Inflation-linked corporate bond spreads: are corporate linkers really as rich as they look?

by Michael Ashton, Natixis Capital Markets

IT IS WELL-KNOWN THAT THE US INFLATION SWAPS MARKET IS MIS-PRICED. THE CONVENTIONAL EXPLANATION IS THAT THIS IS THE CASE BECAUSE THE DEMAND FOR INFLATION PROTECTION EXCEEDS ITS SUPPLY. THE PROBLEM IS, IT ISN'T QUITE TRUE. THE PURPOSE OF THIS CHAPTER IS TO EXPLAIN WHY CORPORATE INFLATION-LINKED BONDS ('LINKERS') ARE NOT AS RICH AS THEY LOOK AND THE INFLATION SWAPS MARKET IS, IN FACT, NOT NEARLY AS MIS-PRICED AS IS COMMONLY ASSUMED.

Suppose the corporate yield curve, the treasury yield curve, and the equivalent inflation-linked curves are arrayed as in Exhibits 1 and 2. For simplicity, assume each pair of curves is parallel (which allows us to omit the $_i$ subscripts).

(1) $S = C - T$, where C is the corporate yield, T is the treasury yield, and S is the credit spread.

(2) $S_R = C_R - T_R$, where C_R is the corporate inflation-linked (IL) bond yield, T_R is the TIPS yield, and S_R is the credit spread in real space.

Does $S = S_R$?

(3) Given: $T = T_R + E(I) + P$, where E(I) is expected inflation over the life of the bond and P is a premium for the variance in inflation around the expectation. This verity is a version of what is known as the Fisher Equation.[1] P is unobservable in ordinary circumstances, so we usually shorthand that as:

(3a) $T = T_R + BEI$ where BEI is 'breakeven inflation'.

It must also be the case that

(4) $C = C_R + BEI$, since surely the expected inflation and the variance of inflation is exogenous to the composition of the bond market.

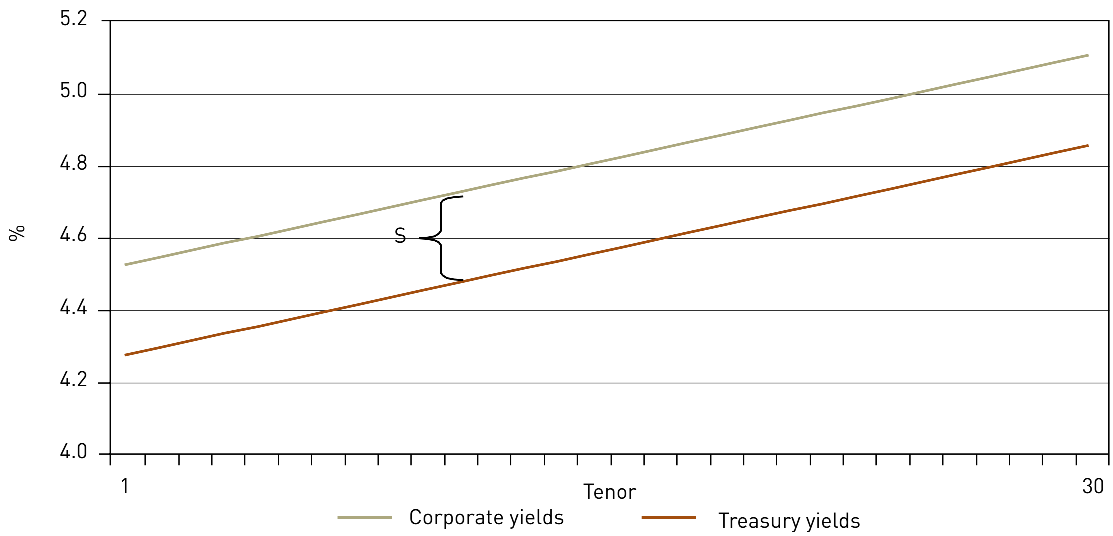
Substituting (3a) and (4) into (1):

(5) $S = (C_R + BEI) - (T_R + BEI) = C_R - T_R = S_R$

So, apparently, the fair credit spread for a corporate linker over the TIPS curve is approximately equal to the credit spread for a corporate nominal bond over the treasury

