Obtaining Euro Credit Beta

- We explore ways to replicate the Barclays Capital Euro IG Credit Index, and introduce E-TCX as the newest member of our family of highly liquid cash credit index replicating portfolios.
- Synthetic replication in the form of a Euro Credit RBI® basket swap is a good solution for investors seeking sustained credit beta exposure and who are less sensitive to tracking error volatility. However, the pattern of RBI monthly tracking errors makes the RBI less appealing for short-term tactical exposure to credit markets.
- There are no Exchanged-Traded Funds (ETFs) that track the Euro IG Credit Index and just one that tracks the Euro IG Corporate Index (IEAC). Although IEAC has done a reasonably good job of tracking the Euro IG Corporate Index (15.8bp of TEV over the last 21 months), it has, thus far, lacked sufficient volume to support institutional trading. Even the highest-volume ETFs that track other Euro corporate benchmarks do not have adequate volume at this time to reliably support institutional trades.
- E-TCX is a cash portfolio of 48 highly liquid bonds designed to match the excess returns of the Euro IG Credit Index. Liquid bonds are identified by their Liquidity Cost Scores (LCS)™, an objective measure of bond-level liquidity. E-TCX's composition is rebalanced and published monthly.
- We construct the E-TCX using a transparent stratified sampling approach that follows a set of rules, has good issuer diversification (the E-TCX averages approximately 42 different issuers each month), and closely matches the sector and DTS characteristics of the Euro IG Credit Index.
- From June through December 2010, E-TCX experienced an average excess return difference versus the Euro IG Credit Index of -2.5bp per month with tracking error volatility of 24.3bp per month. While LCS history for Pan-European credit bonds only goes back to May 31, 2010, we evaluate the E-TCX construction methodology going back to February 2007 using proxy LCS values from a regression model. Over the 47-month period from February 2007 to December 2010, the E-TCX tracked the excess returns of Index with a mean of -0.3bp per month and TEV of 35.0bp per month.
- To help develop a market in tradable cash Euro credit beta products (long or short), we introduce the EUR Corporate TCX, a 40-bond portfolio, rebalanced quarterly, with additional constituent requirements with respect to amount outstanding and trading volume. The EUR Corporate TCX might serve as the basis for a total return swap that has good tracking to the Euro IG Corporate Index.

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Executive Summary

Investors often seek short-term exposure to the Euro IG Credit index in a form that is easy to trade, both long and short. To do so, investors have a range of choices: index swaps, RBIs, ETFs, and cash replication. First, while total return index swaps on the Euro IG Credit Index guarantee the index's total return, they are often unavailable. An alternative is for investors to synthetically replicate the index using a Euro Credit RBI basket of liquid derivatives. While the RBI produces reasonable long-term tracking at a low cost, the volatile CDS-cash basis may generate large and perverse monthly tracking errors. For example, over the past 47 months, the Euro Credit RBI has experienced excess return TEV of 103.8bp versus the Euro IG Credit Index. In addition, the correlation of the RBI and Credit Index excess returns was just 0.64, as there were months with the RBI having positive excess returns while the Credit Index was experiencing negative excess returns, and vice versa. Given this short-term tracking error volatility, investors using synthetic replication as a source of credit beta in expectation of short-term spread tightening or widening may be disappointed.

Exchange-traded funds are another beta alternative for this index. However, they currently have insufficient liquidity to support institutional-size transactions. Finally, while cash replication of the index usually has better tracking properties, it can be time-consuming and difficult as it is hard to discern which bonds are liquid and, once identified, how to combine them into a portfolio to track the index.

Last year, we announced "tradable credit portfolios", or "TCX" which are small baskets of liquid bonds designed to offer investors an easy way to obtain short-term exposure to an underlying USD credit index[1]. Now, with the release of LCS for Pan-European Credit bonds[2], we are introducing **E-TCX**, a small cash basket of liquid credit bonds constructed to track the Euro IG Credit Index. We use LCS to identify objectively the liquid universe of cash bonds from which to construct the E-TCX using a transparent rules-based portfolio construction methodology (stratified sampling).

We present and analyze the E-TCX portfolio characteristics and realized performance over the past seven months (June to December 2010), and compare it with that of the Euro IG Credit Index. In terms of excess returns (versus Treasuries), the E-TCX has a monthly tracking error volatility of 24.3bp relative to the Euro IG Credit Index, with an average excess return difference of -2.5bp per month.

While LCS history for Pan-European credit bonds goes back only to May 31, 2010, we evaluate the E-TCX back to February 2007 using estimated LCS values from a regression model. Over the 47-month period from February 2007 to December 2010, the E-TCX tracked the excess returns of Index with a mean of -0.3bp per month and TEV of 35.0bp.

E-TCX is updated and published monthly in ***LCS Report***, a publication available on Barclays Capital Live.

We show how a similar methodology can be used to create a 30-bond proxy (S-TCX) for tracking the Sterling IG Credit Index. Combining the TCX, E-TCX and S-TCX into a Global TCX portfolio can be an effective way to track the Global IG Credit Index.

[1] See *Tradable Credit Portfolio (TCX) to Track the USD IG Credit Index*, Barclays Capital, 20 April 2010 and *Long Tradable Credit Portfolio (LTCX) to Track the USD IG Long Credit Index*, Barclays Capital, 2 June 2010
[2] See *Liquidity Cost Scores (LCS) for Pan-European Credit Bonds*, Barclays Capital, 24 September 2010

In an effort to help develop a market for tradable cash Euro credit beta products, we introduce the **EUR Corporate TCX**, a 40-bond cash replicating index portfolio, rebalanced quarterly, with additional constituent requirements with respect to amount outstanding and trading volume. (We introduced the **USD Corporate TCX** late last year.) The EUR Corporate TCX might serve as the basis for a total return swap (either funded or unfunded, long or short) for investors looking for short-term Euro IG Corporate Index beta.

Alternatives for Obtaining Euro IG Credit Index Beta

For investors seeking to replicate the Barclays Capital Euro IG Credit Index, there are various alternatives to consider. A straight-forward way to earn the return of the Euro IG Credit Index would be to enter into a **Total Return Index Swap** (funded or unfunded, receiver or payer) with a broker/dealer. In exchange for a funding cost and spread, the receiver is guaranteed the return of the benchmark. The RBI investor assumes the counterparty risk of the broker/dealer which can be mitigated with collateral management. Unfortunately, total return swaps are often unavailable on credit/corporate benchmarks.

Another approach to replicating the index is synthetic replication in the form of a **Replicating Bond Index (RBI®) Swap** (funded or unfunded, receiver or payer). A client can enter into a Euro Credit RBI swap to receive (or pay) the total return on the RBI basket and pay (or receive) Libor plus a spread. The underlying RBI basket contains a combination of six par interest rate swap indices to match the KRD profile of the Euro IG Credit Index and an iTraxx-Europe 5y swap to match the Index's Libor spread duration.[3] An advantage of a Euro Credit RBI swap is that the underlying components of the RBI basket are very liquid instruments, enabling quick and efficient execution. However, it is important to note that the RBI basket total return does not necessarily equal the index total return. Consequently, unlike an index total return swap, investors using an RBI swap for Credit Index beta bear any tracking error risk between the RBI and Index returns.

Tracking errors for the Euro Credit RBI are susceptible to movements in the particularly volatile CDS-cash basis. Figure 1 shows how the RBI tracked the Index during the recent credit crisis, both during market's decline (September to October 2008), as well as its recovery (April to October 2009).

Figure 1: Monthly Total Returns, Euro IG Credit Index and Euro Credit RBI, (bp)

	Euro IG Credit Index Total Return	Euro Credit RBI Total Return	RBI – Index Tracking Error
Decline			
Sep 2008	-366.5	-9.6	356.9
Oct 2008	-224.4	135.9	360.3
Recovery			
Apr 2009	258.1	160.0	-98.0
May 2009	194.0	58.0	-136.0
Jun 2009	197.9	73.8	-124.1
Jul 2009	318.5	191.4	-127.1
Aug 2009	112.9	24.4	-88.5
Sep 2009	144.0	71.7	-72.3
Oct 2009	76.5	-1.3	-77.8

Note: All returns are gross of any transactions cost. Source: Barclays Capital

[3] See *Replicating Bond Index Baskets (RBI®s): Performance, Risks and Alternative RBI Baskets*, Barclays Capital, 7 October 2009.

However, to the extent that the CDS-cash basis has tended to mean revert over time, the RBI has shown good long-term tracking potential. Since 2004, the Euro Credit RBI has a monthly tracking error to the Index of 5.9bp with a TEV of 79.3bp. In addition, while the Euro Credit RBI is susceptible to the volatility of the CDS-cash basis, it avoids some of the idiosyncratic name selection risk inherent with any small cash proxy.

Exchange Traded Funds (ETFs) are another way for investors to gain credit beta. While there are currently no ETFs which track the Barclays Capital Euro IG Credit Index, we can evaluate ETFs more generally by looking at IEAC, an iShares ETF designed to track the Barclays Capital Euro IG *Corporate* Index. Figure 2 displays IEAC's realized tracking performance from April 2009 through December 2010. Over the past 21 months, IEAC has tracked the Euro IG Corporate Index with a mean tracking error of -7.7bp/month and TEV of 15.8bp.[4] Figure 2 also displays average daily volume for the ETF in 2010. While the ETF tracked the index reasonably well over the period, an average volume of €4.0mn suggests that institutional investors have been unable or unwilling to use this ETF to gain exposure to the Euro IG Corporate Index.

