19 April 2013
Fixed Income Research
http://www.credit-suisse.com/researchandanalytics

Credit Suisse Basis Points: Cross-Currency Basis Swaps

US Interest Rate Strategy

Research Analysts
Michael Chang
Director
212 325 1962
michael.chang.2@credit-suisse.com

Carl Lantz
Managing Director
212 538 5081
carl.lantz@credit-suisse.com

Cross-Currency Basis Swaps

A cross-currency basis swap (CCBS) is a floating-for-floating exchange of interest rate payments in two different currencies. Unlike other basis swaps, CCBS also exchange notional principals.

The floating reference for each leg is based on the associated reference rate, typically a three-month deposit rate, in the respective currency. Market convention is to quote the spread against the non-USD leg. Thus, in a standard CCBS, an investor would pay (receive) 3m USD LIBOR and receive (pay) the relevant 3m deposit rate in the other currency plus a spread.

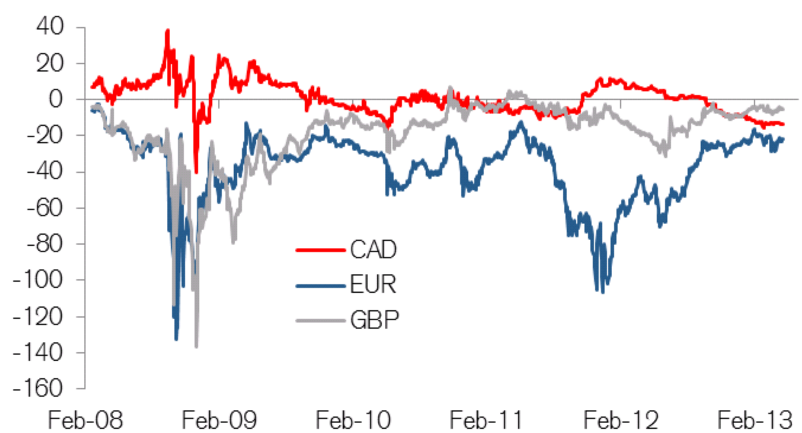
The basis spread partly reflects the difference in credit risks implied by the two reference rates.

CCBS spreads are driven by supply and demand for the products as investors swap liabilities to the desired currency or swap issuance after using foreign debt markets to avail more favorable funding.

The spreads are also driven by market perception of relative funding stresses in the two currencies, as became acutely clear during the recent financial crisis when the demand for USD funds drove most CCBS spreads lower (Exhibit 1).

Exhibit 1: CCBS spreads dropped across multiple currencies at the height of the financial crisis as the demand for USD funds soared

1y cross-currency basis swaps vs. 3m USD LIBOR (spread in basis points)



Source: Credit Suisse

In this introduction to CCBS, we review the mechanics of the basis swap and present a theoretical pricing methodology. We also highlight market conventions for the major currencies and show practical uses of the product.

Overview

Floating-to-floating exchange of 3m deposit rates

A cross-currency basis swap (CCBS) is a floating-for-floating exchange of interest rate payments and notional amounts in two different currencies. The floating reference for each leg is based on the associated reference rate, a three-month deposit rate, in the respective currency. For example in a standard EURUSD basis swap, an investor might pay 3m USD LIBOR and receive 3m EURIBOR plus a spread.

Principals are also exchanged

CCBS exchange payments on a quarterly basis similar to most other basis swaps. However, unlike other basis swaps, CCBS also swap notional principals.

CCBS exchange floating rates that contain innate credit risk; therefore, the basis spread partly reflects the difference in credit risks of the two reference rates. For example, in a USDCAD basis swap, the USD LIBOR is an unsecured deposit rate while CDOR is a secured rate. This potentially would tend to cause CDOR to trade below LIBOR all else being equal, which requires a positive spread on the CDOR leg to make the basis swap fair.