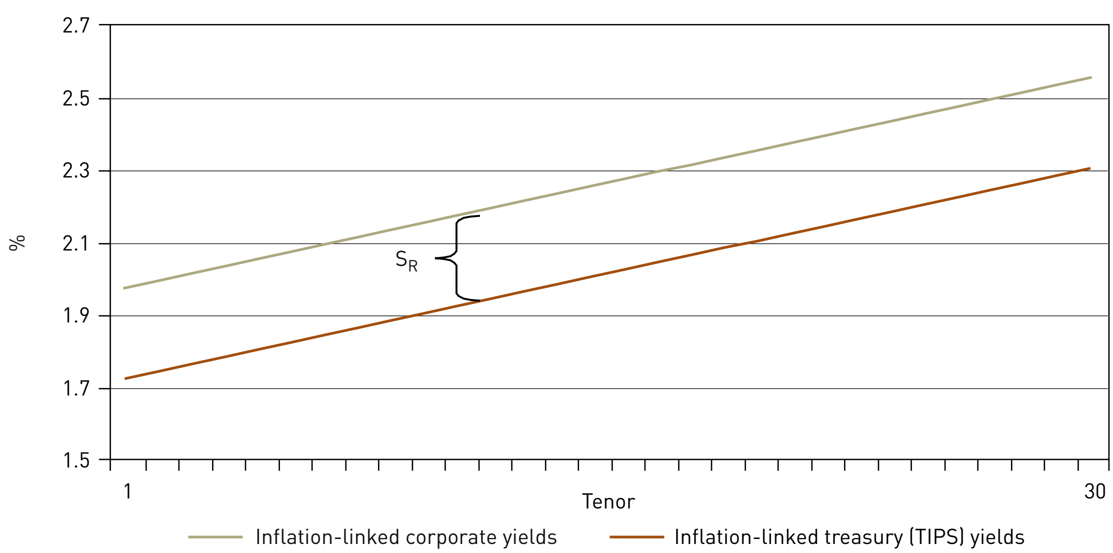
Michael Ashton
US Inflation Product Manager
Natixis Capital Markets
tel: +1 (212) 891 5833
e-mail: michael.ashton@cm.natixis.com

Nominal corporate and treasury yield curves **Exhibit 1**



Source: Natixis Financial Products

Inflation-linked corporate and treasury yield curves **Exhibit 2**



Source: Natixis Financial Products

curve[2]. On the basis of this belief, the corporate linker market has shown anaemic growth, because corporate linker issues trade at much tighter spreads to TIPS than the same credits' nominal paper trades to treasuries. If equation (5) is right, then institutional investors are correctly eschewing this market because of insufficient compensation for credit risk.

There is only one problem, and it is hidden in the assumptions. Equations (3a) and (4) are incomplete. They assume that the yield of the bond is the only important difference between two bonds, and for a long-only holder this may be arguably true. But for a leveraged investor, it is false: the cost of money used to buy the bond varies depending on the bond. Therefore, (3a) and (4) should be altered:

(6) $T - RP_T = T_R - RP_R + BEI$, where RP_T is the repurchase (repo) rate paid when borrowing money using the treasury bond as collateral and RP_R is the repo rate paid using the TIPS bond as collateral. Therefore,

(6a) $T = T_R + BEI + RP_T - RP_R$, or in words: the nominal treasury yield equals the TIPS yield, plus compensation for expected inflation, minus the advantage the buyer of the treasury bond gains in using it, rather than TIPS, as collateral to fund the purchase.