Figure 2: Monthly Tracking Error and Average Daily Volume, IEAC and IBCX

ETF	Benchmark Index	Tracking Error[5] (Apr '09 – Dec '10)	TEV	2010 Average Daily Volume[6] (€,mn)
IEAC	Barclays Capital Euro Corporate	-7.7bp	15.8bp	4.0
IBCX	iBoxx Euro Liquid Corporate	-1.1bp	35.4bp	14.5

Source: Barclays Capital

While IEAC is the only ETF to track the Barclays Capital Euro IG Corporate Index, investors may also consider ETFs designed to track other corporate benchmarks. To the extent that the alternative benchmark tracks the Barclays Capital index and the ETF has significantly more trading volume than IEAC, this may prove to be a satisfactory approach for institutional investors. To that end, we evaluated the performance of IBCX, an iShares ETF designed to track the iBoxx Euro Liquid Corporate Index. The results for IBCX are shown in Figure 2. To be sure, IBCX tracked its benchmark quite well over the past 21 months with mean monthly tracking error of -1.1bp and TEV of 35.4bp. It also had daily trading volume of €14.5mn, more than 3.5 times as much as IEAC. In fact, the iShares ETF to track this iBoxx index has the most daily volume of any Euro-denominated corporate ETF. However, even daily volume of €14.5mn is insufficient to support institutional investing. Moreover, the iBoxx Euro Liquid Corporate Index containing 40 liquid corporate bonds does a very poor job of tracking the Barclays Capital Euro IG Corporate Index of more than 1,000 bonds. Over the past 21 months, the iBoxx index has underperformed the Barclays Capital Index by 26.4bp/month. As such, even with IBCX tracking *its* benchmark quite well, it fared much worse when used to track the Barclays Capital index.[7]

ETFs are still relatively new in fixed-income markets. Over time, daily volume may increase to the point of being able to support institutional trading. At this time, however, ETFs do not

[4] Tracking numbers reflect the market returns of the ETF rather than the NAV returns.
[5] Both ETFs trade on various exchanges. Results represent tracking of the specified ticker on the London Stock Exchange.
[6] Average Daily Volume is calculated by summing volume data from the various exchanges on which the ETF trades. Reported exchange volume numbers include trades arising from new shares issued or existing shares cancelled by the ETF provider.
[7] IBCX ***underperformed*** the Barclays Capital Euro IG Corporate Index by 27.5bp per month with TEV of 58.2bp. Its average tracking error to the Euro IG Credit Index was -20.5bp per month with TEV of 54.1bp.

seem to be a viable option for institutional clients looking to replicate a Barclays Capital benchmark.

A final credit beta alternative is to replicate the index with **cash bonds**. However, cash replication can be a challenge. Aside from the task of constructing a portfolio that will actually track the benchmark, investors using cash replication need to ensure that the bonds in their replicating portfolio are liquid. The purpose of this report is to suggest and back-test a cash replication methodology that investors can readily turn to when they need credit beta exposure.

LCS Overview

In October 2009, Barclays Capital introduced Liquidity Cost Score (LCS)™ for US credit bonds (IG and HY). A bond's LCS measures the cost (in bp) of immediately executing a round-trip transaction for a standard institutional trade. In September 2010, we extended the LCS methodology to Pan-European credit bonds (IG, HY and FRNs) with history dating back to May 2010. LCS values are updated monthly and are available in POINT®.

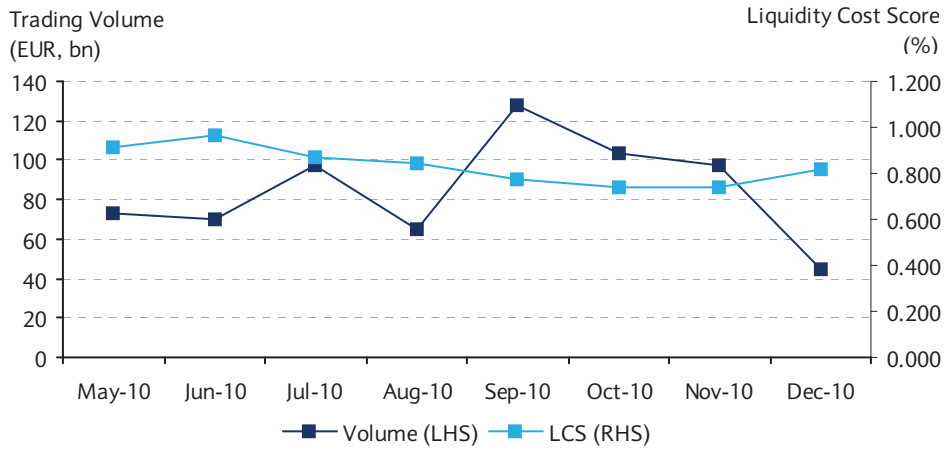
The LCS model uses bid-ask quotes supplied by traders to compute a bond's LCS:

LCS = (Trader Ask price – Trader Bid price) / Trader Bid price

The LCS model recognizes that some trader quotes are "live" whereas others are "indicative only". Trader-supplied bid-ask quotes for benchmark (i.e., actively quoted, high volume or on-the-run) bonds are taken as is. For *non-benchmark* bonds, trader quotes are considered "indication-only" type quotes, which we adjust wider to make the resulting LCS values more reflective of the real cost of trading the bond. Our Pan-European LCS model benefits from bond-level trading volume data we receive from xtrakter, a subsidiary of Euroclear, a major clearer of Pan-European credit bond trades.

Xtrakter volume data are also used in computing LCS for those bonds for which we do not have trader quotes. For these non-quoted bonds, we use a regression model to compute LCS, in which one of the independent variables is the bond's volume. Figure 3 shows monthly LCS and aggregate volume for the Euro IG Credit Index since May 31, 2010. For more information about Pan-European LCS, please consult the Pan-Euro LCS publication.

Figure 3: Average Liquidity Cost Score and Aggregate Trading Volume for the Euro IG Credit Index, by month, May 31, 2010 –December 31, 2010



Source: Barclays Capital

Euro Tradable Credit Portfolio (E-TCX)

We use LCS to ***objectively*** identify liquid bonds to build a replicating portfolio for the Euro IG Credit Index. We previously demonstrated this for the US Credit Index (TCX) and Long Credit Index (LTCX). We update the TCX and LTCX holdings and historical performance on a monthly basis, which are published in our monthly *LCS Report* available on Barclays Capital Live (keyword: QPSPUBS). Figure 4 shows the historical tracking performance of the TCX and LTCX since 31 January 2007.

Figure 4: Monthly Excess Returns (to Treasuries) of the TCX and LTCX, February 2007 – December 2010 (bp)

	TCX – US Credit Index ExRet	LTCX – US Long Credit Index ExRet
Entire Period		
Mean	-3.9	0.7
Stdev	82.5	49.1
Max	219.8	118.6
Min	-443.5	-156.7
Feb 07- Dec 08		
Mean	-8.6	0.2
Stdev	111.6	37.1
Max	219.8	91.4
Min	-443.5	-102.2
Jan 09- Dec 10		
Mean	0.6	1.1
Stdev	40.6	59.1
Max	117.5	118.6
Min	-77.2	-156.7

Source: Barclays Capital

Constructing the E-TCX Portfolio

We construct the E-TCX to track the *excess returns* of the Euro IG Credit Index[8]. To do so, we follow the same general stratified sampling approach as for the TCX and LTCX. First, we divide the Euro IG Credit Index into **six** sectors (financial senior Aaa/Aa, financial senior A/Baa, financial subordinated, cyclical/non-cyclical/capital goods/basic industry, utility/industrial, non-corporate) and **four** duration buckets (0-2.5, 2.5-4, 4-6, 6+). For each of the resulting 24 buckets, we identify the top 20% most liquid ("top LCS quintile") index bonds according to their LCS rank. To ensure a sufficient number of eligible bonds, we augment this set of liquid bonds with the top LCS quintile of bonds by duration category. This combined set of bonds forms the "eligible" universe of bonds for the E-TCX. We then use stratified sampling to select eligible bonds to match the contribution to DTS (spread duration-times-spread), as well as the market value percentage, of the Euro IG Credit Index for each of the 24 sector-duration buckets.[9]

We match, as closely as possible, the contribution to DTS for each of the sector-duration buckets. Since this sector contribution to DTS matching does not ensure that the E-TCX exactly matches the overall OAD or key rate duration (KRD) profile of the Index, there may be a mismatch in OAD between the E-TCX and the Index. As we will discuss, for investors looking to match duration as well, there may be a need for a duration adjustment elsewhere in the portfolio or a Treasury futures overlay.

E-TCX Construction Rules

The E-TCX is designed to be transparent and replicable. The E-TCX construction methodology follows a set of rules:

- E-TCX contains 48 bonds (two bonds from each of the 24 sector-duration buckets).
- Each bond must be part of the E-TCX eligible universe (i.e., a member of Euro IG Credit Index and top LCS quintile in given sector-duration bucket) at the beginning of the month. E-TCX excludes securities with embedded options (callables/putables)[10], as well as zero-coupon bonds. E-TCX also excludes the 5% of bonds within each sector-duration bucket with the highest OAS to Libor. The composition of the Euro IG Credit Index and LCS values are available from POINT®.
- For each sector-duration bucket, we calculate a mean DTS ("DTS_{avg}"). We then calculate a mean DTS for all bonds in the Index belonging to the bucket with a DTS greater than DTS_{avg} and for all bonds with a DTS less than DTS_{avg}. We label these "higher" and "lower" bucket means, DTS_{hi} and DTS_{lo}, respectively. We then select two eligible bonds, one closest to DTS_{hi} and the other closest to DTS_{lo}, and weight them to match the DTS_{avg} and market value percentage of the bucket.[11]
- Maximum market value limit per issuer (ticker) at beginning of the month is 5%.
- Minimum market value limit per bond at beginning of the month is 0.5%.

[8] Excess returns for Euro-denominated bonds are computed using a blended curve constructed with Treasuries from Germany, France and the Netherlands..
[9] We could use POINT's Global Risk Model and optimizer to construct the E-TCX, but we prefer a more transparent stratified sampling approach. We discuss this in more detail below.
[10] Fixed-to-float bonds are typically callable when they become floating but are index-eligible only during their fixed-rate period. These bonds *are* eligible for the E-TCX.
[11] If all eligible bonds in a given bucket are above or below DTS_{avg}, we select the two eligible bonds closest to DTS_{avg}. The bond farther from DTS_{avg} is assigned 50bp and the bond closer to DTS_{avg} is assigned the remaining weight. If a bucket has less than two bonds in the eligible universe, bonds are selected from the next higher duration bucket for the respective sector. The E-TCX will still look to match DTS and market value percentage for the original bucket.

- Non-financial subordinated bonds are not eligible for inclusion.
- E-TCX contains no cash at the beginning of the month (interest payments received during the month do not earn reinvestment).
- E-TCX composition is held fixed for a calendar month. Any bond downgraded below investment grade remains in the E-TCX until the following month.
- We rebalance E-TCX as of the last business day of each month. To help minimize turnover, if a bond in the current E-TCX remains in the eligible universe, the bond will remain in the new month's E-TCX (provided the other E-TCX construction constraints are satisfied), although its market value weight may change.

Figure 5 presents the composition of the E-TCX as of December 31, 2010. As measured by LCS, the E-TCX has a liquidity score 55% better (i.e., lower) than the Index (0.36 versus 0.82).