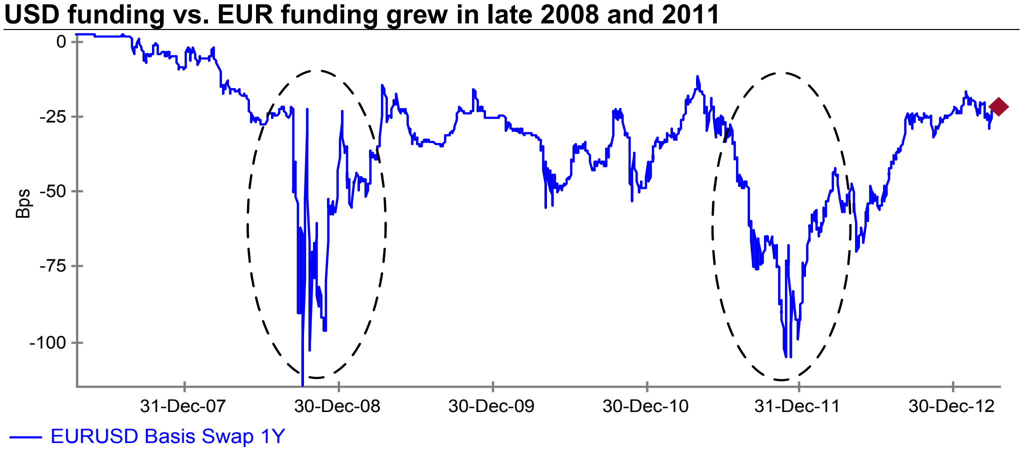
Primarily used to swap liabilities into currency of choice to avail favorable rates or foreign funds

A common use of CCBS is to exchange floating liabilities in one currency for another. With the growth of international markets, cross-currency basis swaps are used to match assets and liabilities of corporations that have exposure to foreign exchange fluctuations from international operations.

Basis swaps are used extensively to swap issuance back to the currency of choice after availing more favorable funding in a foreign market. Additionally, firms that need foreign-denominated cash can raise the funds using a cross-currency basis swap. The supply and demand for CCBS based on firms swapping issuance or raising foreign funds drives the cross-currency basis spreads.

Funding stresses and/or concerns over the credit risk of banks in one currency versus another can cause severe dislocations in CCBS spreads. A good illustration of this phenomenon was at the peak of the financial crisis when the demand for USD relative to all other currencies soared. During this time, dollar funding in the interbank cash market became extremely limited as banks' became reluctant to lend to other banks. As a result, the basis swap markets, as an alternative to acquire USD funds, saw increased demand to receive USD funds in exchange for EUR, among other currencies. This excess demand drove the EURUSD basis swap spreads down to highly negative levels as counterparties were willing to receive lower interest payments in return for US dollar funds (Exhibit 2).

Exhibit 2: EURUSD 1Y basis swap turned extremely negative as the demand for USD funding vs. EUR funding grew in late 2008 and 2011



Source: Credit Suisse

Other primary drivers of the basis spread include the expected forward path of the currencies themselves and the difference in the credit quality of the underlying reference instruments.