Similarly,

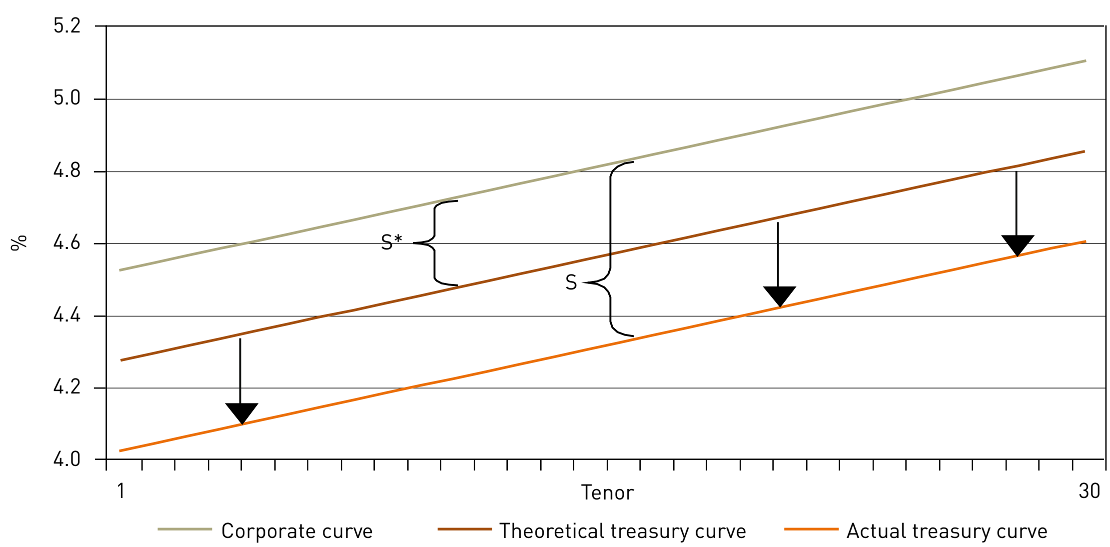
(7) $C = C_R + BEI + RP_C - RP_{CR}$, where RP_C is the repurchase (repo) rate paid using the nominal corporate bond as collateral and RP_{CR} is the repo rate paid using the inflation-linked corporate bond as collateral.

Substituting (6a) and (7) into (1)

(8) $S = (C_R + BEI + RP_C - RP_{CR}) - (T_R + BEI + RP_T - RP_R)$
$= C_R - T_R + (RP_C - RP_T - RP_{CR} + RP_R)$
$= S_R + (RP_C - RP_{CR} + RP_R - RP_T)$

The question of whether the fair level of inflation-linked corporate spreads over TIPS should be equivalent to the fair level of nominal corporate spreads over treasuries

Theoretical treasury curve vs. actual treasury curve **Exhibit 3**



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comes down to whether the parenthetical expression in (8) has zero expectation. Clearly, at present it does not: while nominal corporate bonds and inflation-linked corporate bonds probably face similar repo market conditions (so that the first two terms roughly cancel), TIPS almost never trade special in the repo market while regular treasuries do with great frequency. This means the expectation for $(RP_R - RP_T)$ is greater than zero, implying

(9) $S > S_R$

But consider the implication. What has happened here?

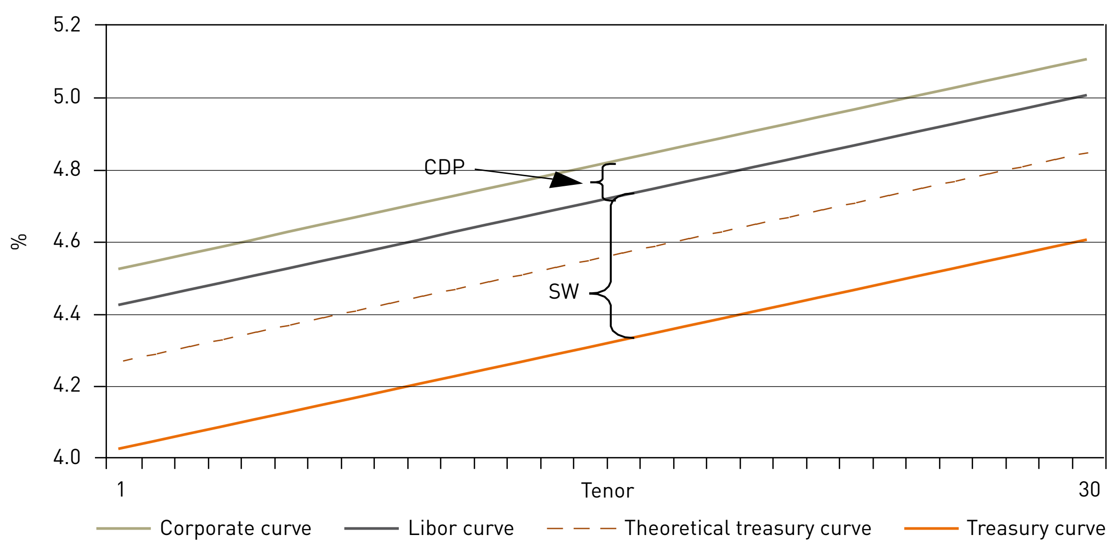
The actual treasury curve differs from the theoretical curve in that it reflects the typical repo market conditions – in which treasuries very often trade at special rates. Over the years, investors have come to believe not only that this is normal, but that the proper relationship between sovereign and corporate dollar curves is not S* in Exhibit 3, but S. But the truth is plain from this argument. Inflation-linked corporates are not expensive because they trade at too-tight spreads to TIPS. Nor are nominal corporates cheap because they trade at too-wide spreads to treasuries. Instead, nominal treasury bonds are rich, at least from the perspective of a long-only investor.