As with the TCX and LTCX, we select bonds for the E-TCX based entirely on their risk and liquidity characteristics, not on any relative value considerations or trading desk recommendations. However, investors using the E-TCX to build a fully-funded bond portfolio can make substitutions reflecting their views.

Figure 5: Current E-TCX Portfolio Composition (Rebalanced as of December 31, 2010)

Identifier	Ticker	Description	Coupon	Mat Date	MV%	LCS
FR0010814434	ACAFP	CREDIT AGRICOLE SA	7.88	10/26/2019	1.26	1.00
XS0425811865	AEGON	AEGON NV	7.00	4/29/2012	3.88	0.17
XS0177448015	AVLN	AVIVA PLC	5.25	10/2/2013	0.50	1.01
XS0260057285	AXASA	AXA SA	5.78	7/6/2016	1.97	1.12
XS0323119973	BAC	BANK OF AMERICA CORP	5.13	9/26/2014	3.48	0.49
XS0445843526	BACR	BARCLAYS BANK PLC	4.88	8/13/2019	1.94	0.55
XS0495946310	BACR	BARCLAYS BANK PLC	3.50	3/18/2015	2.92	0.31
XS0415007789	BMW	BMW AG	6.13	4/2/2012	4.06	0.11
XS0275937471	BMY	BRISTOL-MYERS SQUIBB CO	4.38	11/15/2016	2.20	0.33
XS0542371629	BNP	BNP PARIBAS	2.63	9/16/2016	1.09	0.27
XS0443469316	C	CITIGROUP INC	7.38	9/4/2019	0.80	0.62
XS0409247524	CCDJ	CAISSE CENTRALE JARDINS	5.38	1/23/2014	1.18	0.30
FR0010850719	COFP	CASINO GUICHARD	4.38	2/8/2017	2.48	0.33
FR0010893396	COFP	CASINO GUICHARD	4.48	11/12/2018	2.03	0.27
XS0229097034	CS	CREDIT SUISSE FIRST BOSTON	3.63	9/14/2015	1.70	0.97
XS0426739354	DANGAS	DONG A/S	4.88	5/7/2014	3.23	0.41
XS0559434351	DLNA	DELTA LLOYD NV	4.25	11/17/2017	0.50	0.51
DE000A0TWHZ4	DT	DEUTSCHE TELEKOM AG	5.75	1/10/2014	3.28	0.21
XS0272359489	EIB	EUROPEAN INVESTMENT BANK	3.88	10/15/2016	2.41	0.46
XS0417871554	EIB	EUROPEAN INVESTMENT BANK	2.50	4/15/2012	1.96	0.32
XS0365301620	EIBKOR	EXPORT-IMPORT BANK OF KOREA	5.75	5/22/2013	0.84	0.26
XS0256996538	ELEPOR	ELECTRICIDADE DE PORTUGAL	4.25	6/12/2012	2.54	0.19
ES0230960009	ENGSM	ENAGAS	4.38	7/6/2015	3.37	0.23
XS0479541699	GASSM	GAS NATURAL CAPITAL MARKETS	4.13	1/26/2018	1.81	0.39
XS0453908377	GE	GE CAPITAL CORP	5.38	1/23/2020	0.79	0.45
XS0491042353	GE	GE CAPITAL CORP	4.25	3/1/2017	3.39	0.34
XS0242988334	GS	GOLDMAN SACHS GROUP INC	3.75	2/4/2013	0.50	0.26

Identifier	Ticker	Description	Coupon	Mat Date	MV%	LCS
XS0494996043	GS	GOLDMAN SACHS GROUP INC	4.38	3/16/2017	1.93	0.54
XS0429114530	IBRD	WORLD BANK (IBRD)	3.88	5/20/2019	3.25	0.32
XS0301885603	JPM	J.P. MORGAN & CO INC	4.63	5/29/2012	1.35	0.17
XS0350487400	LLOYDS	LLOYDS TSB BANK PLC	5.63	3/5/2013	1.67	0.46
XS0469192388	LLOYDS	LLOYDS TSB BANK PLC	3.25	11/26/2012	2.11	0.19
XS0206170390	MEX	UNITED MEXICAN STATES	5.50	2/17/2020	3.11	0.33
XS0497185511	MRKGR	MERCK FIN SERVICES GMBH	3.38	3/24/2015	5.00	0.18
XS0497179035	NBHSS	NORDEA BANK	4.50	3/26/2020	1.54	0.99
XS0456477578	PEMEX	PETROLEOS MEXICANOS	5.50	1/9/2017	1.25	0.36
XS0538543389	RENAUL	RCI BANQUE SA	2.75	9/10/2012	1.93	0.17
XS0202649934	REPSM	REPSOL SA	4.63	10/8/2014	2.02	0.26
XS0147030554	RWE	RWE AG	6.13	10/26/2012	1.50	0.12
XS0456451771	SANFP	SANOFI-AVENTIS	4.13	10/11/2019	0.72	0.27
XS0454821462	SEB	SKANDINAVISKA ENSKILDA BANK	9.25	3/31/2015	1.83	0.92
XS0426682570	STANLN	STANDARD CHARTERED BANK	5.75	4/30/2014	2.63	0.31
XS0426626312	SWED	SWEDEN (KINGDOM OF)	3.13	5/7/2014	0.95	0.33
XS0496546853	TELECO	TELSTRA CORP LTD	4.25	3/23/2020	4.39	0.41
NL0006133175	TNTNA	TPG NV	5.38	11/14/2017	1.77	0.22
XS0526073290	UBS	UNION BANK OF SWITZERLAND	3.50	7/15/2015	1.18	0.36
XS0428037583	VW	VOLKSWAGEN	5.38	11/15/2013	1.32	0.23
XS0284082186	WSTP	WESTPAC BANKING CORP	4.25	1/25/2012	2.46	0.13
		E-TCX				**0.36**
		Euro IG Credit Index				**0.82**

Source: Barclays Capital

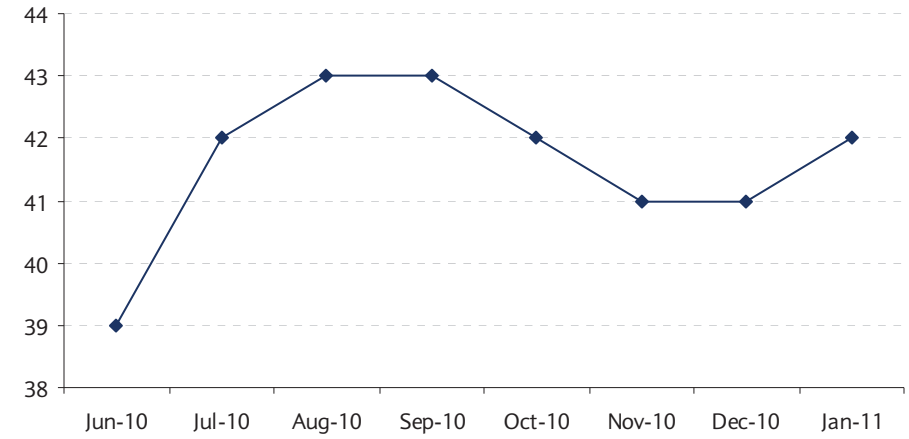
Properties of the E-TCX Portfolio

Number of Issuers

Since June 2010[12], the 48-bond E-TCX portfolio has contained approximately 42 different issuer names (Figure 6), compared with approximately 400 different names in the Euro IG Credit Index. Although any small proxy will have higher issuer concentration than the Index, the E-TCX forces diversification by imposing a maximum issuer market value constraint of 5% at the beginning of each month. Figure 6 shows that the number of issuers in the E-TCX has ranged from 39 to 43 over the past eight months.[13]

[12] We have Pan-Euro Credit LCS values back to May 31, 2010.
[13] To date, we have constructed 8 monthly E-TCX portfolios, although we only have full monthly returns for 7 of them. We have yet to calculate a monthly return for the Jan 2011 E-TCX constructed on December 31, 2010.

Figure 6: Number of Different Issuers in E-TCX, by month, May 31, 2010 – Dec 31, 2010

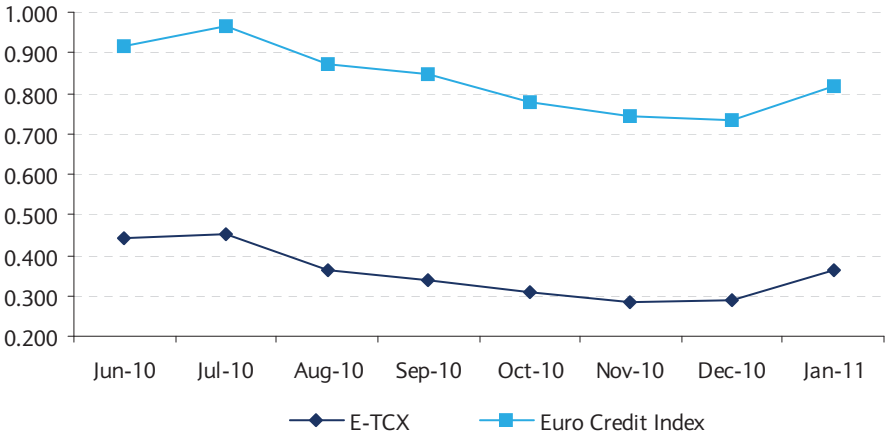


Source: Barclays Capital

Liquidity

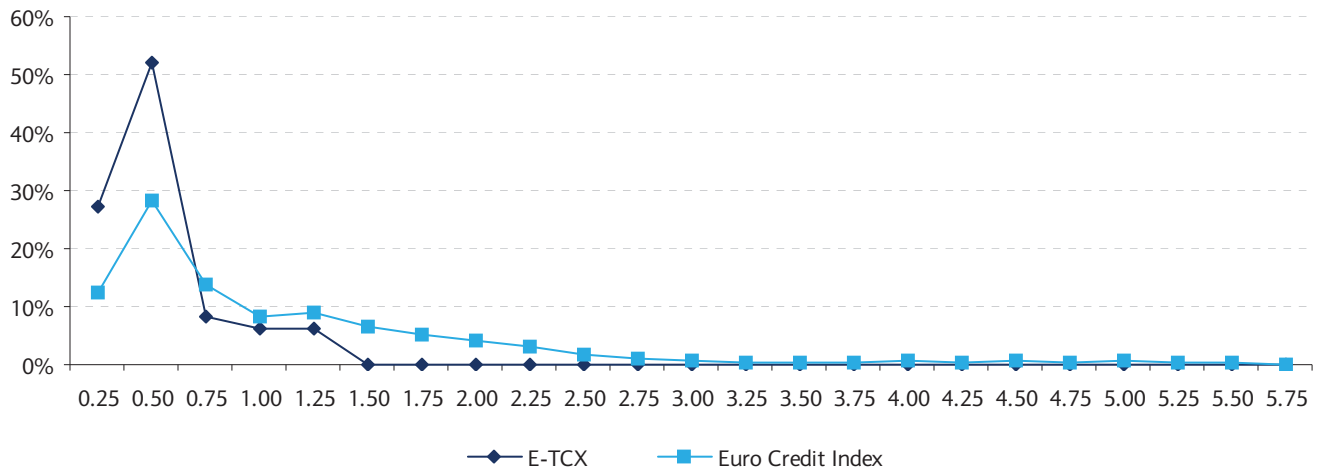
Because each bond in the E-TCX comes from the top LCS quintile (by sector-duration bucket), the E-TCX has a liquidity advantage versus the Index. Figure 7 shows how this advantage has varied over time. The average beginning-of-the-month LCS of the E-TCX has been approximately 58% lower than that of the Euro IG Credit Index. Furthermore, not only does the E-TCX have a better (*i.e.*, lower) average LCS, but also the cross-sectional distribution of its LCS scores is much tighter than that of the Index (Figure 8).