Market Conventions

Quoted against USD LIBOR flat

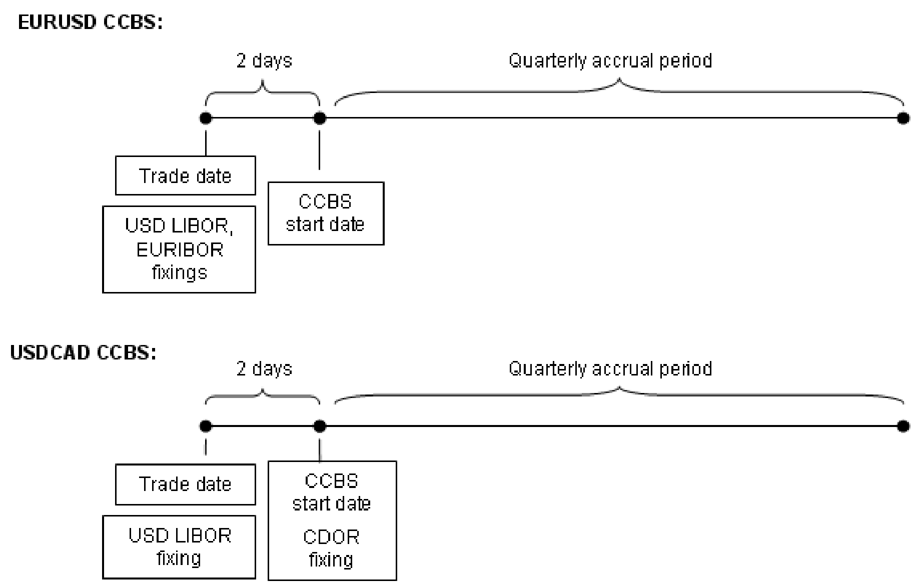
The spread of a cross-currency basis swap is generally quoted against USD LIBOR flat. For example, the 1Y EURUSD basis swap with a spread of -28 basis points would mean the quarterly exchange of 3m EURIBOR minus 28bps (Act/360) vs. 3m LIBOR flat (Act/360) for a period of one year.

Cross-currency basis swap spreads reflect the dynamics of supply and demand and can indicate demand for a certain currency over another. The spreads also indicate the relative creditworthiness of banks in one currency dominion versus the other.

Spot for CCBS is T+2, but individual reference rate fixings may vary

The spot for a cross-currency basis swap is T+2 (the same as USD LIBOR spot). However, the fixing date for the two legs of a cross-currency basis swap may differ depending on the convention for the relevant reference rates. In a typical EURUSD basis swap, both EUR and USD legs are tied to 3m deposit rates that fix two business days prior, i.e. the spot dates for both the 3m EURIBOR and 3m LIBOR are T+2. The same is not true, for example, in a USDCAD CCBS, where the spot for the USD leg (3m USD LIBOR) is T+2 and the spot for the CAD leg (3m CDOR) is T+0. Hence, while the first USD 3m LIBOR is known at the time when the trade is transacted, the 3m CDOR rate is known two business days later when CDOR sets. Exhibit 3 illustrates the timeline for fixings for the first accrual period of EURUSD and USDCAD cross-currency basis swaps.

Exhibit 3: Timeline of rate fixings for a cross-currency basis swap is dictated by convention in relevant reference rates



Source: Credit Suisse

CCBS conventions for some of the major currencies are listed in Exhibit 4.

Exhibit 4: Cross-currency basis swap conventions

Ccy Pair	Non-US Reference Rate	Non-US Ref. Rate Spot	Effective Date	Spread Basis	Quotation Convention	5Y CCBS Spread as of 2/21/2013	Index for 2yrs+ standard IRS
AUDUSD	3M Bank Bill (secured)	Same Day	T+2	Act/360 on USD and Act/365 on AUD leg	USD 3M Libor Flat	26.8bps	6m Bank Bill
EURUSD	3M Euribor (unsecured)	T+2	T+2	Act/360 on both legs	USD 3M Libor Flat	-20.8bps	6m Euribor
GBPUSD	3M GBP Libor (unsecured)	T+2	T+2	Act/360 on USD and Act/365 on GBP leg	USD 3M Libor Flat	-7.4bps	6m GBP Libor
NZDUSD	3M Bank Bill (secured)	Same Day	T+2	Act/360 on USD and Act/365 on NZD leg	USD 3M Libor Flat	35.3bps	3m Bank Bill
USDCAD	3M CDOR (secured)	Same Day	T+2	Act/360 on USD and Act/365 on CAD leg	USD 3M Libor Flat	4.75bps	3m CDOR
USDCHF	3M CHF Libor (unsecured)	T+2	T+2	Act/360 on both legs	USD 3M Libor Flat	-39.5bps	6m CHF Libor
USDJPY	3M JPY Libor (unsecured)	T+2	T+2	Act/360 on both legs	USD 3M Libor Flat	-54.25bps	6m JPY Libor

Source: Credit Suisse, the BLOOMBERG PROFESSIONAL™ service

The mechanics of a CCBS

A cross-currency basis swap differs slightly from other basis swaps, given that notional principals are exchanged in a standard CCBS. CCBS can be mark-to-market or non-mark-to-market. Mark-to-market CCBS have adjustments to the notional principal at the quarterly payment dates based on prevailing spot exchange rates, while non-mark-to-market CCBS do not. Standard CCBS trade on a mark-to-market basis.