Such an investor, who sells corporate paper to buy treasuries, gives up the entire spread S. That spread represents compensation the investor is paying to move up in credit quality (S*), plus compensation for the ability to fund his position at special repo rates (S-S*). The problem is, this long-only investor doesn't receive this latter advantage, and so is giving away S-S* for nothing.

Let us consider another way to look at the yield of a corporate bond: the yield of a corporate bond can be broken down as the sum of Libor swap rates plus an ssue-specific credit spread over or under Libor (see Exhibit 4).

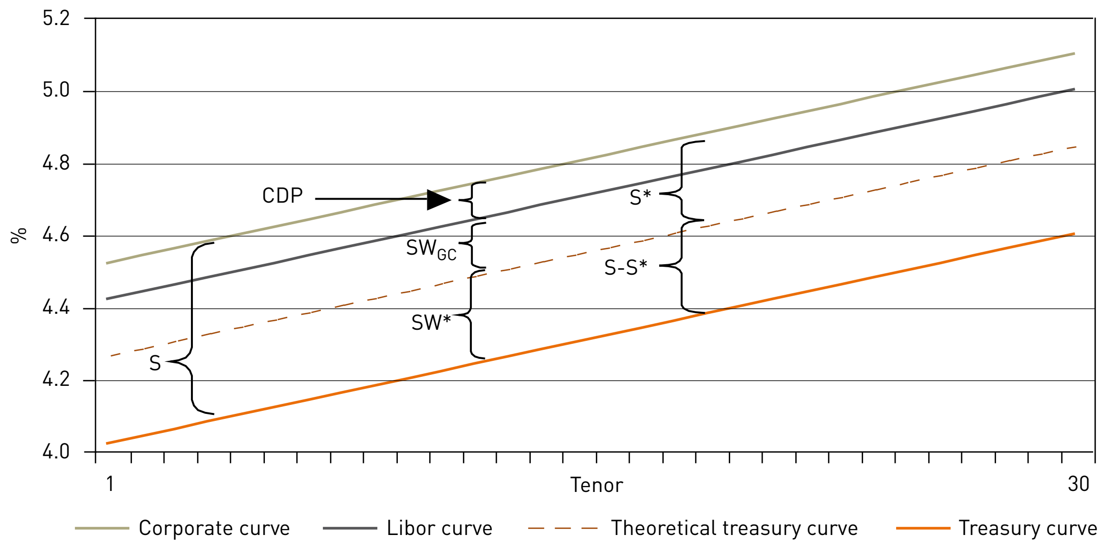
I have designated the spread of Libor yields over treasury yields here as SW and the additional increment particular to a given credit as CDP (which stands notionally for credit default premium). These concepts bear some resemblance to other capital market structures. SW is similar to a

Corporate yields as Libor plus a spread **Exhibit 4**



Source: Natixis Financial Products

Different ways of modelling corporate bond spreads **Exhibit 5**



Source: Natixis Financial Products

Libor swap spread, such as the type that is the basis for the US interbank swaps market, although traded swap spreads often involve a swap and a treasury of slightly different maturities. CDP resembles a credit default swap premium, but differs in some respects. For my purposes, these distinctions are not material since I am drawing a framework to illustrate concepts and not attempting to build a robust no-arbitrage term structure model.

