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Credit Strategy
**Credit Derivatives
Strategy**

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Efficient Hedging of Bond Portfolios: CDS Indices vs. TRS

The trade-offs in hedging with CDS indices and TRS

This note addresses the following frequent question from our clients: "*Is it better to hedge my bond portfolio with imperfectly-matching but more liquid CDS indices or with less liquid TRS that closely match my benchmark? Do you have an analysis of the trade-offs?*"

Unsurprisingly, neither of the alternative hedging instruments strictly dominates the other and so it very much depends on the portfolio manager's preferences between the basis risk and transaction costs. This report analyses the magnitude of the relevant trade-offs, taking into account the time-varying nature of relative hedging costs.

We are happy to continue the conversation beyond this note, so please reach out if you have any feedback or questions.

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Introduction

The spoiler of this report is that there is no definitive answer to the CDS index vs. TRS question. However, in order for a portfolio manager to make the right choice based on their individual preferences, a detailed analysis of relative hedging efficiency is instrumental. Following a large number of questions we have received from clients on this topic, this report aims to provide more transparency around the issue.

The costs of entering and exiting a TRS position are greater than the same round-trip in CDS indices but note the same could be said about the underlying cash bond portfolio. **CDS indices are naturally the most liquid instrument in credit and a clear winner in terms of transaction costs. The key consideration for hedging is the trade-off between those costs and basis risk.** While there is also some basis between the TRS-linked iBoxx Liquid sub-indices and the bond index the portfolio manager is actually benchmarked against,¹ that basis will typically be significantly smaller. Nonetheless, to capture that potential basis as well, we also present our analysis for broader bond portfolios than the relevant TRS-linked indices.

While we offer our conclusions from this exercise, the report is constructed so that the reader can form their own views by reviewing the relevant analytical pages.

Outline

The next section summarises some of our observations and conclusions, which are by no means definitive or exhaustive.

After that, on p. 4-6, we provide:

- An overview of historical spreads for the relevant bond & CDS indices
- A clarification of some frequent misinterpretations of TRS bid/offer quotes
- A set of notes about the methodology of our hedging performance analysis

Then we compare the historical performance of CDS index & TRS hedges of the following bond portfolios:

- EUR IG (p. 7)
- EUR HY (p. 8) & EUR Liquid HY (p. 11)
- USD IG (p. 9) & USD Liquid IG (p. 12)
- USD HY (p. 10) & USD Liquid HY (p. 13)

The charts and analytics written within them should provide a solid foundation for assessing the suitability of the alternative hedging decisions.

¹ E.g. broader iBoxx indices or indices from other providers such as ICE BofAML or Bloomberg Barclays.



Conclusion

While the basis/cost trade-off is a matter of preferences, overall it is difficult not to note that **in many cases CDS indices seem to have been very poor hedges of relevant bond portfolios:**

1. The distribution of portfolio returns hedged by CDS indices tends to be wider than one might normally expect (top and middle right charts on p. 7-13). This is presented both visually in the charts and also summarised by a single metric capturing the mean error of the hedges ("RMSE" as explained in the methodology later).
2. Note that the "fat tails" of those distributions indicate meaningful risks of the hedges being massively off. The frequency of periods in which the hedges actually worked in the "wrong direction" certainly seems quite high (dots in the 1st & 3rd quadrants in the bottom right charts on p. 7-13).

On those metrics, one seems to get what one pays for in terms of hedging quality.

On the other hand, there are some other considerations to bear in mind:

1. **Some CDS indices have historically performed better as hedges than others.** For instance, the IG CDS indices (Main on p. 7, CDX IG on p. 9 & 12) seem to have done better than their HY counterparts (Crossover on p. 8 & 11, CDX HY on p. 10 & 13) in hedging their respective bond universes.
2. We consider fixed 3m periods in our performance analysis. **The option to extend those periods as and when needed comes at a cost of rolling the TRS contract.** That might, for instance, increase the transaction costs from 0.5% to 1% while there would be no extra bid/offer to pay on not closing the CDS index position until later. To that end, we have presented 0% and 1% alternatives to the baseline assumption of 0.5% discount of the TRS bid quote relative to the index level. This is to show the sensitivity of relevant TRS-hedged portfolio return distributions to alternative transaction costs which may also vary across market environments.
3. CDS indices allow higher-frequency entries and exits, enabling the investor to be more nimble. That can offer **valuable optionality**. Our simplified fixed-period comparisons may not tell the full story.
4. There may be **room for informed tactical basis trading incorporated into the hedging decision** given that liquid CDS indices tend to overshoot and undershoot over time, with some mean-reversion taking place eventually. In particular, entering CDS hedges when the CDS-bond basis is historically tight is likely to result in a greater conditional hedging efficiency than the one presented in our unconditional analysis. (For example, CDS indices were more efficient hedges before the [ECB QE/CSPP widened the CDS-bond basis](#) while they are likely to be less efficient as the ECB tapers and the basis likely tightens in the process.)

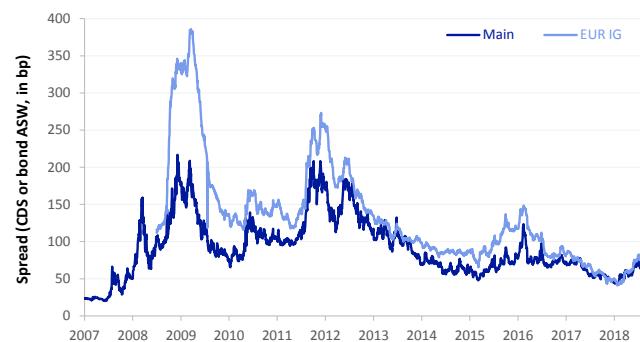


Historical spreads: cash bond vs. CDS indices

The below charts summarise historical spreads of relevant cash bond indices and CDS indices. **With the exception of EUR IG, TRS trade on liquid sub-indices of the respective broad iBoxx indices.** We show both the broad and the liquid version in such cases.