Examples of the two types of CCBS are presented below using EURUSD and USDCAD basis swaps. While EURUSD is used as an example for a non-mark-to-market CCBS, a standard EURUSD basis swap also trades on a mark-to-market basis.

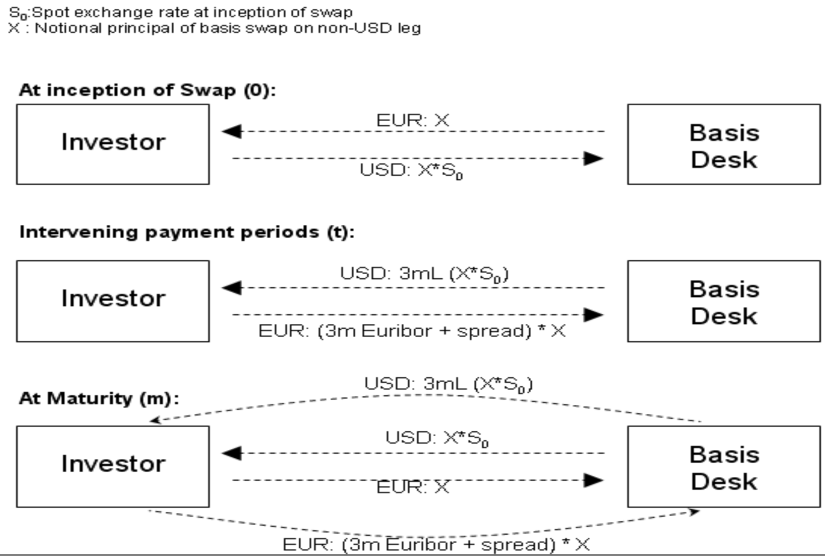
Non-mark-to-market CCBS

Notional principals exchanged at onset and expiry only

On the onset, notional principals of equivalent value, based on the current spot rate (S_0), are exchanged. In the intervening period, at each payment date, the floating reference rates plus the predetermined spread are exchanged until expiration, when in addition to the interest rate payments, the principals are exchanged again.

Exhibit 5 shows the basic mechanics of a non-mark-to-market EURUSD cross-currency basis swap and Exhibit 6 shows a stylized example of cash flows. In a EURUSD CCBS, the floating rate references for the USD and EUR legs are 3m USD LIBOR and 3m EURIBOR, respectively – both unsecured rates that fix two business days prior to the accrual period.

Exhibit 5: Mechanics of a non-mark-to-market EURUSD basis swap (with no principal adjustments at quarterly payment dates)



Source: Credit Suisse

Exhibit 6: Sample cash flows of a 1YR non-mark-to-market EURUSD basis swap

Starting Notional (EUR €)		10,000,000			
EURUSD Basis Spread (Aug 13, 2009)		-0.3350%			
Swap start date	8/17/2009				
	8/17/2009	**11/17/2009**	**2/17/2010**	**5/17/2010**	**8/17/2010**
Spot EURUSD	1.4082	1.4876	1.3607	1.2395	
3mEuribor	0.873%	0.714%	0.661%	0.683%	
EURIBOR fixing day	8/13/2009	11/13/2009	2/15/2010	5/13/2010	
3mLIBOR	0.440%	0.273%	0.250%	0.436%	
LIBOR fixing day	8/13/2009	11/13/2009	2/15/2010	5/13/2010	
Number of days in period	0	92	92	89	92
EUR Leg (€)					
Day-count convention	Act/	360			
Notional Exchange	10,000,000				-10,000,000
Quarterly Cash Flows:					
Qtrly Interest Rate	0	-13,749	-9,686	-8,059	-8,893
Total (€)	**10,000,000**	**-13,749**	**-9,686**	**-8,059**	**-10,008,893**
USD Leg (US$)					
Day-count convention	Act/	360			
Notional Exchange	-14,082,000				14,082,000
Quarterly Cash Flows:					
Qtrly Interest Rate		15,834	9,807	8,703	15,686
Total (US$)	**-14,082,000**	**15,834**	**9,807**	**8,703**	**14,097,686**