Combining these Exhibits, we can decompose 'S' more finely. In Exhibit 5, I further decompose SW into SW_{GC} and SW* for reasons which will become apparent shortly. I also show S* from our earlier chart, again for purposes tied to future exposition.

Now that we have chopped the corporate bond spread into manageable components, we can examine them in turn.

SW_{GC}

A number of authors have previously written about the drivers of swap spreads. While many have chosen to focus on the risk of default as a key determinant of spreads (see for example Bollier and Sorensen (1994) or Cooper and Mello (1991)), the evolution of swap market practices has effectively removed credit risk as a meaningful consideration between collateralised counterparties.[3] More-recent papers, such as Collin-Dufresne and Solnik (1999) have addressed swap spreads in this context, treating swaps as default-free. In particular, He (2000) recognised that swap spreads have two components, one which incorporates the instantaneous spread between Libor and general collateral repo rates, and one which represents the residual spread and therefore captures the value of the specialness option.

SW*

He's (2000) model, however, does not address the variable I have labelled SW*, which is not surprising because the specialness of a particular bond, and how that specialness persists, or vanishes, or recurs episodically over time, is an idiosyncrasy of each bond and a function of many factors. These include the size of the issue, the intentions of holders of large positions in the issue, whether the owners lend out their assets in the repo market, the size of the 'short base', Federal Reserve actions to 'free up' an issue, and other factors.

The owner of a treasury issue has, as I have pointed out earlier, paid for the privilege of ownership in the form of sacrificing an amount of yield S-S*, or equivalently SW*. If the owner of the security does not benefit from lending the security, then this premium is merely lost. However, an investor who is able to let the bond out in repo has acquired not only SW_{GC}, but also an option that takes the form of occasional specialness. When the bond becomes special, then the investor is entitled to borrow money at below-GC rates for a time. The ex-post value of this option over the life of a security is simply the sum of the realised spreads under GC at which the bond was financed.

But this is distinct from what an investor would pay a priori for such an option (or, in the current circumstance, how much yield – SW* – the investor would give up to earn the expected financing advantage). In the case of SW_{GC}, we were able to focus on the expected value of the spread since the volatility of the spread is quite low[4]. But in the case of SW* the possible distribution of values is much larger, and using a simple measure of expectation will fail to capture some of the important drivers of spreads.

If the value of the bond's specialness over its life is expressed as the average amount of specialness realised, then we can consider the owner of the bond to be long an average-price put on the financing rate, struck at-the-money at the expected financing rate. Hull (2002) provides an analytical approximation for a put option on an arithmetic average (further citing Turnbull and Wakeman (1991)).

The notation grows fairly dense at this point, and is again beyond the scope of our current argument. For our purpose in this article, the degree of accuracy is less important than the value of the intuition, for as we will see, this framework will permit us to analyse the current state of the CPI swaps market.

Summary of conceptual model of swap spread determinants

Corporate spreads over treasuries consist of an issuer-and-tenor-specific idiosyncratic spread (CDP) added to or subtracted from a Libor swap spread. Libor swap spreads, in turn, represent the relatively stable (until recently) spread between Libor and general collateral repo rates (SW_{GC}), plus a premium that reflects the cost to the buyer of a treasury bond of the stochastic stream of value emanating from treasuries' tendency to go special from time to time (SW*).

It is important to recognise that changes in SW* are not a Libor-side phenomenon, but rather manifest through changes in the treasury issue's yield. For example, swap spreads for on-the-run treasury notes are usually wider than spreads for off-the-runs, because the former tend to exhibit greater specialness in repo. But the spread widens not through movements in the Libor curve above each treasury, but via movements in the bonds. To wit, bonds which are more often special in repo trade at lower yields than identical bonds that are G/C.

The explicit object of this chapter is not to expand upon prior research regarding swap spread drivers. However, in order to explore the ramifications of changes in financing (repo) market conditions on the fair spread of corporate versus sovereign TIPS-style bonds,[5] it was necessary to establish this framework.

