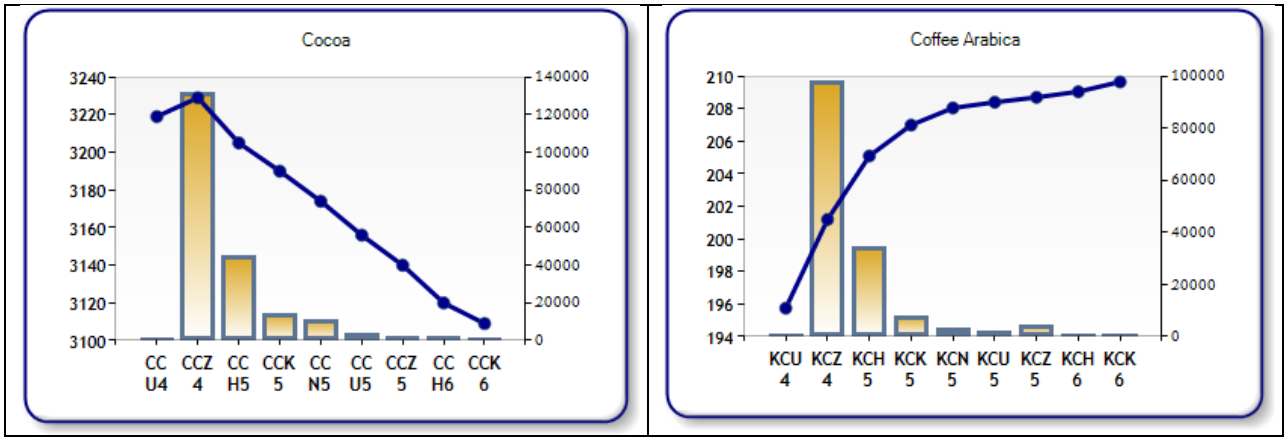
Normalizing Term Structure

The single most important factor that almost all retail traders neglect is term structure. Making sense of the information in the curve is not always easy. It can be a tricky subject, but in this article I'll make an attempt to break it down to something which should be relatively easy for most people to use. I'll cut a few corners to make it simpler but more pragmatic for high end retail traders.

The basics

I'll cover the basics very briefly, as I assume readers to already have a general understanding of this. If that's not the case, please contact me and I'll do a basic write-up on the topic.

Term structure refers to the shape of the curve that you get if you plot each contract for a single futures market with price on the Y axis. There might be traded contracts for January, February, March etc, and they will all have different price. So let's plot them after each other in a graph and see how the prices relate to each other.



If each point is getting more expensive, the market is said to be in a state of contango. If each point gets cheaper, it's in backwardation. Sometimes a market is clearly in one of these states and sometimes it simply lacks a definable structure.

The term structure does not in any way imply directional expectations on the underlying market. That's a common misunderstanding though.

Now here is the most important point to understand about term structure: A significant structure will have a major impact on the long term price.

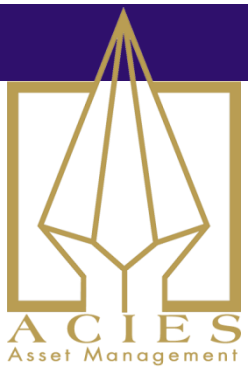
If the underlying asset doesn't move at all, each point on the futures curve will end up where the spot currently is. The closer to delivery, the closer the price will get to spot. This means that in a contango, each point will slowly fall down to meet the spot. The opposite goes of course for backwardation.

At times the term structure is the only important factor for a market. At other times, it's irrelevant.

Analyzing term structure

Knowing the shape is not enough. If it's not steep enough, it might not matter too much. This is why it makes sense to normalize it to something that can be compared. For a first step, let's calculate an implied yield curve.

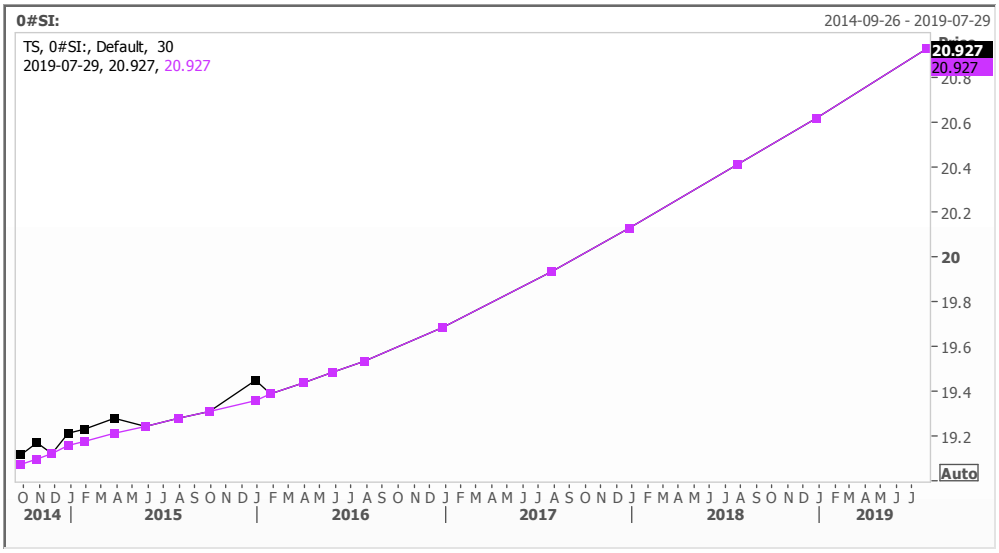
If you studied finance you probably see that as obvious. If you didn't, the word might sound scary. It's really not. We're just recalculating the price difference between the points in the curves above so that they can be expressed in annual yield numbers.