Figure 7: Average LCS, E-TCX, and Euro IG Credit Index, May31, 2010 –Dec 31, 2010 (%)



Source: Barclays Capital

Figure 8: Cross-Sectional LCS Distribution, E-TCX and Euro IG Credit Index, Dec 31, 2010 (%)



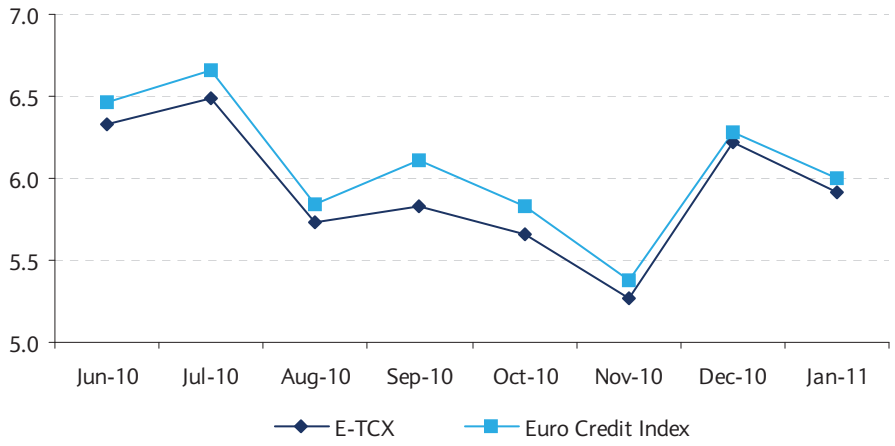
Source: Barclays Capital

Portfolios with better liquidity often trade at a yield concession to the market. E-TCX is no exception. Over this period, the E-TCX has traded, on average, at a 3bp lower yield than the Index.

DTS

By construction, the E-TCX closely matches the DTS of the Euro IG Credit Index. As credit investors typically focus on capturing the excess return of credit to Treasuries, as opposed to total return, it is preferable to match the index's spread change sensitivity (which we measure by DTS) rather than Treasury-duration sensitivity. In some months, an exact DTS match may not be possible if the set of liquid bonds in a sector-duration bucket do not have sufficient DTS range, or if the minimum and maximum issuer constraints prevent a perfect DTS match. Nevertheless, as shown in Figure 9, the DTS match for E-TCX and Euro IG Credit Index has been very close.

Figure 9: Monthly DTS, E-TCX and Euro IG Credit Index, May 31, 2010 – December 31, 2010

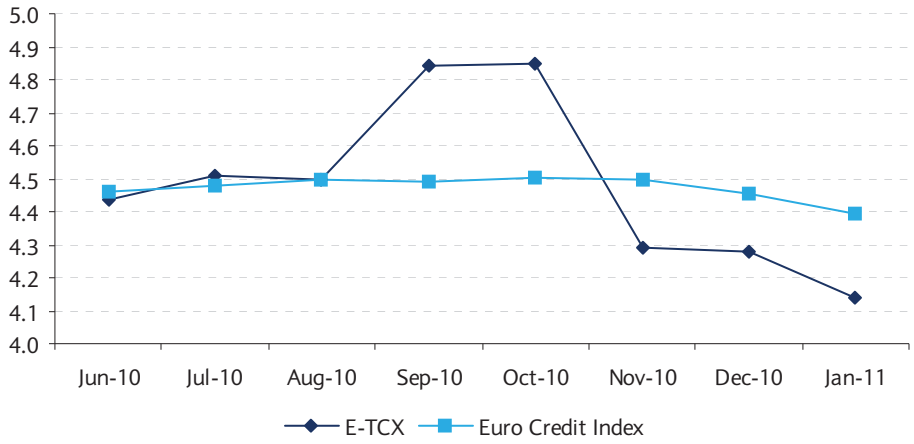


Source: Barclays Capital

OAD

Since the E-TCX does not explicitly match the OAD of the Index, there may be an OAD mismatch between the E-TCX and Euro IG Credit Index. The E-TCX will tend to have a slightly higher OAD than the Index, owing to the positive relationship between LCS and OAS (see the TCX paper for a discussion of this issue). Figure 10 shows the OADs of E-TCX and the Euro IG Credit Index.

Figure 10: Monthly OAD, E-TCX and Euro IG Credit Index, May 31, 2010 – Dec 31, 2010



Source: Barclays Capital

For investors needing an OAD match as well, a simple duration overlay can be used. For example, suppose the E-TCX matches the contribution to DTS of the Euro IG Credit Index but is long 0.10 in (Treasury) OAD terms. Managers investing €100mn in the E-TCX expect to earn the excess return of the Euro IG Credit Index on their investment. However, if the Treasury curve shifts, the total return on the E-TCX may differ from the Euro IG Credit Index from the OAD mismatch. If desired, the investors can compensate by either shortening/lengthening OAD elsewhere in their portfolio or executing a Treasury futures overlay to the E-TCX to match the Index's duration.[14]

E-TCX Performance vs. Euro IG Credit Index

For the US Credit and Long Credit Index TCX baskets, we were able to generate historical portfolios beginning in February 2007. However, LCS values for Pan-European bonds are only available since May 2010. To better evaluate the ability of a 48-bond portfolio constructed using the prescribed E-TCX methodology to track the Euro IG Credit Index, we extend the E-TCX back to February 2007 using estimated LCS prior to May 2010. We ran a regression of quoted LCS values since May 2010 on various bond attributes (DTS, amount outstanding and age of the individual securities). The estimated coefficients were all statistically significant with intuitive signs (positive for DTS and age, negative for amount outstanding). Using this simple regression model, we estimated LCS values for the constituents of the Euro IG Credit Index back to February 2007. Given that E-TCX methodology depends not on a bond's actual LCS value but on how its LCS compares with

[14] If there is interest, we may publish the weights for the Treasury overlay. As of December 31, 2010, the overlay weights for the 2y, 5y, and 10y contracts would have been 4.1%, -5.4%, and 5.4% of the target E-TCX exposure, respectively,

those of the other bonds in its sector-duration bucket, we consider these estimated LCS to be acceptable for the purposes of evaluating the E-TCX's ability to track the Index.

In the sections below, we discuss the historical performance of the E-TCX. For transparency, we differentiate between the E-TCX portfolios constructed using estimated LCS (February 2007 – May 2010) and those constructed using actual LCS.

Excess Returns

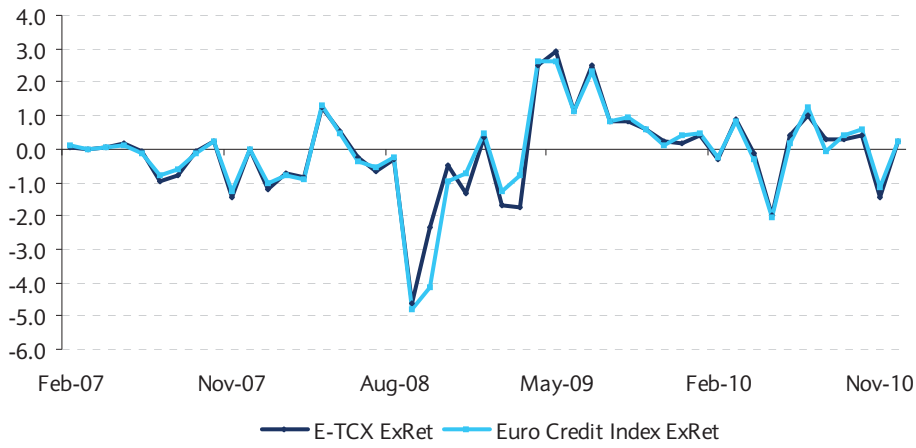
The objective of E-TCX is to match the monthly excess returns (to Treasuries) of the Euro IG Credit Index. Figure 11 compares the E-TCX and Index excess return performance since February 2007. For the 47-month period, the E-TCX excess returns tracked the Euro IG Credit Index excess returns with an average monthly tracking error of -0.3bp and tracking error volatility of 35.0bp. Figure 12 shows that in terms of monthly excess returns, the E-TCX and Index have tracked each other closely over this time. In the limited time period for which we have live LCS data, E-TCX excess returns have tracked index excess returns with a mean TE of -2.5bp and TEV of 24.3bp.

Figure 11: Monthly Excess Returns (to Treasuries) of the E-TCX and Euro IG Credit Index; February 2007 – December 2010 (bp)

	E-TCX Excess Returns	Euro IG Credit Index Excess Returns	E-TCX ExRet - Index ExRet
Entire Period			
Mean	-11.1	-10.8	-0.3
Stdev	128.9	134.2	35.0
Max	291.9	265.2	177.9
Min	-462.7	-482.0	-97.5
Feb '07 – May '10			
Mean	-16.0	-16.1	0.1
Stdev	136.1	142.3	36.8
Max	291.9	265.2	177.9
Min	-462.7	-482.0	-97.5
Jun '10 – Dec '10			
Mean	16.8	19.3	-2.5
Stdev	76.7	72.7	24.3
Max	101.4	121.7	36.1
Min	-146.5	-116.8	-29.6

Source: Barclays Capital

Figure 12: E-TCX and Credit Index Excess Returns (to Treasuries); February 2007 – December 2010 (%)



Source: Barclays Capital

Total Returns

As discussed above, from time to time, there may be a modest OAD (and KRD) mismatch between E-TCX and the Euro IG Credit Index. To more precisely compare the total return performance of the E-TCX relative to the Index, we add the returns from a futures overlay (Schatz, Bobl and Bund futures) to the E-TCX to match the KRDs of the Euro IG Credit Index We then compare the total returns of the E-TCX (with overlay) with those of the Euro IG Credit Index.