Insights implied by model framework

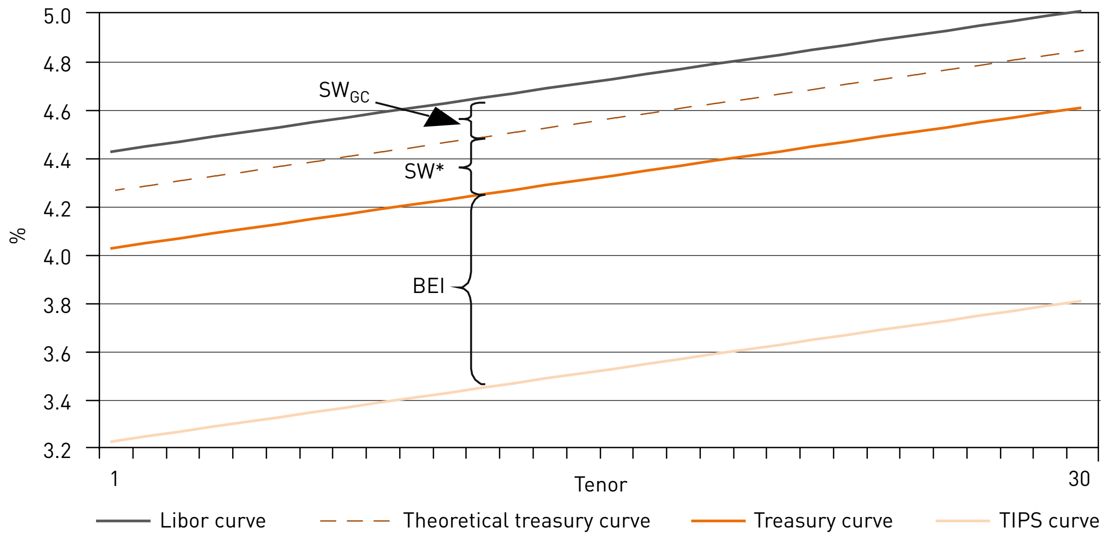
The relative value of TIPS vs. treasuries

What can we say about breakeven inflation (BEI) as it is typically measured, as the spread between treasury yields and TIPS yields, as illustrated in Exhibit 6?

Equation (3a) expressed the Fisher equation in its common form $T = T_R + BEI$, but Equation (6a) made the more-complete statement that $T = T_R + BEI + RP_T - RP_R$. This rearranges to:

(10) $BEI = T - T_R + RP_R - RP_T$

Breakeven inflation (BEI) **Exhibit 6**



Source: Natixis Financial Products

Since treasuries go on special while TIPS rarely do, it is easily seen that $RP_R > RP_T$, and that therefore BEI calculated using (3a) will understate TIPS' BEI for the investor who could lend his securities as collateral. In Exhibit 6, this manifests itself in a lower treasury curve than would otherwise be the case.

We can estimate the amount by which BEI is understated for any given tenor by noting that, relative to the theoretical curves that would exist if all securities repoed at G/C, the treasury yield curve will be lower by SW* and TIPS by SW_R* (the latter is not illustrated in Exhibit 6). SW* is simply the difference between a treasury asset swap and the GC/Libor swap spread; SW_R* will be the difference between a TIPS asset swap and the GC/Libor swap spread. As an example, Exhibit 7 shows TIPS and nominal treasuries of 5y and 10y tenors (approximately), as of May 7, 2008. Notice that the TIPS asset swap quotes are essentially the same as the Fed Funds/Libor basis swap levels[6]. This implies that the market sees virtually no chance of specialness for these issues while the specialness option in both the 5y and 10y

TIPS and nominal treasuries of 5y and 10y tenors, as of May 7, 2008 **Exhibit 7**

	Asset swap	FF/Libor Basis swap
Tsy 4.250% – 15/08/13	L-73	33.5 bp
TIPS 15/07/13	L-34	33.5 bp
Tsy 3.5% – 15/02/18	L-60	26.5 bp
TIPS 15/01/18	L-27	26.5 bp

SW*	SW_R*
29.5 bp	0.5 bp
33.5 bp	0.5 bp

Source: Natixis Financial Products, Tullett Prebon

US CPI swaps, from May 7, 2008	Exhibit 8
Five-year BEI[7]:	2.341%
Five-year CPI swaps:	2.730%
10-year BEI[7]:	2.386%
10-year CPI swaps:	2.780%

Source: Tradeweb, Natixis Financial Products

tenors for nominal treasuries costs 29.5bps per annum in the 5y and 33.5bps per annum in the 10y. That is, treasuries trade 'rich' to a general-collateral-financing world by some 29bps-33bps (for these two issues), while TIPS do not.