In the table below, I calculated the implied yields for silver. The spot is as of writing this at 19.19. The implied yield was calculated by a simple money market yield conversion.

The December yield was calculated like this: [(19.22 / 19.19) ^ (360 / 117)] -1 = 0.5%.

Contract Expiry	Price	Days	Implied Yield
Spot	19.19	0	0
2014-09-26	19.115	23	-5.9%
2014-10-29	19.165	56	-0.8%
2014-11-25	19.12	83	-1.6%
2014-12-29	19.22	117	0.5%
2015-01-28	19.225	147	0.4%
2015-03-27	19.3	205	1.0%
2015-05-27	19.242	266	0.4%
2015-07-29	19.274	329	0.5%
2015-09-28	19.307	390	0.6%
2015-12-29	19.445	482	1.0%
2016-01-27	19.383	511	0.7%
2016-03-29	19.432	573	0.8%
2016-05-26	19.482	631	0.9%
2016-07-27	19.532	693	0.9%
2016-12-28	19.685	847	1.1%
2017-07-27	19.934	1058	1.3%
2017-12-27	20.125	1211	1.4%
2018-07-27	20.412	1423	1.6%



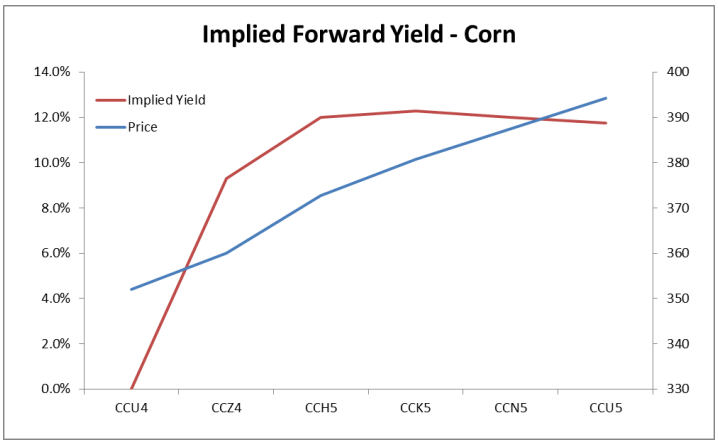
In this example, we see that even though silver is clearly in a state of contango, it's not a factor to care about. An implied yield of a percent or less is really just a rounding error. Visually it looks important, until you do the math on what it really means.

Implied data

Constructing an implied yield curve like this means that you need access to prices and expiry dates for each futures contract as well as the current spot price. The first part is usually much easier for retail traders to obtain. Spot is straight forward in some markets, but can get tricky in others. Finding the exact matching spot is not always easy.

My take on this is that it's a corner you can cut. If you don't have access to proper spot data, calculate from the nearest futures contract. After all, you're interested in whether or not the steepness of the curve is enough to bother with or not. You're not looking for exact numbers.

Calculating the implied yield based on just the futures curve is then very straight forward. Let's take the current corn market as an example.



The term structure of corn is quite steep. Each price rises up, as the blue line shows. The red line shows the annualized implied yield on the same points. As you see, the implied yield is in the double digits. For the price of the March 2015 corn contract not to fall until expiry, we need to see a rise in the spot price of over 10%. Just for the futures contract to stay at the same level.

This might happen. But it's quite a strong factor holding down the price. Going short the CH5 will make money until expiry unless we see a double digit advance in corn spot. See it as a welcome tailwind.

Normalizing it further

Ok, so you made your implied yield curves of the markets you cover. Now you realize that they're expressed in percent and that the various markets that you follow have very different vola. How do you compare them on an equal basis? After all, we don't base position sizes on percent.

Again, let's cut corners in a way that would make an economics professor cry. We're looking for workable solutions here, not for a Nobel Prize. Just a number that we can relate to and compare across markets.

The simple solution? Divide the implied annualized yield numbers above by the ATRP. Don't ask what period to use for the ATR. This is such a crude measurement that it really doesn't matter that much. Use what you're comfortable with.

The example below is for feeder cattle, which is in a backwardation. Obviously it's absolutely critical to take liquidity into account before picking what contract to trade, but what the table below should tell you is that given enough liquidity, the FCF5 clearly has the most favorable discount.

Expiry	Price	Days	Implied yield	Implied annual ATR units
2014-09-26	230.675	0	0	0
2014-10-31	229.7	35	-4.263%	-4.15
2014-11-21	228.225	56	-6.634%	-6.46
2015-01-30	221.8	126	-10.604%	-10.32
2015-03-27	220.3	182	-8.701%	-8.47
2015-05-01	219.9	217	-7.629%	-7.43
2015-05-22	219.9	238	-6.980%	-6.79
2015-08-28	220.5	336	-4.718%	-4.59

The entire point of normalizing discount/premium to annual implied ATR units is to be able to compare across markets. Of course, the step from these tables to building a model that trades the right contract is still far. But I hope I got you a lot closer to such a solution.