Source: Credit Suisse, Locus Analytics, the BLOOMBERG PROFESSIONAL™ service

Mark-to-market CCBS

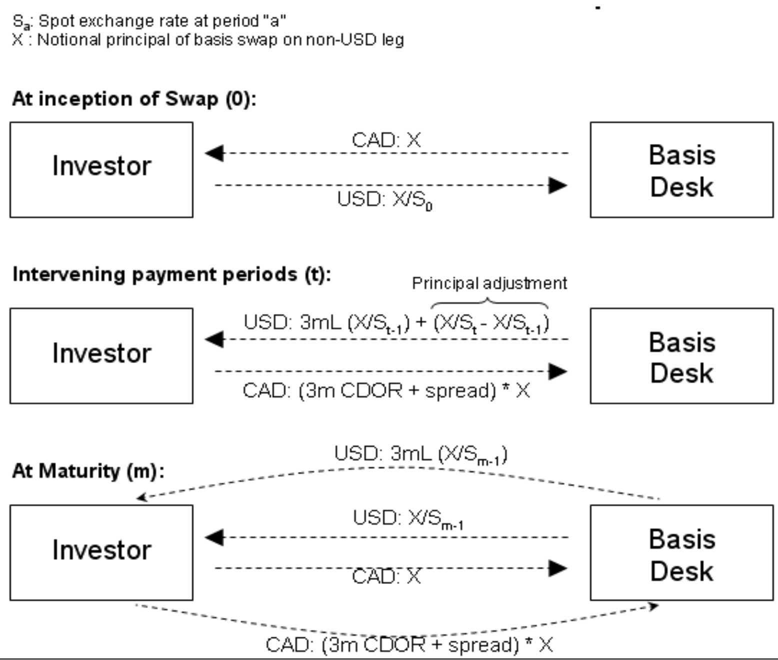
Principals are reset at each periodic payment date

Similar to a non-mark-to-market CCBS, notional principals are exchanged at the onset, based on the current spot rate (S_0), in a mark-to-market CCBS. However, the principals are reset at each quarterly payment date based on the prevailing spot exchange rates and this adjusted notional principal is then used as the basis to compute interest over the next period. Thus at each quarterly payment period, the payment consists of two parts – the change in principals due to changes in the exchange rate and the interest payments. The principals exchanged at maturity are the adjusted principals from the period just prior to the expiry date.

The mechanics of a mark-to-market USDCAD basis swap are shown in Exhibit 7. Sample cash flows of receiving CAD in a mark-to-market CCBS for a period of one-year are illustrated in Exhibit 8.

In the case of a USDCAD basis swap, the floating rate references for the USD and CAD legs are 3m USD LIBOR and 3m CDOR, respectively, where LIBOR is an unsecured rate while CDOR is an secured rate. In addition, the LIBOR leg fixes two business days prior to the accrual start date while the CDOR rate fixes on the same day the accrual periods starts.