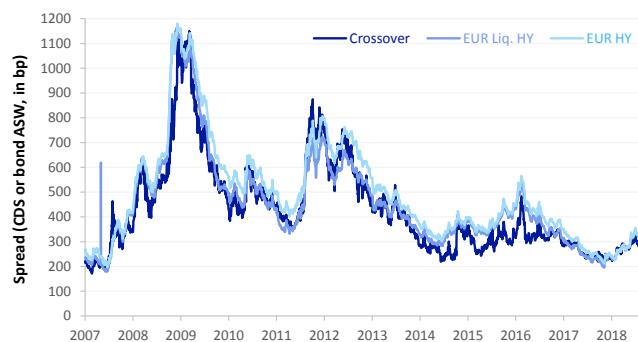
Note that for some indices, the iBoxx index provider Markit has calculated only limited histories of some analytics. Therefore, even if total returns for those indices are available for longer periods and we later use them for the analysis of hedging performance, some bond asset swap spread series in the below charts are shorter.

Figure 1: EUR IG: CDS vs. cash bond indices



Source: Deutsche Bank, Markit, Bloomberg Finance LP

Figure 2: EUR HY: CDS vs. cash bond indices



Source: Deutsche Bank, Markit, Bloomberg Finance LP

Figure 3: USD IG: CDS vs. cash bond indices



Source: Deutsche Bank, Markit, Bloomberg Finance LP

Figure 4: USD HY: CDS vs. cash bond indices



Source: Deutsche Bank, Markit, Bloomberg Finance LP

Some misunderstanding about TRS transaction costs

In conversations with clients, we have often come across some confusion about the TRS bid/offer. This is our take on the most frequently raised points:

- **Question:** The TRS quote is 223/224 and a 1pt bid/offer seems quite a lot. Shouldn't it be tighter than for the underlying bonds?

Answer: The index level is not a bond price and only its percentage change (total return) matters for the TRS performance. The quote 223/224 implies a bid/offer of 0.45%.



- Question: Even so, one might expect TRS bid/offer spreads to be narrower relative to bonds, esp. for longer expiries. For instance, the bid/offer implied by a recent 3m TRS quote 224.7/225.1 was 0.18% which looks OK but the 12m quote 222.9/224.1 implied 0.54%. For an index with average duration close to 5.5, the latter implies roughly a 10bp bid/offer in yield terms. Isn't it too much for a macro credit product?

Answer: Bond and TRS bid/offers are not directly comparable.

1) If held to expiry, the TRS contract settles at the index level and so there are no additional "exit costs" relative to the index which some might perceive as the "effective mid". (Unless one chooses to roll to later expiries but even then dealers will quote roll costs more attractive than crossing the bid/offer of the standalone old and new contracts.) In contrast, to get out of a bond position one needs to sell at bid or buy at offer rather than mid, which some see as paying half of the bid/offer at entry and the other half at exit. Thus, unlike bonds, the *TRS transaction costs are paid all upfront*.

2) While funding long bond positions is generally straightforward, it is difficult or outright impossible to short some corporate bonds. Where it is possible, no term repo is available and one needs to roll positions overnight with uncertainty about future repo rates in the rest of the relevant period. Some bonds can go special or become simply impossible to short. This asymmetry (and risk to be hedged or absorbed by the dealer) naturally widens the bid/offer as time to expiry lengthens.² It also creates a "skew" by pushing the "mid" below the index level, meaning that TRS tend to trade at a discount. The bid/offer and discount merely crystallise the difficulty of shorting the underlying bond portfolio and also the balance sheet costs of the bond position.

3) At times, strong hedging flows can deepen the TRS discount, making shorting at those levels less attractive. The flip side for investors is that dealers try to recycle the hedging flows, with their axes offering an attractive opportunity to go long via TRS to outperform the benchmark.

TRS transaction costs are obviously greater than those of CDS indices. But we hope that the above helps clarify some confusing optics of TRS quotes for those not familiar with the product and that it puts to rest some misconceptions about TRS trading costs relative to bonds.

Methodology and analysis of hedging performance

- We use total returns on the relevant iBoxx indices³ as the **mark-to-market on the bond portfolio to be hedged** over a 3-month period.
- For **CDS index hedges**, we use Markit's short total return indices. Since these are effectively total returns on a floating-rate credit-linked note (CLN), we add total returns on an interest rate swap overlay to obtain total returns on a 5y fixed-coupon CLN shorting the relevant CDS index. The CDS indices roll semi-annually and the roll costs are taken into account. Further, we assume spread bid-offers that result in the

² If all the transaction costs captured by the TRS bid/offer and discount were converted to an annualised running spread over the funding rate, they would tend to be relatively stable across expiry dates even if the all-in upfront increases with time to expiry for reasons explained above.

³ These include both financials and non-financials. We use shorthand references to be concise and consistent across indices even if the full official names may be slightly different. For instance, "iBoxx EUR IG" really refers to the "Markit iBoxx EUR Corporates" benchmark index.



following combined costs of entering and exiting the hedging position: 0.04% of notional for iTraxx Main & CDX IG and 0.16% of notional for iTraxx Crossover & CDX HY. Likewise, we assume that the round-trip on the interest rate swap trades costs 0.03% of notional. In practice, the transaction costs are lower in calm markets and can be higher in a more volatile environment but the potential changes would have only a very minor impact on our results.

