Fermat's Last Spreadsheet

Maths & Trading & Finance, Computing & Calculating & Coding, Languages & Learning

Facts, rules of thumb, and intuition for swap spreads

The *N-year swap spread* is defined as:

N-yr swap spread := N-yr swap rate – N-yr government bond yield.

Since most quants spend much less time on the bond market than on the swaps market, they often don't come to appreciate the central importance of the swap spread. Here is an unordered list of why the swap spread is important:

- it is the unhedgeable part left over after you hedge a bond portfolio with swaps,
- it is a value measure of whether investors should buy their exposure with swaps or bonds,
- it makes up one of the standard collection of arbitrage strategies in the fixed income space,
- it moves a lot (sometimes up, sometimes down) in times of market stress.

The swap spread is fascinating, believe it.

This post collects a few of my personal notes on the swap spread, including my tricks for remembering the rules-of-thumb, and gives links to well-written articles across the web.

Basic terminology

In various strategy reports you may read phrases like:

"the swap spread tightens when the curve steepens",

"the spread is cheap".

The 'cheap' comment is easiest to understand: the value of the spread is low relative to its average (and note that this can also mean that the spread is negative).

The terms 'tighten' or 'widen' are actually not too difficult either: tightening generally means that the number (which is probably a yield spread in most cases) is getting smaller, and widening the opposite.

Let's summarize:

swap spread is a low/er number = "spread is cheap" or "spread has tightened",

swap spread is a high/er number = "spread is expensive" or "spread has widened".

[As I have written previously, see here (https://fermatslastspreadsheet.wordpress.com/2011/11/30/mine-yours/), you will massively benefit from learning how to translate every trading statement into an asset form so that you can use terms like 'buy' or 'sell', 'cheap' or 'expensive', etc.]

Buy/sell intuition

In the next section we discuss rules of thumb for the swap spread, so you had better get comfortable with knowing which positions are long or short the spread.

If you think that the swap spread is cheap what trades do you need to do in order to *buy* it?

Answer:

1. buy the swap, and
2. buy the bond.

which just means you buy the bond and pay fixed in the swap. Have a think about it, you'll see it's right.

Another way to say this is to say that:

buying the spread = buying the hedged bond.

In summary we have the useful facts that you need to remember:

long the spread = long bonds,

short the spread = short bonds,

and consequently we should get used to things like:

"spread is cheap" = "govvies are cheap relative to swaps",

"spread is tightening" = "govvies are getting cheaper".

As a follow on to this we see that the swap spread will tighten either because bonds are cheapening or because swaps are getting less expensive (so more sellers, which means more people *receiving*). That's worth writing down:

spread tightens = bonds cheapening or more receiving in swaps,

spread widens = bonds rallying or more paying in swaps.

Armed with these, you will find the next section easier to understand.

Rules of thumb (ROTs) and Facts for the swap spread

ROT 1: spreads are *usually* positive.

This is because the swap rate reflects the borrowing costs for banks and financial institutions whilst the government bond yield is the cost of borrowing for governments — and since governments are generally considered to be a safer credit than banks, their cost of borrowing is smaller and so the spread is positive.

Fact 2: spreads have been negative.

There are huge debates about why spreads have been able to go negative, but a couple of reasons offered are:

1. credit risk fears for sovereigns,
2. corporate hedging (receiving fixed).

ROT 3: spreads tighten when the curve steepens.

The web-wide explanation for this is that when the curve steepens it becomes more attractive to corporates to hedge their fixed-rate debt (ie bonds that they issued which have a fixed coupon) by receiving fixed in a swap. This is simply because in such a hedge swap they would be paying low libors and receiving a relatively high coupon.

In my view you can alternatively say: swap rates are high relative to the libors, *so sell the swap rate* — which means receive.

ROT 4: swap spreads reflect the Libor – repo spread.

It is an academic fact that if we know exactly how the libor-repo spread would be for the next 10 years then the 10 year swap spread *would be exactly determined*. This is because you could set up the following trades:

1. buy the 10-year govvie,
2. finance this through repo,
3. pay fixed in the 10-year swap to receive libor,

and you would be left receiving (Libor-repo) and paying (Swap – Bond yield). Actually this is *quite academic* as it doesn't account for haircuts on the repo financing nor for the fact that the bond yield will likely not be the same as the coupon on the bond. Nonetheless this rule of thumbs stands strong.

ROT 5: swap spreads tighten when Goverments increase issuance (or there is an expectation they will).