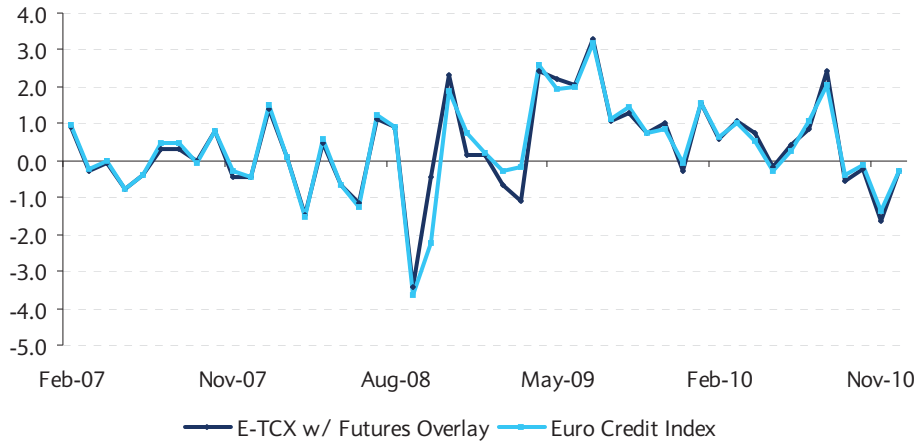
Figure 13 shows summary statistics for the E-TCX total returns with and without the futures overlay. (Figure 14 shows the time series of total returns for the E-TCX, with overlay, and the Euro IG Credit Index – very similar to the time series for excess returns.) As expected, given the small OAD (and KRD) mismatches, the effect of the futures overlay on total returns is small in terms of mean and standard deviation. The effect on the extreme maximum and minimum returns is small as well. Over the entire 47-month period, the E-TCX (with and without the futures overlay) tracked the total returns of the Euro IG Credit Index equally well.

Figure 13: Monthly Total Returns, E-TCX (with and without Futures Overlay) and Euro IG Credit Index, February 2007 – December 2010 (bp)

	E-TCX w/o futures overlay TR	E-TCX w/ futures overlay TR	Euro IG Credit Index TR	E-TCX w/ overlay – Index TR
Entire Period				
Mean	33.9	34.8	34.8	0.0
Stdev	123.1	122.8	123.8	34.9
Max	329.9	331.3	318.5	181.0
Min	-346.9	-344.8	-366.5	-96.3
Feb '07 – May '10				
Mean	37.5	38.3	37.8	0.6
Stdev	123.6	123.4	127.0	36.8
Max	329.9	331.3	318.5	181.0
Min	-346.9	-344.8	-366.5	-96.3
Jun '10 – Dec '10				
Mean	14.1	14.4	17.6	-3.1
Stdev	127.6	127.0	110.4	22.4
Max	243.2	241.2	206.9	34.3
Min	-159.6	-163.8	-134.3	-29.5

Note: All returns are gross of any transactions cost. Source: Barclays Capital

Figure 14: Monthly Total Returns, E-TCX (with Futures Overlay) and Euro IG Credit Index, February 2007 – December 2010 (%)



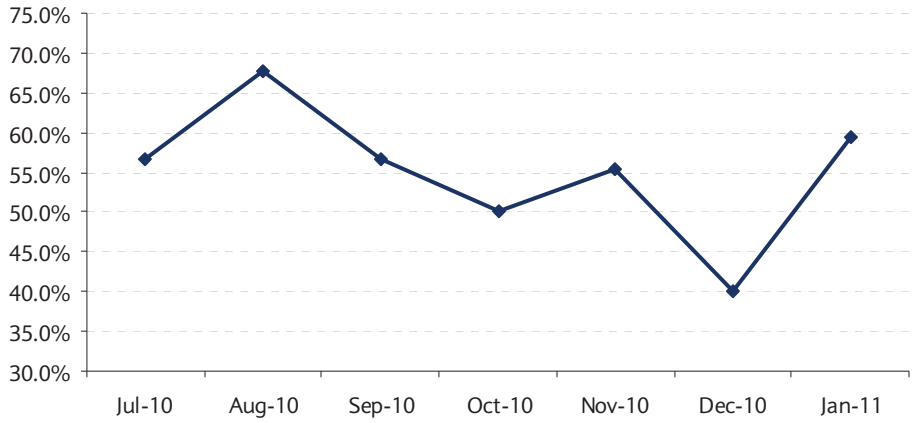
Source: Barclays Capital

Turnover

There are rules to limit changes in the composition of the E-TCX from one month to the next. However, the E-TCX's high liquidity requirement can produce large monthly turnover. Although a bond's liquidity (i.e., LCS) is persistent, it is not constant as it fluctuates with changes in the bond's attributes (e.g., DTS and age) and with its level of trading volume and trader-quoted status. In addition, new, often more liquid, bonds are constantly entering the Index. As a result, bonds will move in and out of E-TCX over time based on liquidity. Turnover also arises from re-weighting the market value weights of bonds remaining in the E-TCX to match contribution to DTS each month. Figure 15 shows the monthly turnover since July

2010[15]. Since the beginning of the period, the E-TCX has turned over, on average, 55.1% of its portfolio's market value at the time of each rebalancing. To be sure, these months have been particularly volatile for European credit markets. (Over the same period, the USD TCX has turned over just 23.3%). In any case, though, rebalancing the E-TCX each month may prove to be too costly or inconvenient for investors.

Figure 15: Monthly Turnover, E-TCX, July 2010 – January 2011 (%)



Source: Barclays Capital

Quarterly E-TCX

To reduce turnover, investors wanting longer-term credit beta may opt to hold an E-TCX portfolio for a quarter before rebalancing, rather than rebalancing monthly. We define a quarterly rebalancing strategy for the E-TCX as follows: Given the initial month's E-TCX, we hold the composition fixed for three months and then roll the portfolio into the new monthly E-TCX. We construct three versions of the quarterly E-TCX, each corresponding to the starting month. Version 1 ("V1") begins February 2007, V2 on March 2007 and V3 on April 2007. Each quarterly E-TCX version is held unchanged for three months.

As with the TCX and LTCX, we find that investors can experience good tracking using the quarterly E-TCX for their credit beta, while experiencing significantly reduced turnover. Figure 16 presents the monthly excess returns and excess return tracking errors for the three quarterly E-TCX versions, compared with the Euro IG Credit Index. Over the past 47 months, the three quarterly E-TCX baskets tracked the Euro IG Credit Index with TEVs of 27.6bp, 27.2bp, and 34.9bp, respectively, which compares quite favourably with the 35.0bp tracking performance for the monthly E-TCX.[16] This result is not too surprising to us. Given that the composition of the Euro IG Credit Index changes slowly, and the E-TCX contains highly liquid bonds that match the sector-duration contribution to DTS of the Index, tracking should generally be satisfactory over three months.

[15] With LCS data first being available as of May 31, 2010, the first E-TCX portfolio was in June 2010. The first E-TCX rebalancing occurred at June month-end when the July E-TCX was constructed. The most recent rebalancing occurred at the end of December, with the construction of the January E-TCX.

[16] The largest excess return deviations of the E-TCX were in October 2008 and March 2009, with tracking errors of +177.9bp and -97.5bp, respectively. By construction, only one of the quarterly E-TCX versions will have the same constituents (and return) as the monthly E-TCX in any given month. In the case of the two outlier months, the monthly E-TCX's tracking errors were more extreme than the tracking errors of the quarterly versions, resulting in this phenomenon. Over the other 45 months in the history, the E-TCX has tracked the Index with a TEV of 18.5bp. Over the same 45 months, the quarterly versions of the E-TCX have tracked the index with TEVs of 21.3bp, 17.6bp, and 22.0bp, respectively.

Figure 16: Monthly Excess Returns and TEV of Excess Returns (vs. Euro IG Credit Index), February 2007 – December 2010 (bp)

	E-TCX	V1	V2	V3	Credit Index
Mean ExRet	-11.1	-11.7	-12.9	-5.2	-10.8
Stdev	128.9	140.7	132.1	121.0	134.2
Mean Net ExRet (vs. Euro IG Credit Index)	-0.3	-0.9	-1.6	6.4	
TEV (vs. Euro IG Credit Index)	35.0	27.6	27.2	34.9	

Source: Barclays Capital

Sustained Credit Beta Exposure: Synthetic Credit Replication (Euro IG Credit RBI® Swaps)

For investors looking for credit beta over sustained periods, the turnover of the E-TCX (monthly or quarterly) is too costly. For investors needing a longer-term (i.e., a year or more) unfunded credit beta, and who are not too sensitive to monthly tracking errors, a Euro Credit RBI basket swap is an effective credit beta alternative.

Figure 17 shows the excess returns (to Treasuries) for the Euro IG Credit Index and Euro Credit RBI.[17] From February 2007 to December 2010, the mean excess return for the RBI was -1.7bp, with a standard deviation of 98.4bp, compared with -10.8bp, and a standard deviation of 134.2bp, for the Index. Over the period, the monthly TEV between the Credit RBI and Credit Index was 104bp (roughly three times that of the E-TCX (see Figure 11)).