- For **TRS hedges**, we calculate corresponding total returns on short index positions over the relevant period. The underlying iBoxx bond indices roll monthly and roll costs are taken into account. We enter the short TRS position at a bid and assume to hold until the 3m expiry when the trade is settled at the index level. Our base assumption is that TRS trade at a discount of 0.5% to index level on the bid side, i.e. it costs about 0.5pp in performance over the 3-month period to put the TRS hedge on. For sensitivity analysis, we also present distributions and analytics for the alternative discount assumptions of 0% and 1%.
- **Caveat:** Markit's short CDS total return indices are rebalanced daily to maintain constant leverage. For instance, we use 1x levered indices in which the CDS index position is rebalanced at the end of each day so that the next day starts with the notional equal to the value of the "fund". Thus, if the combined daily return on the short CDS index position (due to spread moves and/or defaults) and on the cash collateral position (earning EONIA) is positive, more protection is bought. If it is negative, some protection is sold. Over our 3m hedging periods, this introduces some distortions which would be negligible in a normal environment but notable in periods with large price swings. We have constructed short TRS total return indices with the same assumption of daily rebalancing in order to preserve comparability. As will be apparent in some charts, in both cases some distortions have necessarily been introduced. For instance, even a short TRS position linked to exactly the same index being hedged still did not provide exactly the opposite return during the financial crisis as some charts show. However, since the distortions affect both types of hedges, our conclusions should be unaffected.
- If there is too much of a **duration mismatch** between indices, we scale the relevant hedge notentials up or down as noted at the top of each page.
- In addition to the mean and standard deviation of hedged returns shown in the distribution charts, we also provide the **root mean square error (RMSE) of the hedges**. This is simply the square root of the average squared deviation of hedged returns from zero, which is a single measure taking into account both the performance variability (st. dev.) and bias (mean) of the hedges.
- For hedging AT1 portfolios, for which no corresponding CDS index is available and so we do not include them here, see our primer [AT1 Total Return Swaps: A New Addition to the Macro Credit Toolbox](#).

Each of the following pages provides an analysis of the hedging performance of CDS indices and TRS for a given type of bond portfolio.



EUR IG hedged with EUR IG TRS & iTraxx Main

- Bond portfolio to hedge: **iBoxx EUR IG** (notional 100)
- TRS-linked bond index: **iBoxx EUR IG** (notional 100)
- CDS index: **iTraxx Main 5y** & IRS: EUR 5y (notionals 100)

Figure 5: Bonds vs. TRS & CDS hedges since 2007...

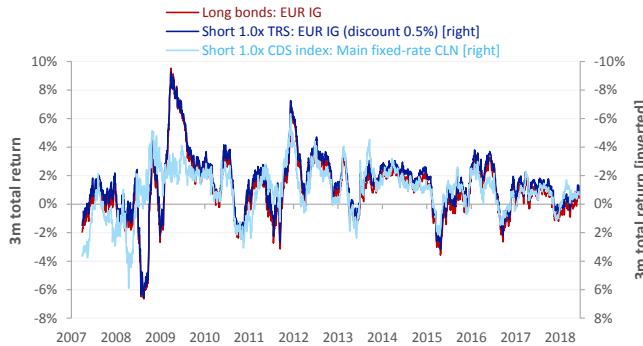


Figure 6: ...and the distribution of hedged returns

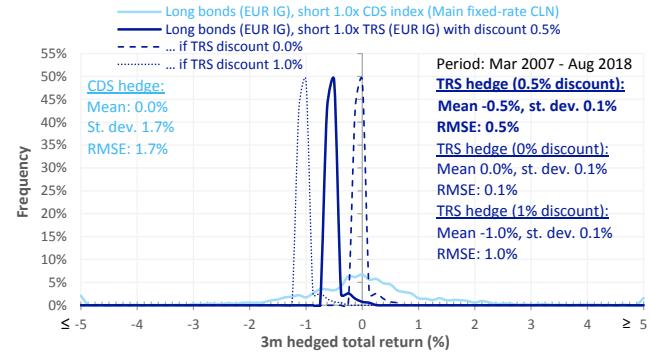


Figure 7: Bonds vs. TRS & CDS hedges since 2013...

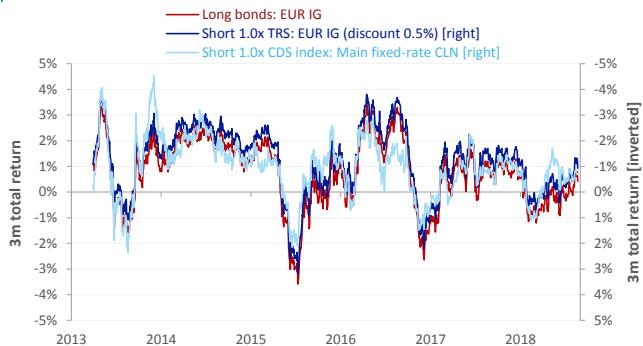


Figure 8: ...and the distribution of hedged returns

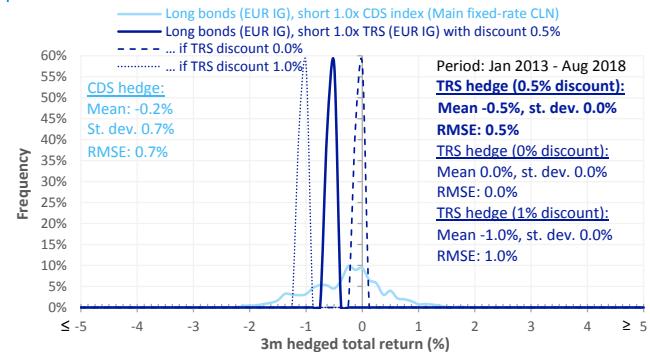


Figure 9: Total returns on bonds vs. TRS hedge

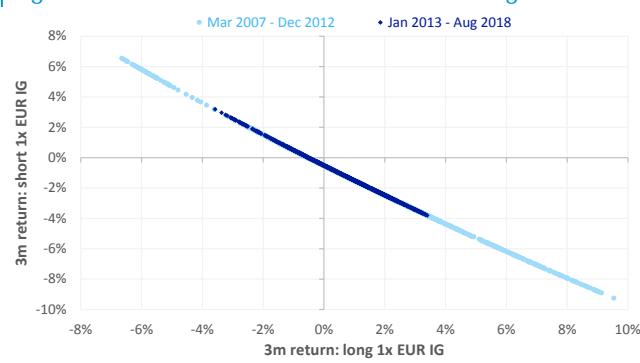
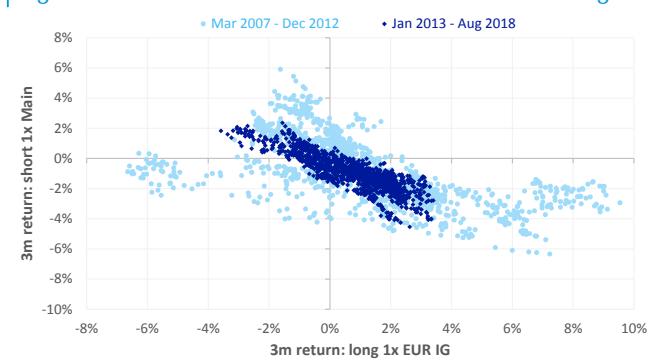