This implies that the 5y BEI understates 'expected inflation' by some 29bps, while the 10y BEI understates 'expected inflation' by some 33bps. Interestingly, this means that instead of overstating inflation expectations, as the market has long believed, US CPI swaps probably more accurately represent the fair market estimate of breakeven inflation (see Exhibit 8).

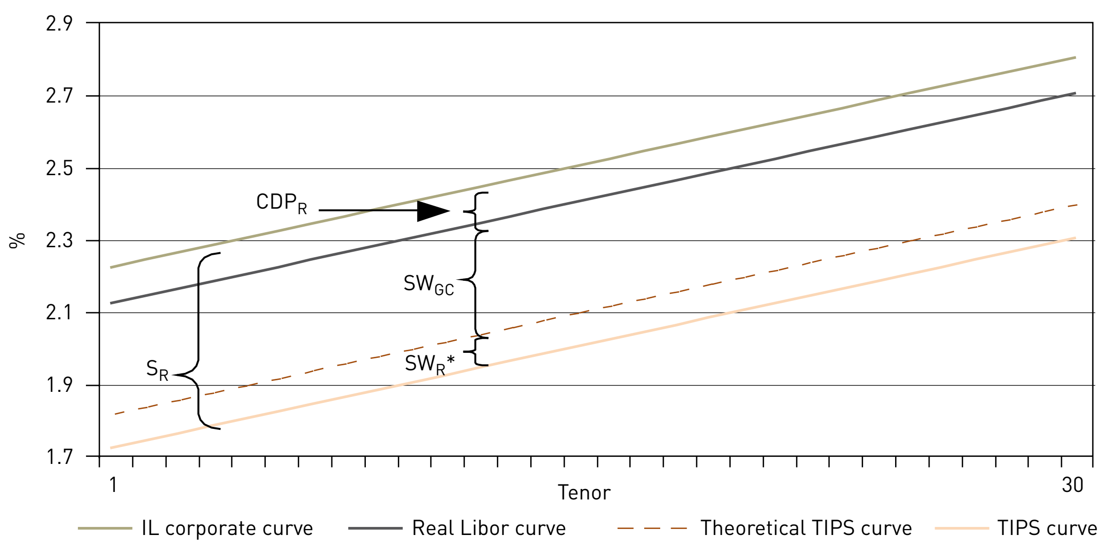
A cheaper risk-free investment

As noted earlier, a long-only investor who gains no benefit from specialness in repo is surrendering S-S*, also known as SW*, but gains nothing for that increment. Such an investor could create a cheaper risk-free instrument by buying TIPS and doing an asset swap of TIPS flows for fixed-rate flows (on a fully collateralised basis, this is still credit-risk free). This investor should expect to gain $SW^*-SW_R^*$ before bid/offer. Unfortunately, many investors who cannot utilise the repo markets are also prevented from utilising swaps; these investors should at least seek SW* minimisation as an additional portfolio construction constraint.

The relative value of corporate linkers

Exhibit 5 can be easily adapted to the inflation-linked bond world using our notation (see Exhibit 9).

Modelling inflation-linked corporate bond spreads **Exhibit 9**



Source: Natixis Financial Products

I have argued (culminating in Equation (9)) that S should be greater than S_R, but restating the point using the proposed framework:

(11) $S = SW^* + SW_{GC} + CDP$ (see Exhibit 5)

and

(12) $S_R = SW_R^* + SW_{GC} + CDP_R$ (see Exhibit 9)

I've already observed that SW_{GC} at any time is a function of tenor and not structure. If it is also the case that a company's idiosyncratic yield premium does not vary substantially from issue to issue of the same tenor and seniority in the capital structure, then the remaining terms of Equations (11) and (12) may be compared:

(13) $S - S_R = SW^* - SW_R^*$

In other words, the difference in the spread of corporate TIPS-style linkers (compared to TIPS) and the spread of nominal corporate bonds (compared to treasuries) should differ by the difference in the specialness premium if the spread-of-spreads is to be fair. So, using the five-year example from Insight 1, if a credit's five-year debt trades at T+100, its TIPS-style linker debt is fairly priced at around TIPS+71.