Figure 17: Monthly Excess Returns (to Treasuries) of the Euro IG Credit Index and Euro Credit RBI; February 2007 – December 2010 (bp)

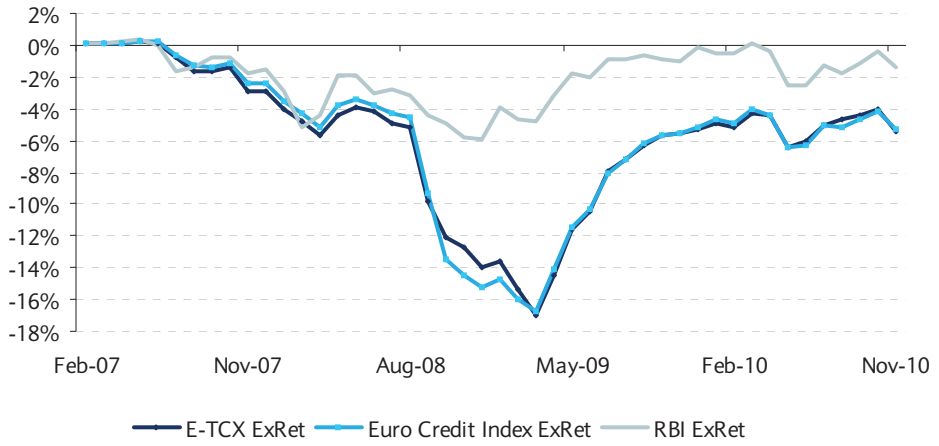
	Euro IG Credit Index ExRet	Euro Credit RBI ExRet	RBI – Index ExRet
Entire Period			
Mean	-10.8	-1.7	9.1
Stdev	134.2	98.4	103.8
Max	265.2	259.9	360.3
Min	-482.0	-233.6	-157.2

Note: All returns are gross of any transactions cost. Source: Barclays Capital

Unlike the E-TCX, the Euro Credit RBI also exhibited large deviations in excess returns to the Index. Figure 18 presents the cumulative excess returns (to Treasuries) for E-TCX, Euro Credit RBI, and Euro IG Credit Index since February 2007, and shows that the excess return for the RBI did not track the excess returns of the Index. In fact, the RBI had large positive net excess returns when the Index had large negative excess returns during the recent financial crisis, and vice versa when the credit market recovered (see page 4 above). This should caution investors looking to use the RBI for short-term tactical exposure to the Euro IG Credit Index.

[17] Euro IG Credit RBI excess returns are measured as the total (funded) return of the RBI less the total return of the matched Treasury portfolio for the Euro IG Credit Index.

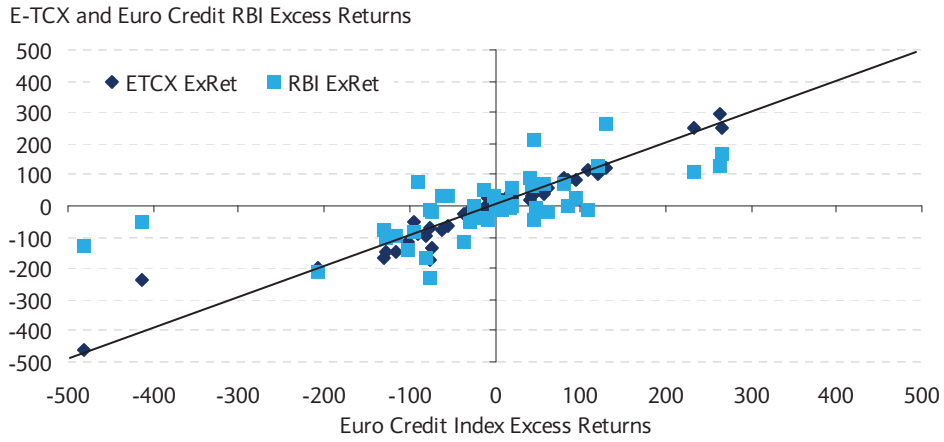
Figure 18: E-TCX, Euro IG Credit Index, and Euro Credit RBI Cumulative Excess Returns (to Treasuries); February 2007 – December 2010 (%)



Source: Barclays Capital

While the correlation of monthly excess returns between the E-TCX and Euro IG Credit Index was 0.97 for the entire period, the correlation in excess returns between the RBI and Index was only 0.64. To see this, we plot the monthly excess returns for the Euro Credit RBI against those of the Euro IG Credit Index and do the same for E-TCX. Figure 19 shows that the excess returns for the E-TCX line up more closely to the 45-degree line than those of the RBI.

Figure 19: E-TCX and Euro Credit RBI Excess Returns versus the Euro IG Credit Index Excess Returns; February 2007 – December 2010 (bp)



Source: Barclays Capital

Despite the tendency for high monthly tracking errors during volatile periods, if investors are insensitive to monthly volatility, and if they have a view that the movement in the CDS-cash basis will tend to mean revert, then the Credit RBI can be a low cost and convenient source of sustained credit beta exposure.[18]

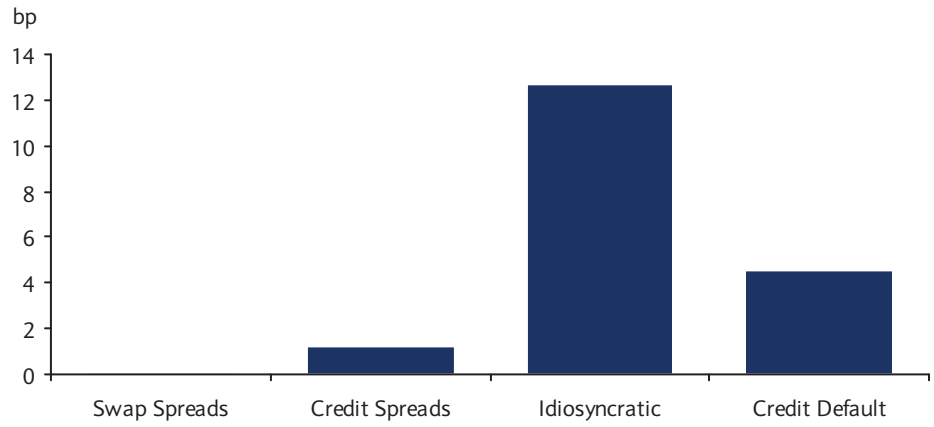
[18] As noted earlier, we have data for the RBI covering a longer period (April 2004 to December 2010). For this longer time, the tracking error of excess returns versus the Euro IG Credit Index is almost 25% lower (79bp) than the recent 47-month period (104bp). From April 2004 to January 2007, the excess return tracking error volatility for the Euro Credit RBI was only 13bp. This suggests that for periods with stable index excess returns, the Euro Credit RBI does a good job tracking the Index.

E-TCX Construction: Stratified Sampling versus Portfolio Optimization

To construct E-TCX, we employ a stratified sampling approach which is easily replicable, transparent, and intuitive. An alternative approach would be to use the Global Risk Model and Optimizer in POINT® to more efficiently minimize the expected TEV of the cash basket. To be sure, the E-TCX construction methodology is broadly consistent with the Global Risk Model framework as it looks to match the Index contribution to DTS for each sector rather than spread duration. But the Global Risk Model estimates TEV looking at 13 credit sectors (not six), takes into account the correlation between credit sectors, and looks at the idiosyncratic volatility and default probability of individual names. It seems likely that using the Risk Model and Optimizer would reduce the expected TEV of the E-TCX, albeit without the transparency benefits of the stratified sampling approach. In this section, we look back to December 31, 2010 to evaluate how much we might be sacrificing expected index tracking accuracy for transparency by not using the Risk Model/Optimizer approach.

As of month-end December 2010, the Global Risk Model estimates 18.6bp of monthly TEV for the E-TCX (with futures overlay) versus the Euro IG Credit Index. With no exposure to curve, credit/swap spreads (1.4bp) and idiosyncratic/default risk (17.2bp) are the sole contributors to estimated risk (Figure 20).

Figure 20: Contributors to Tracking Error Volatility of the E-TCX (with overlay) versus the Euro IG Credit Index; December 31, 2010 (bp)



Source: Barclays Capital

In evaluating the Global Risk Model and Optimizer as a potential alternative for E-TCX construction, we performed three different optimization exercises, see Figure 20.

Figure 21: TEV Comparison between Stratified Sampling-based E-TCX and Risk Model-based Variants

Portfolio	Eligible Securities	# of bonds	Total TEV	Syst. TEV	Idio. /Def. TEV
E-TCX	E-TCX Eligible Universe	48	18.6	1.4	17.2
Optimization #1	48-bond E-TCX	40	16.0	1.1	14.9
Optimization #2	Euro IG Credit Index	48	14.4	0.7	13.7
Optimization #3	E-TCX Eligible Universe	48	15.0	0.6	14.5

Source: Barclays Capital

For Optimization #1, we minimize the total expected tracking error volatility of the basket (assuming a futures overlay to match OAD) choosing from the *same 48 bonds* that were in the E-TCX as of December 31, 2010. The only constraint imposed on the problem is the 5% maximum ticker concentration and 0.5% minimum bond weight. The resulting portfolio has expected TEV of 16.0bp, a reduction of 2.6bp. As shown in Figure 21, the reduction in TEV comes, primarily, from idiosyncratic and default risk, which decreased from 17.2bp to 14.9bp. Given that the E-TCX itself only has 1.4bp of systematic TEV, it is not surprising that the Optimizer has little scope to reduce its risk contribution. However, the Optimizer is able to reduce expected idio/default TEV by 2.3bp while choosing from the *same* 48 bonds. It does this by removing eight of the securities from the portfolio. The resultant 40-bond optimized portfolio actually has lower predicted TEV than our 48-bond E-TCX proxy. Nevertheless, the TEV of the E-TCX portfolio is still quite low, supporting the notion that the stratified sampling approach does a fairly good job constructing proxy portfolios with relatively low expected TEV.

While allowing the Optimizer to re-allocate the existing E-TCX holdings produced a meaningful decrease in expected TEV, perhaps an even better way to realize the benefits of using the Risk Model is to allow the Optimizer to start from scratch. Accordingly, Optimization #2 minimizes expected tracking error (assuming a futures overlay to hedge curve exposure), while choosing from any 48 bonds from the Euro IG Credit Index. In addition to the 5% maximum ticker constraint and 0.5% minimum bond weight, we add an LCS constraint that requires the resulting portfolio to have an average LCS less than or equal to that of the E-TCX on 31 December (0.360). The results of Optimization #2 are displayed in Figure 21. Allowing more flexibility enables the Optimizer to construct a portfolio with just 14.4bp of TEV, 22% less than that of the E-TCX. Again, the Optimizer is primarily able to reduce expected idio/default risk, decreasing the contribution to 13.7bp. With greater flexibility in the tradable universe of securities, the Optimizer is also able to reduce the contribution of systematic risk to 0.7bp (50% lower than that of the E-TCX).