Figure 10: Total returns on bonds vs. CDS index hedge



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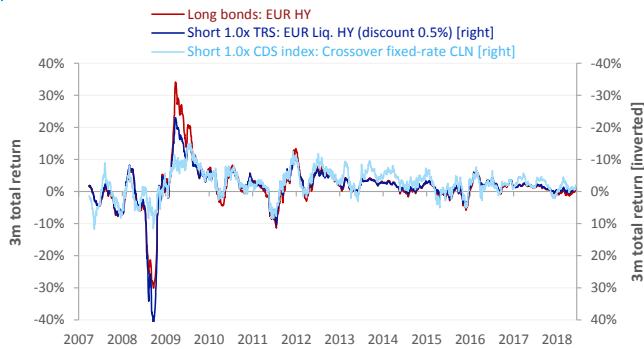
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EUR HY hedged with EUR Liq. HY TRS & iTraxx Crossover

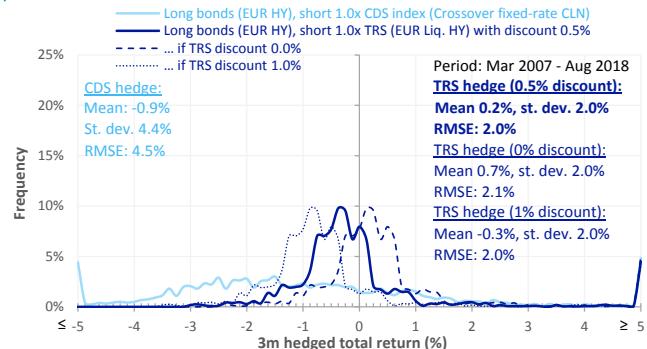
- Bond portfolio to hedge: **iBoxx EUR HY** (notional 100)
- TRS-linked bond index: **iBoxx EUR Liquid HY** (notional 100)
- CDS index: **iTraxx Crossover 5y** & IRS: EUR 5y (notionals 100)

Figure 11: Bonds vs. TRS & CDS hedges since 2007...



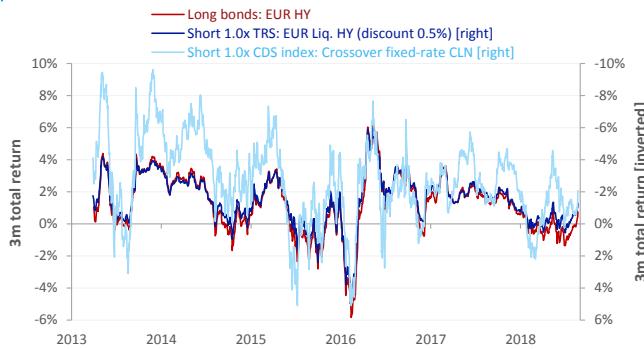
Source: Deutsche Bank, Markit, Bloomberg Finance LP

Figure 12: ...and the distribution of hedged returns



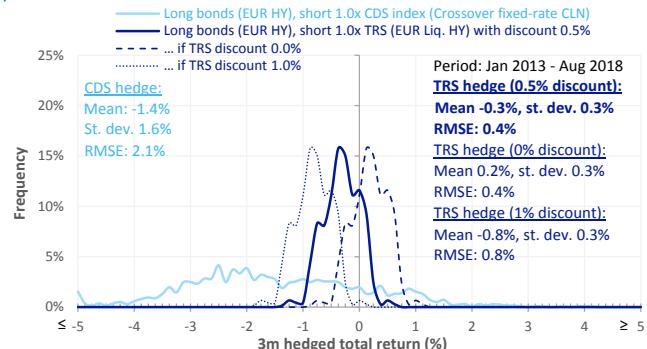
Source: Deutsche Bank, Markit, Bloomberg Finance LP

Figure 13: Bonds vs. TRS & CDS hedges since 2013...



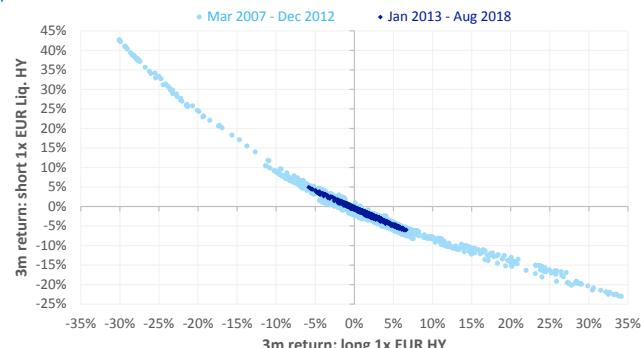
Source: Deutsche Bank, Markit, Bloomberg Finance LP

Figure 14: ...and the distribution of hedged returns



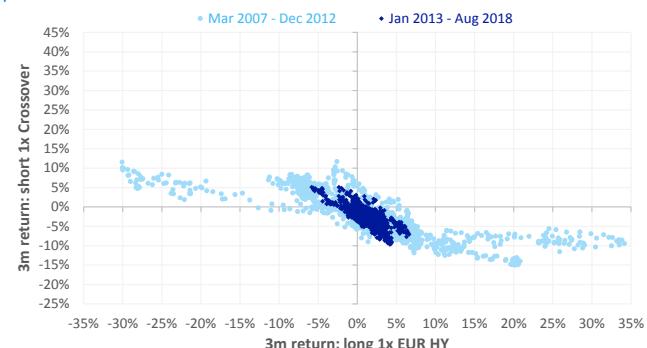
Source: Deutsche Bank, Markit, Bloomberg Finance LP