Conclusion

The inflation-linked corporate bond market has had a disappointing few years. Institutional investors profess to want an incremental yield along with inflation protection, but perceive corporate linker spreads as too tight.

Spreads of inflation-linked corporate bonds over TIPS are indeed considerably lower than spreads of nominal corporate bonds over treasuries. However, this is because the reference treasury bond curve is lower (richer) than it should be in theory. This is a consequence of the fact that the owner of a treasury bond possesses a financing advantage stemming from their tendency to trade special in the repo market. TIPS, conversely, rarely trade special. As a result, corporate linker spreads look tighter, because they are quoted as spreads above a cheaper curve.

The richness of treasuries compared with Libor-based instruments can be usefully characterised as the price of an average-price option on the spread (during a bond's entire remaining life) of treasuries' realised funding under general collateral repo rates. This means that, in principle, we can evaluate by how much BEI rates in bonds are understated due to the specialness of treasuries and whether corporate linker spreads are cheap, rich, or roughly fair. Presently, it seems as if corporate linker spreads are in the neighbourhood of fair value and in any event much less expensive than it appears at first blush.

The model also sheds light on some possible catalysts for future convergence in these spreads. Among the most likely is the possibility that TIPS bonds may begin to trade special with more frequency as this market matures.

When that happens, spreads of corporate linkers will widen, but not because existing deals are cheapening. Spreads will converge with spreads in the nominal market because TIPS richen, causing TIPS yields to decline relative to corporate linker deals.

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Notes:

1. Technically the Fisher Equation says $(1+T) = (1+T_R)(1+E(i))(1+P)$ so that the equality shown in equation (3) is not precisely correct. However, it is close enough that the market tends to use the version that is easier to calculate in one's head, and we will employ the simpler version since we are driving at the qualitative intuition rather than at the precise quantitative result.
2. It can be shown that using the full Fisher expansion results in

$$S_R = \frac{S}{1+BEI}$$

but this is a very small discrepancy when inflation rates are low.

Again, in this chapter we are aiming for intuition rather than analytical precision, but the reader should know that similar conclusions obtain from using the longer-winded approach.

3. A very high percentage of the net present value of these swaps is collateralised, and maturity payments are netted so that only a tiny fraction of the notional amount is at risk in a vanilla Libor swap between collateralised counterparties operating under an ISDA Master Swap Agreement and a Collateral Support Annex (and a high proportion of swap volumes fall into this category). These transactions are at least AAA in quality, and the market treats them so (judging from the sheer volume of outstanding transactions).
4. Also, the biggest risk in SW_{GC}, that is the shape of the curve between overnight rates and 3m Libor rates, can be hedged in the market; basis swaps on Fed Funds vs. Libor are tradeable for reasonably long tenors.
5. For a discussion of the differences between corporate floating-rate inflation-linked bonds (CIPS) and TIPS-style bonds, see "iApples and iOranges: Comparing CIPS with TIPS," unfinished working paper, available at http://everyonesillusion.wetpaint.com/page/Inflation+Linked+Research
6. There is no basis swap for G/C vs. Libor, but G/C typically trades a few basis points under Fed Funds. While this changes SW* and SW_R* (lower, because the basis swap would be higher), the spread between the two will be unaffected of course.
7. Remember that BEI here incorporates the premium for variance in inflation outcomes around E(i), so BEI as a measure of expected inflation is slightly overstated. This works in the opposite direction of the specialness effect, but is likely to be quite small. The structure of the bond 'breakeven,' too, is path-dependent since there are multiple cash flows while the swap structure is a single cash flow and so a pure breakeven. This means the two structures are not precisely comparable, but nevertheless the swaps market in this case seems to be closer to the mark.

The opinions expressed in this article are those of the Inflation Derivatives Desk of Natixis Capital Markets and may differ from the opinions expressed by other departments of Natixis Capital Markets