In running Optimization #2, we impose the constraint that the aggregate LCS of the portfolio be less than or equal to the LCS of the E-TCX. However, while investors are certainly interested in the overall liquidity of their portfolios, it is also very important that each bond be liquid rather than have a solution with a "barbell" portfolio of very liquid and not-so-liquid bonds. One way to evaluate the optimized portfolio is to look at the constituents and see how many of them were part of the E-TCX eligible universe. In this case, eight of the securities chosen by the Optimizer were not eligible for the E-TCX. That is, their LCS was not in the top quintile of the bond's sector/duration bucket. One of the more striking examples is a Government of Poland bond. With an LCS of 1.063, it was more than double the LCS cut-off for its sector/duration bucket (0.474).

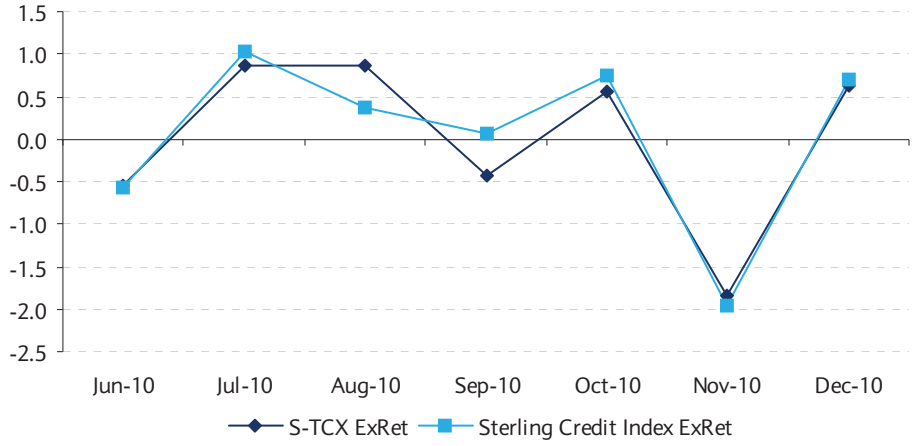
To address this issue, Optimization #3 uses only the E-TCX eligible universe as the list of securities from which the Optimizer can choose. This has the benefit of ensuring the relative liquidity of each bond in the resulting portfolio, while still giving the Optimizer flexibility to choose from a broad list of securities (423). Again, the results are shown in Figure 21. The optimized portfolio has a TEV of 15.0bp (idio/default: 14.5bp, systematic: 0.6bp). While this portfolio has slightly higher total TEV than Optimization #2 (14.4bp), all of the holdings are now within the top quintile of LCS for their respective sector/duration buckets.

Overall, POINT's Global Risk Model and Optimizer could be used in a variety of ways to reduce expected TEV in the E-TCX portfolio construction process. However, the modest expected risk reduction would come at the cost of less simplicity and transparency. We see no compelling reason to abandon our E-TCX stratified sampling approach.

Going Global: Global TCX to Track the Global Credit Index

With the availability of LCS for Sterling credit bonds, we can extend the TCX methodology to create a replicating proxy portfolio to track the Sterling IG Credit Index (S-TCX). We use largely the same design and rules as for the E-TCX (page 7 above). However, rather than use six sectors and four duration buckets to produce a 48-bond portfolio, the S-TCX uses five sectors and three duration buckets to construct a 30-bond portfolio. Figure 22 shows how the S-TCX had tracked the excess returns of the Sterling IG Credit Index since June 2010. Over the past seven months, the S-TCX has tracked the excess returns of the index with a monthly mean tracking error of -4.1bp and TEV of 30.1bp.

Figure 22: Monthly Excess Returns, S-TCX and Sterling IG Credit Index, June 2010 – December 2010 (%)

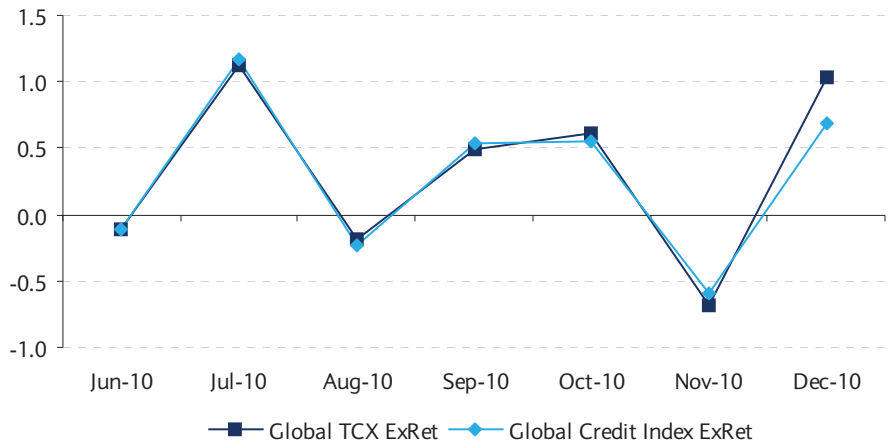


Source: Barclays Capital

With the TCX, E-TCX, and S-TCX in place, we can combine them into a Global TCX portfolio to track the Global Credit Index. As of December 31, 2010, the Global Credit Index contained 8,100 bonds in 15 currencies with bonds denominated in USD, EUR, and GBP comprising 88.7% of the market weight of the index (54.8%, 26.5%, and 7.4%, respectively). The EUR and GBP components of the Global Index are the same as the Euro and Sterling Credit Indices, respectively. The USD component of the Global Credit Index includes more bonds than the US Credit Index, with the inclusion of 144A bonds, which are not eligible for the US Credit Index. We create the Global TCX by weighting the three currency TCX baskets with their relative Global Credit Index weights. As such, when the Global TCX was rebalanced as of December 31, 2010, the TCX was given a weight of 61.8% (54.8%/88.7%). The E-TCX and STCX were assigned weights of 29.9% (26.5%/88.7%), and 8.3% (7.4%/88.7%), respectively.

The Global TCX has tracked the Global Credit Index quite well since June 2010. Figure 23 shows the excess return performance of the Global TCX versus the Global Credit Index, in USD. Over the past seven months, the Global TCX has tracked the index with monthly TEV of 14.3bp and an average tracking error of 3.9bp.

Figure 23: Monthly Excess Returns, Global TCX and Global Credit Index, June 2010 – December 2010 (%)



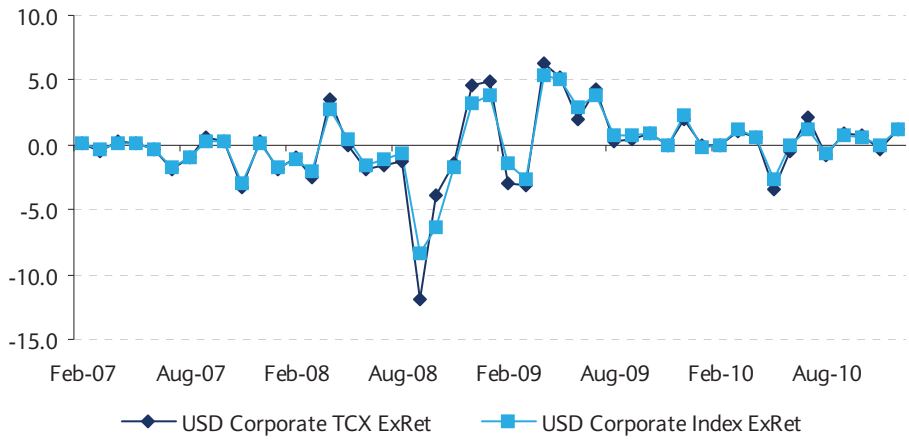
Source: Barclays Capital

EUR Corporate TCX: A Basis for Tradable Cash Credit Beta

There has been significant demand from clients to have the trading desk offer a total return swap (pay or receive) on the TCX. The interest has specifically focused on the Barclays Capital Corporate Indices. To be able to offer such a product at a reasonable cost, it is very important to minimize turnover to the extent possible. As such, the tradable TCX products are rebalanced quarterly, not monthly. As demonstrated above (as well as in the TCX and LTCX papers), TCX baskets held for a quarter continue to track the index quite well.

Also, for a TCX to serve as the basis for a total return swap, a corporate bond cash trading desk must be willing to support **prospectively** two-way trading in the TCX basket constituents over the next quarter. To that end, the tradable version of a TCX includes additional constituent requirements with respect to their amount outstanding and trading volume. We recently created such a cash index for the USD Corporate Index, called the **USD Corporate TCX (which differs from the USD Credit TCX)**. Figure 24 shows excess returns for the USD Corporate TCX and the Corporate Index starting in February 2007. (A time-series of historical returns is also available on the Index Website on Barclays Capital Live.)

Figure 24: Monthly Excess Returns, USD Corporate TCX and USD Corporate Index, February 2007 – December 2010 (%)



Source: Barclays Capital

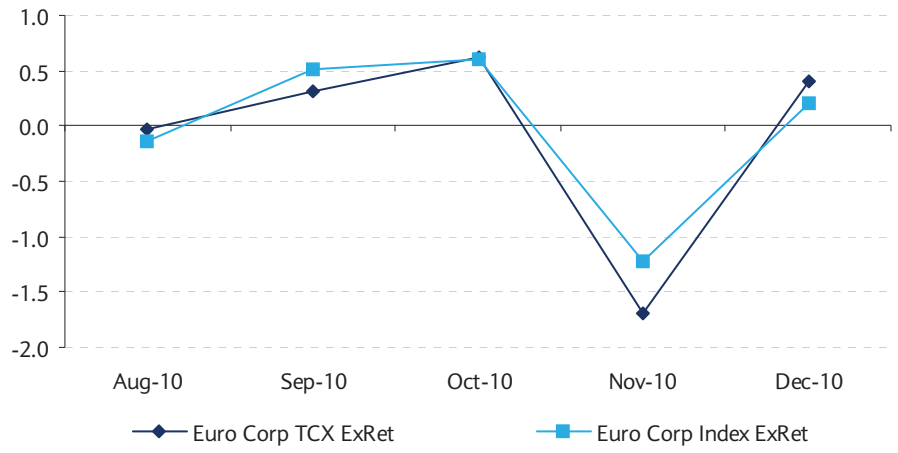
To help develop tradable products for European investors, we created the **EUR Corporate TCX**, a 40-bond basket designed to track the Euro IG Corporate Index. While the structure and rules of this basket are quite similar to those of the E-TCX, there are some differences as well[19]:

- The EUR Corporate TCX is constructed using five sectors and four duration categories.
  - EUR Corporate TCX contains 40 bonds (two bonds from each of the 24 sector-duration buckets).
  - These are the same sectors and duration categories as in the E-TCX, except for non-corporates, which are not in the Euro IG Corporate Index.
- Each bond must have volume in the top 30% of its bucket
- Issue size must be at least €750mn for senior bonds and €500mn for subordinate bonds.
- No more than two bonds per ticker (if possible)
- EUR Corporate TCX composition is held fixed for a calendar quarter.
- EUR Corporate TCX contains no cash at the beginning of the quarter (interest payments received during the month do not earn reinvestment). At the end of each month, cash is reinvested into the basket.