Figure 15: Total returns on bonds vs. TRS hedge



Source: Deutsche Bank, Markit, Bloomberg Finance LP

Figure 16: Total returns on bonds vs. CDS index hedge



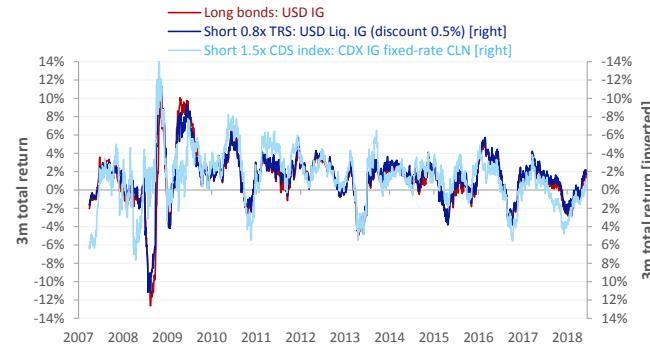
Source: Deutsche Bank, Markit, Bloomberg Finance LP



USD IG hedged with USD Liq. IG TRS & CDX IG

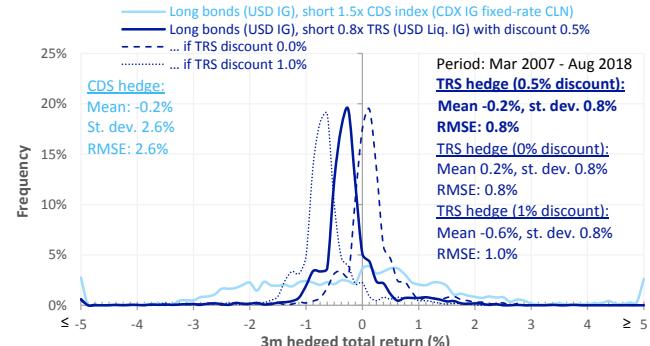
- Bond portfolio to hedge: **iBoxx USD IG** (notional 100)
- TRS-linked bond index: **iBoxx USD Liquid IG** (notional 80)
- CDS index: **CDX IG 5y** & IRS: USD 5y (notionals 150)

Figure 17: Bonds vs. TRS & CDS hedges since 2007...



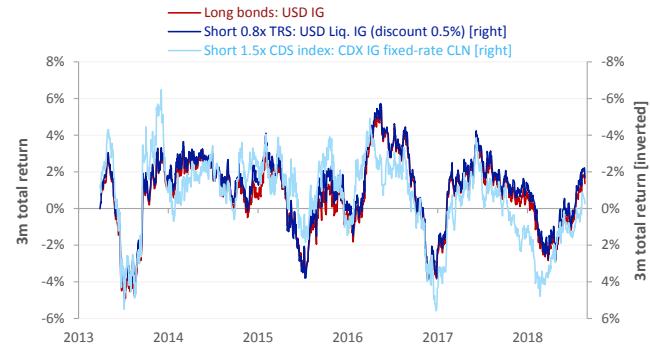
Source: Deutsche Bank, Markit, Bloomberg Finance LP

Figure 18: ...and the distribution of hedged returns



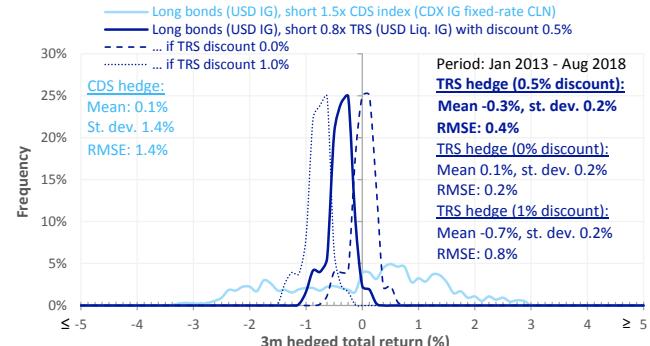
Source: Deutsche Bank, Markit, Bloomberg Finance LP

Figure 19: Bonds vs. TRS & CDS hedges since 2013...



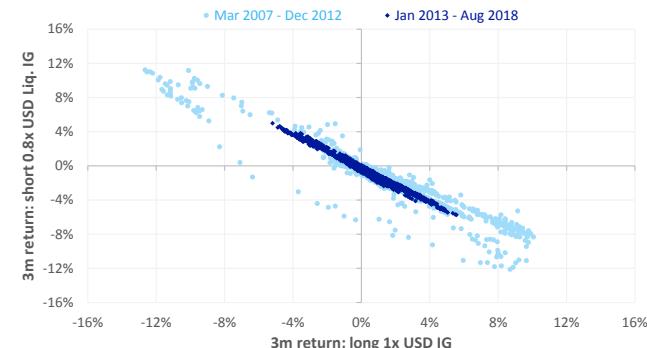
Source: Deutsche Bank, Markit, Bloomberg Finance LP

Figure 20: ...and the distribution of hedged returns



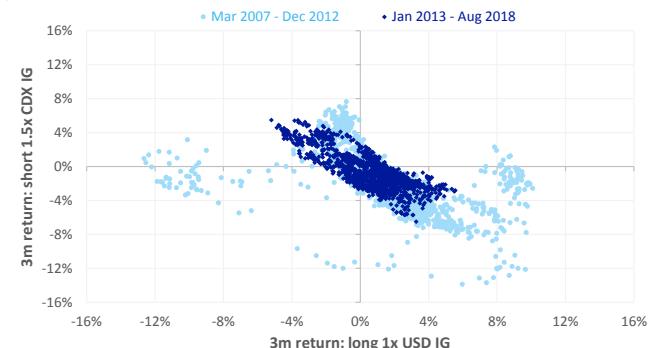
Source: Deutsche Bank, Markit, Bloomberg Finance LP

