+25%
Change in Spot Price	50%	-6.3%	12.5%	18.8%	23.8%	25.0%	26.3%	31.3%	37.5%	56.3%
	25%	-19.6%	-3.6%	1.8%	6.1%	7.1%	8.2%	12.5%	17.9%	33.9%
	10%	-27.7%	-13.2%	-8.4%	-4.5%	-3.6%	-2.6%	1.3%	6.1%	20.5%
	5%	-30.4%	-16.4%	-11.8%	-8.1%	-7.1%	-6.2%	-2.5%	2.1%	16.1%
	0%	-33.0%	-19.6%	-15.2%	-11.6%	-10.7%	-9.8%	-6.3%	-1.8%	11.6%
	-5%	-35.7%	-22.9%	-18.6%	-15.1%	-14.3%	-13.4%	-10.0%	-5.7%	7.1%
	-10%	-38.4%	-26.1%	-22.0%	-18.7%	-17.9%	-17.0%	-13.8%	-9.6%	2.7%
	-25%	-46.4%	-35.7%	-32.1%	-29.3%	-28.6%	-27.9%	-25.0%	-21.4%	-10.7%
	-50%	-59.8%	-51.8%	-49.1%	-47.0%	-46.4%	-45.9%	-43.8%	-41.1%	-33.0%

It is worth noting that depending on the steepness of the curve at the onset of the investment, the middle point of the matrix (i.e. the Implied Roll Cost) will change. This middle point drives the rest of the matrix and therefore depending on the Implied Roll Cost, the investor will need more or less severe changes in the commodity market to start making money.

It is worth noting that when the curve is steeply in Contango (like in April 2020), the middle point indicates a very large loss for the ETP (the Implied Roll Cost is very high, in this example -21.4%) so the Commodity Market would need to change radically to allow the investor to make money like in Figure 11 where almost no cells are green.

FIGURE 11: SENSITIVITY MATRIX OF AN ETP TO SPOT PRICE AND CURVE STEEPNESS WHEN THE CURVE IS DEEPLY IN CONTANGO

		Curve Steepening or Flattenning								
		← FLATTENING					STEEPENING →			
		-25%	-10%	-5%	-1%	+0%	+1%	+5%	+10%	+25%
Change in Spot Price	50%	-27.7%	-13.2%	-8.4%	-4.5%	-3.6%	-2.6%	1.3%	6.1%	20.5%
	25%	-34.4%	-21.3%	-16.9%	-13.4%	-12.5%	-11.6%	-8.1%	-3.7%	9.4%
	10%	-38.4%	-26.1%	-22.0%	-18.7%	-17.9%	-17.0%	-13.8%	-9.6%	2.7%
	5%	-39.7%	-27.7%	-23.7%	-20.4%	-19.6%	-18.8%	-15.6%	-11.6%	0.4%
	0%	-41.1%	-29.3%	-25.4%	-22.2%	-21.4%	-20.6%	-17.5%	-13.6%	-1.8%
	-5%	-42.4%	-30.9%	-27.1%	-24.0%	-23.2%	-22.4%	-19.4%	-15.5%	-4.0%
	-10%	-43.8%	-32.5%	-28.8%	-25.8%	-25.0%	-24.3%	-21.3%	-17.5%	-6.3%
	-25%	-47.8%	-37.3%	-33.8%	-31.1%	-30.4%	-29.7%	-26.9%	-23.4%	-12.9%
	-50%	-54.5%	-45.4%	-42.3%	-39.9%	-39.3%	-38.7%	-36.3%	-33.2%	-24.1%

In other scenarios, the outlook for the ETP could be very different. With a Future Curve slightly in contango only, the prospect for the investor would look better.

Figure 9 to 11 are relevant only for Futures Curve that are in contango at the onset of the investment. When the Futures Curve is in backwardation, the middle point in the matrix would already be positive so only changes in the Commodity market would create losses for the investor. In backwardation, an increase in Spot Price would still benefit the investor (respectively a decrease in Spot Price would cost the investor). However, a steepening of the curve (i.e. the Futures Curve getting further in Backwardation) would create negative performance, when a flattening would increase gains (which is the contrary to what happens in Contango).

In Conclusion, to understand the performance potential and the risk associated with a given Commodity ETP, an investor needs to know:

- + What are the current Futures contracts referenced in the underlying index/asset?
- + What is the roll schedule of the underlying index/asset i.e. when and how the Futures contract changes (or rolls)?
- + What Spot and Curve moves is the investor expecting for its desired investment period that drives his investment in the ETP?

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