If the Government issues more bonds then there will be a higher supply and so we would expect the bonds to cheapen, just by the usual supply-demand rules. And when bonds cheapen their yield increases so the spread tightens.

Ways to remember how the swap spread moves

The above rules of thumb reflect the fact that there are a number of different reasons why swap spreads may move: some due to opportunities in rates (eg more receivers in swaps), some due to credit concerns.

As an effort to make this more understandable for myself, I have come up with the following summary which gives me a good handle for understanding the contrasting forces that move the spreads.

Factor 1: ss widen when paying is popular

This is the thought process I go through to make this clear to myself:

ss widens = swap rates go up = "swap rates are rallying" = profit by paying fixed in swaps.

This factor explains the "spreads tighten with a steep curve", and may also explain why Japan suffers with negative spreads (curve is steep so receiving is the obvious trade).

Factor 2: ss tighten when there are lots of bonds available

Remember this:

lots of bonds => they cheapen => sell to profit = "sell the spread"

(because the spread is long bonds as we saw earlier)

Factor 3: ss widen when people worry about banks

When the swap spreads become the focus of credit concerns it is best to interpret swaps and bond yields as *borrowing rates*. Swap rates reflect the borrowing costs of banks, so if there are worries about banks then their borrowing costs will go up:

"widening" = swap rates increasing = borrowing costs for banks are increasing.

Factor 4: ss tighten when people worry about governments

The above can be applied equally to governments:

"tightening" = sovereign yields increasing = borrowing costs for governments are increasing.

Alternatively,

government bond prices will go down so you should “sell the spread”.

Some links to other reading

Click here (http://www.risk.net/data/Investor/pdf/Deutsche_march02.pdf) for an article that discusses the factors that could affect the dollar swap spread.

Click here (http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1261569&download=yes) for an SSRN article that does something similar for JPY rates.

Click here (http://www.anderson.ucla.edu/documents/areas/fac/finance/8-04.pdf) for an interesting academic article (by Liu and Longstaff) which shows that the swap spread trade does not offer an arbitrage: there’s positive carry yes, but when markets get stressed you can lose your shirt. In concise terms, the arbitrage trade says that the swap spread reflects the credit risk of banks vs governments, and is taking a bet that credit risk for banks will not explode over that for governments by selling the spread (ie short treasuries and receive in swaps).

Click here (http://www.nber.org/papers/w8990.pdf) for another article by Longstaff and others which looks at the swap spread as a measure of credit risk in the markets.

Click here (https://self-evident.org/?p=781) for a blog post which claims that negative swap spreads may not be the most surprising thing on earth.

Footnote

Click here (https://fermatslastspreadsheet.com/2012/02/07/a-quant-trading-model-for-swap-spreads/) to see another post of mine which discusses a quant trading model built by Paul Tooter that is designed to give buy or sell signals on the 10-year USD swap spreads.

Tags: arbitrage (https://fermatslastspreadsheet.com/tag/arbitrage/), steepening (https://fermatslastspreadsheet.com/tag/steepening/), swap spreads (https://fermatslastspreadsheet.com/tag/swap-spreads/), treasury supply (https://fermatslastspreadsheet.com/tag/treasury-supply/)

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12 Responses to "Facts, rules of thumb, and intuition for swap spreads"

ΣΗΦ Says:
January 17, 2012 at 6:29 am | Reply
Thanks for the great post. Been trying to read the MS Fixed Income Research paper, gotta say the par/par and yield accrete stuff takes some time to visualize.

Robert Says:
January 18, 2012 at 9:37 pm | Reply

Glad you liked the post.
For the par-par it might help to know that the principle is simply to have a way to convert a bond, eg a fixed-coupon bond, into an at-par (ie worth 100 at inception) floating-rate note.
So if a trader says 'client buys the asset swap' then you know that the client is taking ownership of the bond and simultaneously enters into a swap with the trader in which:
1) the trader pays Libor+Spread as coupons, and
2) the client pays the bond coupons,
3) the trader pays an upfront amount equal to the bond's dirty price,
4) the client pays 100 upfront,
5) at maturity the trader pays back the 100,
6) at maturity the client pays the bond redemption to the trader.
It really is a swap with 6 components, and if you look at the net cashflows you will see that the bond together with this swap really looks like the client is paying 100 to get a floating-rate note which redeems at 100.