Figure 21: Total returns on bonds vs. TRS hedge



Source: Deutsche Bank, Markit, Bloomberg Finance LP

Figure 22: Total returns on bonds vs. CDS index hedge



Source: Deutsche Bank, Markit, Bloomberg Finance LP



USD HY hedged with USD Liq. HY TRS & CDX HY

- Bond portfolio to hedge: **iBoxx USD HY** (notional 100)
- TRS-linked bond index: **iBoxx USD Liquid HY** (notional 100)
- CDS index: **CDX HY 5y** & IRS: USD 5y (notionals 100)

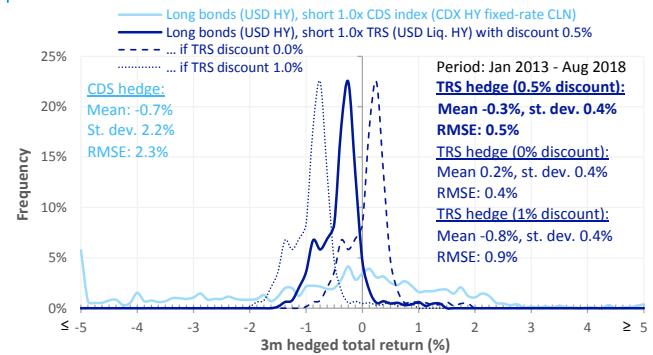
Note that the broad iBoxx USD HY index only starts in 2013. However, later we repeat the same exercise for iBoxx USD *Liquid* HY going all the way back to 2007 just like for the other indices.

Figure 23: Bonds vs. TRS & CDS hedges since 2013...



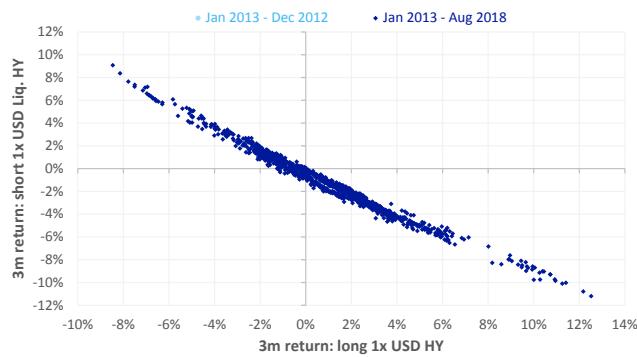
Source: Deutsche Bank, Markit, Bloomberg Finance LP

Figure 24: ...and the distribution of hedged returns



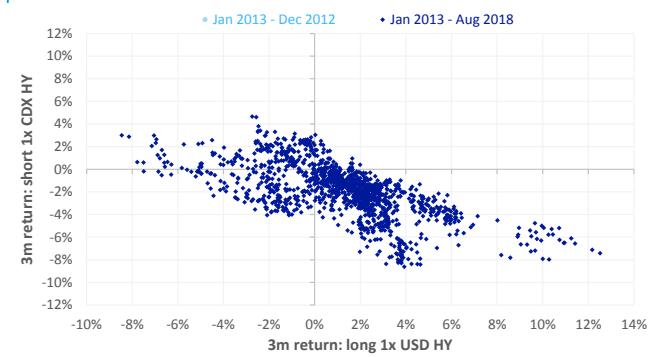
Source: Deutsche Bank, Markit, Bloomberg Finance LP

Figure 25: Total returns on bonds vs. TRS hedge



Source: Deutsche Bank, Markit, Bloomberg Finance LP

Figure 26: Total returns on bonds vs. CDS index hedge



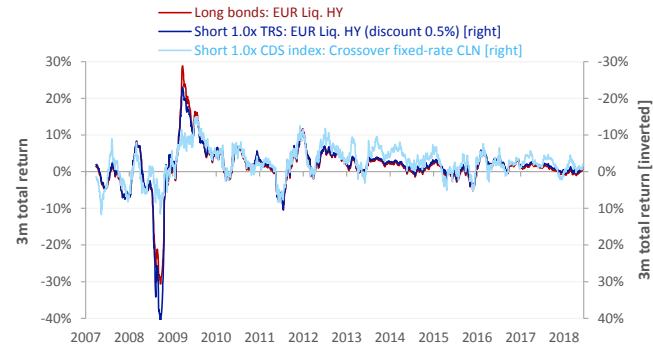
Source: Deutsche Bank, Markit, Bloomberg Finance LP



EUR Liq. HY hedged with EUR Liq. HY TRS & iTraxx Xover

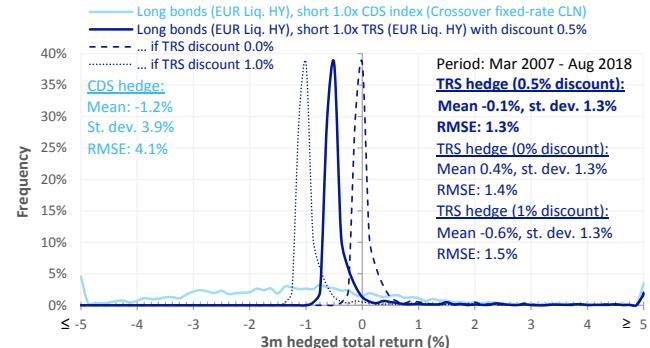
- Bond portfolio to hedge: **iBoxx EUR Liquid HY** (notional 100)
- TRS-linked bond index: **iBoxx EUR Liquid HY** (notional 100)
- CDS index: **iTraxx Crossover 5y** & IRS: EUR 5y (notionals 100)

Figure 27: Bonds vs. TRS & CDS hedges since 2007...