We have history for the EUR Corporate TCX beginning on July 30, 2010[20]. Figure 25 shows excess returns for the EUR Corporate TCX and the Euro IG Corporate Index since August. Over that period, the EUR Corporate TCX has tracked the index with an average monthly tracking error of -6.9bp and tracking error volatility of 26.7bp.

[19] The EUR Corporate TCX specification discussed here is preliminary and subject to change.
[20] Although Pan-Euro LCS values are available beginning at the end of May, we chose July 30, 2010, as the inception date for the Euro Corporate TCX basket to synchronize its rebalancing with that of the USD Corporate TCX.

Figure 25: Monthly Excess Returns, EUR Corporate TCX and Euro IG Corporate Index, August 2010 – December 2010 (%)



Source: Barclays Capital

Figure 26 presents the composition of the EUR Corporate TCX, as of October 29, 2010 (next rebalancing is January 31, 2011). As measured by LCS, the EUR Corporate TCX had a liquidity score 59% better (i.e., lower) than the Index (0.29 versus 0.70). The weighted-average volume of the bonds in the EUR Corporate TCX was ~€168mn versus ~€80mn for the index. The weighted-average issue size for the EUR Corporate TCX was €1.42bn, compared with €1.23bn for the index.

Figure 26: Current EUR Corporate TCX Composition (Rebalanced as of October 29, 2010)

Identifier	Ticker	Description	Coupon	Mat Date	MV%	Issue Size (mn)	LCS	TES
XS0550466469	ACAFP	CREDIT AGRICOLE SA	3.90	4/19/2021	1.83	1,250,000	0.30	1
XS0433130456	BAC	BANK OF AMERICA CORP	7.00	6/15/2016	2.16	1,500,000	0.50	2
XS0530879658	BAC	BANK OF AMERICA CORP	4.63	8/7/2017	1.30	2,000,000	0.46	1
XS0445843526	BACR	BARCLAYS BANK PLC	4.88	8/13/2019	3.23	2,000,000	0.25	1
XS0531068897	BBVASM	BANCO BILBAO VIZCAYA SA	3.88	8/6/2015	3.65	1,250,000	0.21	1
XS0547937408	BPLN	BP CAPITAL MARKETS PLC	3.10	10/7/2014	1.43	1,000,000	0.13	1
XS0433943718	C	CITIGROUP INC	7.38	6/16/2014	5.00	1,500,000	0.37	2
XS0529414319	CAFP	CARREFOUR SA	3.88	4/25/2021	2.60	1,000,000	0.27	1
FR0010850719	COFP	CASINO GUICHARD	4.38	2/8/2017	3.32	887,750	0.32	1
XS0444030646	CS	CREDIT SUISSE FIRST BOSTON	4.75	8/5/2019	0.50	2,550,000	0.34	1
DE000A0T5SE6	DAIGR	DAIMLERCHRYSLER NORTH AMER	7.88	1/16/2014	2.65	2,000,000	0.11	1
XS0210318795	DT	DEUTSCHE TELEKOM AG	4.00	1/19/2015	5.00	1,750,000	0.24	2
XS0435879605	ELEPOR	ELECTRICIDADE DE PORTUGAL	4.75	9/26/2016	1.27	1,000,000	0.28	1
XS0452187759	ENEL	ENEL FINANCE INTERNATIONAL	4.00	9/14/2016	5.00	1,500,000	0.23	1
XS0521000975	ENIIM	ENI SPA	4.00	6/29/2020	2.59	1,000,000	0.31	2
XS0441800579	GE	GE CAPITAL CORP	4.75	7/30/2014	2.29	2,000,000	0.16	1
XS0242988334	GS	GOLDMAN SACHS GROUP INC	3.75	2/4/2013	4.71	1,000,000	0.20	4
XS0335133996	GSK	GLAXOSMITHKLINE CAP PLC	5.13	12/13/2012	3.98	2,250,000	0.15	2
XS0555977312	ISPIM	INTESA	4.00	11/8/2018	0.50	1,250,000	0.26	1
XS0274112076	JPM	J.P. MORGAN & CO INC	4.38	11/14/2016	1.90	1,000,000	0.82	4
XS0301885603	JPM	J.P. MORGAN & CO INC	4.63	5/29/2012	1.34	1,000,000	0.18	4

Identifier	Ticker	Description	Coupon	Mat Date	MV%	Issue Size (mn)	LCS	TES
XS0350487400	LLOYDS	LLOYDS TSB BANK PLC	5.63	3/5/2013	2.29	1,000,000	0.41	4
XS0469192388	LLOYDS	LLOYDS TSB BANK PLC	3.25	11/26/2012	2.32	1,500,000	0.19	1
XS0543111768	MQGAU	MACQUARIE BANK LTD	6.00	9/21/2020	1.93	600,000	0.32	1
XS0497186758	MRKGR	MERCK FIN SERVICES GMBH	4.50	3/24/2020	0.50	1,350,000	0.22	2
XS0431928760	MTNA	ARCELORMITTAL	8.25	6/3/2013	5.00	1,500,000	0.25	2
XS0443210090	NBHSS	NORDEA BANK	3.00	8/6/2012	2.78	2,000,000	0.13	2
XS0532183935	NBHSS	NORDEA BANK	2.75	8/11/2015	2.21	1,250,000	0.18	1
XS0432070752	PFE	PFIZER INC	4.75	6/3/2016	2.89	2,000,000	0.12	2
XS0215828830	PORTEL	PORTUGAL TELECOM INTL FIN	3.75	3/26/2012	2.73	1,300,000	0.18	2
XS0412968793	RDSALN	SHELL INTERNATIONAL FINANCE	3.38	2/9/2012	1.95	1,750,000	0.16	2
XS0427926752	RENAUL	RCI BANQUE SA	8.13	5/15/2012	2.61	750,000	0.16	4
XS0430951888	SEB	SKANDINAVISKA ENSKILDA BANK	4.38	5/29/2012	0.50	1,250,000	0.19	3
XS0454821462	SEB	SKANDINAVISKA ENSKILDA BANK	9.25	3/31/2015	0.50	500,000	0.88	5
XS0336598064	SOCGEN	SOCIETE GENERALE	7.00	12/19/2017	2.53	600,000	0.85	3
XS0365303329	SOCGEN	SOCIETE GENERALE	7.76	5/22/2013	2.42	1,000,000	0.60	2
XS0426682570	STANLN	STANDARD CHARTERED BANK	5.75	4/30/2014	2.09	1,250,000	0.32	2
XS0462999573	TELEFO	TELEFONICA EMISONES SAU	4.69	11/11/2019	5.00	1,750,000	0.38	1
XS0526073290	UBS	UNION BANK OF SWITZERLAND	3.50	7/15/2015	1.69	1,750,000	0.26	1
XS0365663961	WFC	WACHOVIA CORP	6.00	5/23/2013	1.80	1,500,000	0.25	1
		EUR Corporate TCX					**0.29**	**1.9**
		Euro IG Corporate Index					**0.70**	**4.6**

Source: Barclays Capital

Figure 27 shows the distribution of TES[21] scores for the EUR Corporate TCX as of October 29, 2010. The EUR Corporate TCX does not have any bonds with a TES greater than five. In fact, 32 of the bonds have a TES of one or two. The one bond with a TES of five as well as three of the bonds with a TES of four are subordinate financial bonds, which tend to have higher LCS values, but which need to be in the EUR Corporate TCX to help achieve good tracking.

In constructing the tradable EUR Corporate TCX, we chose to filter each of the 20 buckets by volume and LCS rather than just limiting the eligible universe to bonds with a TES of one or two. This is because the TES methodology does not differentiate between sectors. If a sector has higher LCS values or lower trading volume, that sector will have higher (i.e., worse) TES. Given the stratified sampling approach and the need to have sufficient population in each of the buckets, TES scores would not have worked as an explicit constraint in the portfolio construction process.

Figure 27: TES distribution for the EUR Corporate TCX, as of October 29, 2010

Total	1	2	3	4	5	6	7	8	9	10
40	19	13	2	5	1	0	0	0	0	0

Source: Barclays Capital

[21] TES are Trade Efficiency Scores (see publication on Pan-Euro Credit LCS for a complete description). TES combines a bond's recent trading flow ranking with its LCS ranking, to produce an overall ranking of a bond's liquidity cost and trading flow combination, relative to all other bonds. In addition, an investor can refer to a bond's TES time series to evaluate the bond's relative liquidity cost and trading flow combination over time. In contrast, a bond's LCS measures it absolute liquidity cost which can fluctuate over time even if the bond's liquidity cost position relative to other bonds is constant. TES for USD IG Corporates and EUR IG Corporates are now available in POINT®.

Summary

There are several ways to replicate the Euro IG Credit Index, each with varying strengths and weaknesses. For tactical credit beta exposure (i.e., market timing), cash replication proves to be most effective. Fixed-income ETFs have insufficient volume at this stage of their development to support institutional investing. E-TCX provides a transparent approach to tracking the Euro IG Credit Index with a small set of highly liquid cash bonds. Over the past four years, the E-TCX has proven to be a better tracking alternative than synthetic replication, with a lower mean absolute tracking error and significantly lower tracking error volatility than the Euro Credit RBI. Nevertheless, cash replication involves relatively high turnover, which may limit the appeal of E-TCX to investors seeking short-term tactical credit beta.

To help develop a market in tradable cash Euro credit beta products (funded or unfunded, long or short), we introduce the EUR Corporate TCX, a 40-bond cash portfolio, rebalanced quarterly, with additional constituent requirements with respect to amount outstanding and trading volume. The EUR Corporate TCX might serve as the basis for a total return swap that has very good tracking to the Euro IG Corporate Index.

Analyst Certification(s)

We, Ariel Edelstein, Siddhartha Dastidar, Bruce Phelps, Albert Desclée and Simon Polbennikov, hereby certify (1) that the views expressed in this research report accurately reflect our personal views about any or all of the subject securities or issuers referred to in this research report and (2) no part of our compensation was, is or will be directly or indirectly related to the specific recommendations or views expressed in this research report.

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