By the way, traders use 'you buy the asset swap' as a short form of 'you buy the asset-swapped bond'. Most quants refer to only the swap part as the 'asset swap', which causes some initial confusion with trading desks. Personally I go for the trading terminology and call the swap part the 'swap of the asset swap' 🙂

For the yield accrete topic, I'd say upfront that it rarely gets used at all on the trading floor. Nonetheless, the logic is to create an at-par bond from the original bond in a way which means that the holder really does get cash each year which is close to the yield amount. Compare this with just buying a 4%-coupon bond which is trading at a yield of 6%. What actually happens is that you pay less than par for the bond but then still only get 4% coupons per year. The yield accrete effectively spreads the discount over the term to maturity so that you get something like 6% cash per year.

Hope this helps!

greatful Says:
July 20, 2012 at 3:22 pm | Reply
i stumbled upon your website today and i wish you had created the blog a few years ago when i was a junior quant trader. Your blog is a treasure trove. Please continue to enlighten us.

Robert Says:
July 25, 2012 at 8:37 pm | Reply
Thanks for the generous compliments.

Björn Says:
May 22, 2013 at 3:47 pm | Reply
Great post! I was looking forward to read the third suggsted article (July 2005). Unfortunately, it is no longer available at that address. Do you happen to have a copy or know where to find one?

Sam Says:
July 11, 2013 at 11:52 am | Reply
Hi..Just wondering if you had any luck obtaining this article (July 2005)

Robert Says:
July 30, 2013 at 10:41 am

Sorry, but I have not been able to fix the broken link — I cannot find the article anywhere and do not have a copy to link to.

Richard Says:
August 3, 2013 at 9:50 pm | Reply
Hi guys, I'm a french student in Finance and this blog is very helpful. Thanks for that!

However I have one question : Is the "swap spread" and "asset swap spread" the same thing?

Because sometimes it is said that swap spread (or ASW spread) = Bond yield – Swap rate

You'll probably say that's the same in absolute value but it's really confusing when we reflect in term of tightening/widening…

Robert Says:
August 8, 2013 at 10:42 am | Reply
I would use the term 'swap spread' to refer to the 'general' level of swap rates to bond yields; if pushed, I would say that most people would equate that to the difference in rates and yields at the 10-year maturity.
I would tend to use the term 'asset swap spread' when speaking about a specific bond (or specific collection of bonds if we are being a bitter looser): 'you can buy the Nov-17 UK linker at an asset-swap spread of X', for example.
Of course, if there has been a move in roughly the same direction for all French bonds, for example, then saying 'French asset swap spreads have tightened' would be unambiguous too.
It is really all about context at this point, but I would feel happier to say that 'swap spreads' is more like a general measure of the relative costs of swaps and bonds, whilst the 'asset swap spread' is a more specific calculation based on swapping a bond's cashflows for libor+spread flows.

Tat Says:
January 2, 2014 at 4:51 am | Reply
Thanks for the post, extremely helpful! I have one query, you wrote that more people want to receive the swap when the curve steepens, but what from my understanding when the curve steepens you want to pay the spread – how does that work out?

Robert Says:
January 2, 2014 at 9:57 am | Reply
My rule-of-thumb 3 says that the spread tightens when the curve steepens. In other words, when the curve steepens you would expect the spread to become a smaller number; to profit from that you would want to be _short the spread_ as the curve steepens (and to do that you sell the bond and receive in swaps).
Referring to your question, I believe that when people say 'pay the spread' they mean 'pay fixed in swaps, and buy the bond'. So you are right that this is the opposite of my rule-of-thumb 3.

I just had a quick look at the history of 2y10y steepness for USD, against the history of the 5y swap spread (all in BBG) and see that actually there have been periods when both happened — as the curve steepened massively from 2007 to Sep 2008 swaps under-performed bonds substantially (the swap spread got more positive = it widened); but since then the 5y swap spread has generally just tightened down to its current low levels, whilst the curve steepness has actually fluctuated a lot (high of about 275 bps and low of about 100 bps in the period Sep 08 to the present).

All in all, I would answer you by backtracking: clearly my rule-of-thumb 3 is not really a good one!
Nonetheless, it is interesting to go through the thought process and then see how history played out. Thanks for your question.

Richard Says:
April 24, 2015 at 9:08 pm | Reply
Hi

"If you think that the swap spread is cheap what trades do you need to do in order to buy it?"

– If spread is cheap (spread has tightened), should I think it will tighen ? so sell the spread i/o of buy it.
IE : sell bond / rec swap ?

– Do you mean the spead is lower to average so it will widen => buy the spread?