Source: Deutsche Bank, Markit, Bloomberg Finance LP

Figure 28: ...and the distribution of hedged returns



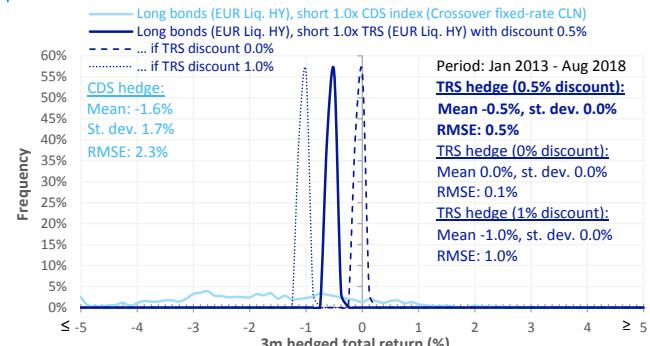
Source: Deutsche Bank, Markit, Bloomberg Finance LP

Figure 29: Bonds vs. TRS & CDS hedges since 2013...



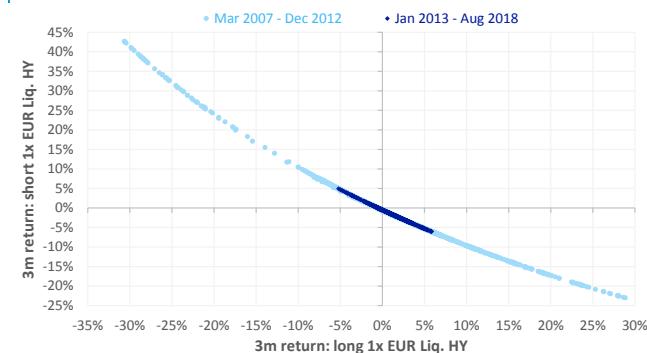
Source: Deutsche Bank, Markit, Bloomberg Finance LP

Figure 30: ...and the distribution of hedged returns



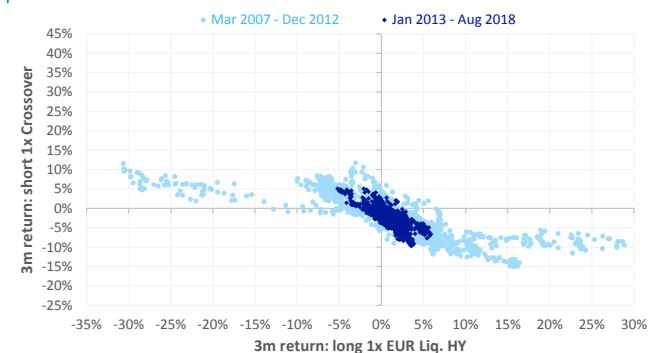
Source: Deutsche Bank, Markit, Bloomberg Finance LP

Figure 31: Total returns on bonds vs. TRS hedge



Source: Deutsche Bank, Markit, Bloomberg Finance LP

Figure 32: Total returns on bonds vs. CDS index hedge



Source: Deutsche Bank, Markit, Bloomberg Finance LP

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USD Liq. IG hedged with USD Liq. IG TRS & CDX IG

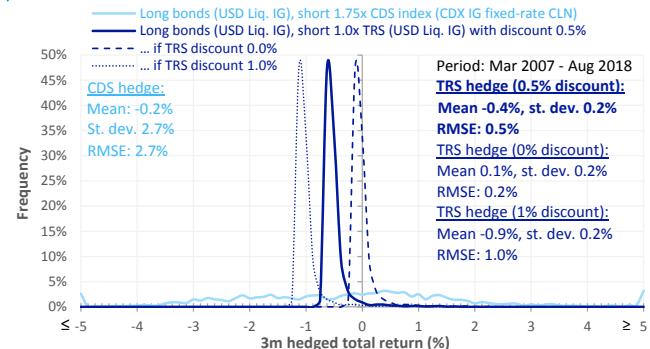
- Bond portfolio to hedge: **iBoxx USD Liquid IG** (notional 100)
- TRS-linked bond index: **iBoxx USD Liquid IG** (notional 100)
- CDS index: **CDX IG 5y** & IRS: USD 5y (notionals 175)

Figure 33: Bonds vs. TRS & CDS hedges since 2007...



Source: Deutsche Bank, Markit, Bloomberg Finance LP

Figure 34: ...and the distribution of hedged returns



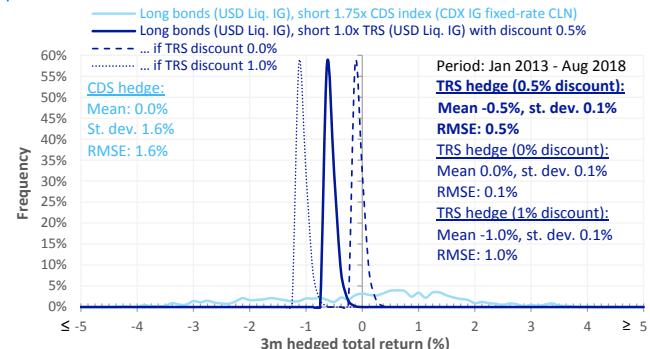
Source: Deutsche Bank, Markit, Bloomberg Finance LP

Figure 35: Bonds vs. TRS & CDS hedges since 2013...



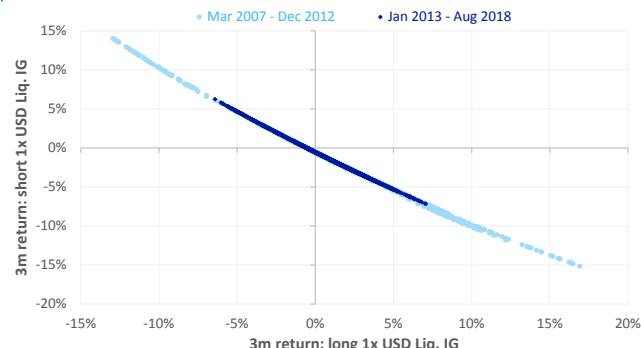
Source: Deutsche Bank, Markit, Bloomberg Finance LP

Figure 36: ...and the distribution of hedged returns



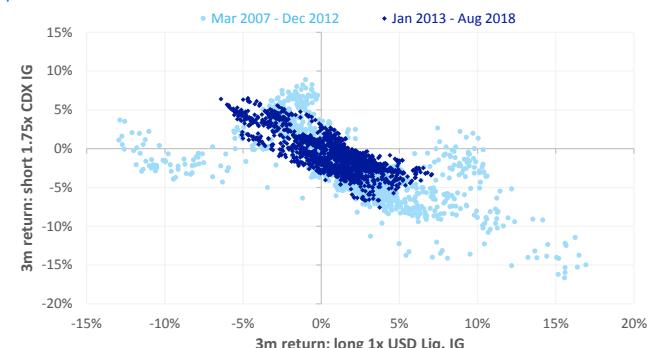
Source: Deutsche Bank, Markit, Bloomberg Finance LP

Figure 37: Total returns on bonds vs. TRS hedge



Source: Deutsche Bank, Markit, Bloomberg Finance LP

Figure 38: Total returns on bonds vs. CDS index hedge



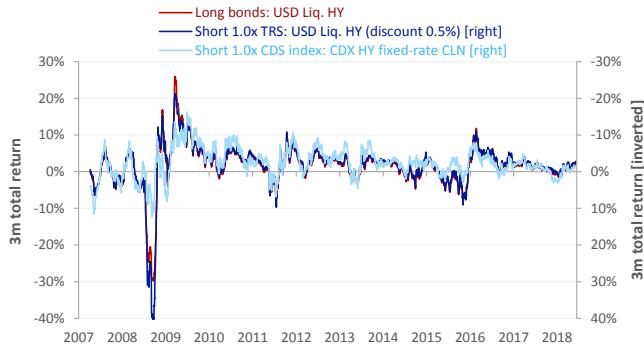
Source: Deutsche Bank, Markit, Bloomberg Finance LP



USD Liq. HY hedged with USD Liq. HY TRS & CDX HY

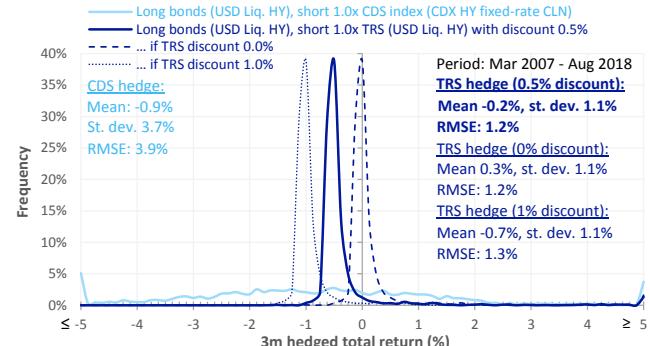
- Bond portfolio to hedge: **iBoxx USD Liquid HY** (notional 100)
- TRS-linked bond index: **iBoxx USD Liquid HY** (notional 100)
- CDS index: **CDX HY 5y** & IRS: USD 5y (notionals 100)

Figure 39: Bonds vs. TRS & CDS hedges since 2007...



Source: Deutsche Bank, Markit, Bloomberg Finance LP

Figure 40: ...and the distribution of hedged returns



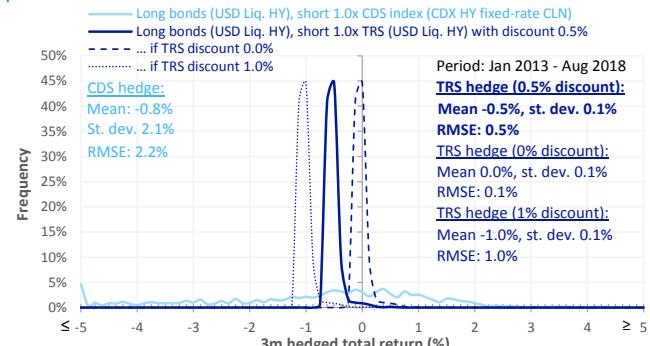
Source: Deutsche Bank, Markit, Bloomberg Finance LP

Figure 41: Bonds vs. TRS & CDS hedges since 2013...



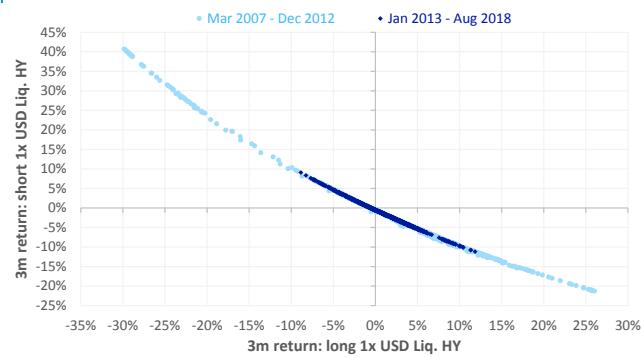
Source: Deutsche Bank, Markit, Bloomberg Finance LP

Figure 42: ...and the distribution of hedged returns



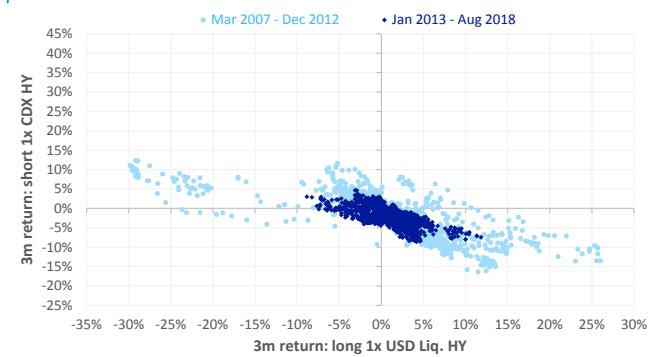
Source: Deutsche Bank, Markit, Bloomberg Finance LP

Figure 43: Total returns on bonds vs. TRS hedge



Source: Deutsche Bank, Markit, Bloomberg Finance LP

Figure 44: Total returns on bonds vs. CDS index hedge



Source: Deutsche Bank, Markit, Bloomberg Finance LP



Appendix 1

Important Disclosures

*Other information available upon request

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