Exhibit 7: Mechanics of a mark-to-market USDCAD basis swap (with principal adjustments at quarterly payment dates)



Source: Credit Suisse

Exhibit 8: Sample cash flows of a 1YR mark-to-market USDCAD basis swap

Starting Notional (CAD)		10,000,000			
USDCAD Basis Spread (Aug 13, 2009)		0.0622%			
Swap start date	8/17/2009				
	8/17/2009	**11/17/2009**	**2/17/2010**	**5/17/2010**	**8/17/2010**
Spot USDCAD	1.1086	1.051	1.0464	1.0325	
3mCDOR	0.433%	0.433%	0.440%	0.727%	
CDOR fixing day	8/17/2009	11/17/2009	2/17/2010	5/17/2010	
3mLIBOR	0.440%	0.273%	0.250%	0.436%	
LIBOR fixing day	8/13/2009	11/13/2009	2/15/2010	5/13/2010	
Number of days in period	0	92	92	89	92
CAD Leg (CA$)					
Day-count convention	Act/	365			
Notional/ Adj Notional	10,000,000	10,000,000	10,000,000	10,000,000	
Cash Flows:					
Qrtly Notional Adj	10,000,000	0	0	0	
Qrtly Interest Rate	0	-12,477	-12,477	-12,477	-19,895
Ending Notional					-10,000,000
Total (CA$)	**10,000,000**	**-12,477**	**-12,477**	**-12,477**	**-10,019,895**
USD Leg (US$)					
Day-count convention	Act/	360			
Notional / Notional Adj	-9,020,386	-9,514,748	-9,556,575	-9,685,230	
Cash Flows:					
Qrtly Notional Adj	-9,020,386	-494,362	-41,827	-128,655	
Qrtly Interest Rate		10,143	6,626	5,906	10,789
Ending Notional					9,685,230
Total (US$)	**-9,020,386**	**-484,219**	**-35,201**	**-122,749**	**9,696,019**

Source: Credit Suisse

Pricing CCBS

From an economic perspective, CCBS reflects the difference between the funding basis of the two currencies – where the funding basis is defined as the spread between the rate at which an investor can actually expect to borrow in a given currency and that currency's benchmark rate.

Determining the fair spread on a cross-currency basis swap is easiest when a liquid forward foreign exchange contract is traded. According to the principle of interest rate parity, a forward exchange rate is equal to the spot rate adjusted for the relative interest rates of the currencies.

To price a cross-currency basis swap, we need the FX forward rate, as well as forward projections of each floating rate to be exchanged out to the swap maturity. We calculate these forward rates (for EURIBOR and LIBOR in the EURUSD example below) from the nominal swap curve in each currency.

Since principals are exchanged, we can think of the CCBS as the exchange of two bonds: one denominated in the home currency and paying the home currency's floating rate, and the other denominated in the foreign currency, paying the foreign currency's floating rate plus the variable spread.

We know the principals of the two “bonds” are set equal at inception, so exchanging them is fair if they “yield” the same thing. We calculate the yield to maturity on each bond, **adjusting the internal rate of return (IRR) on the foreign bond by the foreign currency’s appreciation implied by the FX forward.** The fair spread of the CCBS is the spread that, when applied to the foreign bond’s cash flows, results in the two bonds having the same yield to maturity (YTM).

Exhibit 9: Example of USDEUR CCBS pricing for a trade on 22 February 2013

					Spread (bps)	-25
Cash Flow Date	**Accrual Start Date**	**Fwd 3m LIBOR**	**Fwd 3m EURIBOR**	**EURIBOR + Spread**	**USD Cash Flow**	**EUR Cash Flow**
26-Feb-13					(1,000,000)	759,503
28-May-13	**26-Feb-13**	0.288	0.218	-0.037	728	71
27-Aug-13	**28-May-13**	0.283	0.190	-0.065	714	125
26-Nov-13	**27-Aug-13**	0.321	0.259	0.004	810	-8
26-Feb-14	**26-Nov-13**	0.348	0.310	0.055	1,000,888	759,609
			YTM		**0.31%**	**-0.01%**
			EUR Forward Appreciation			**0.32%**
			All-in YTM		**0.31%**	**0.31%**

Source: Credit Suisse, the BLOOMBERG PROFESSIONAL™ service

In the above example, we calculate the IRRs on a USD floating-rate bond of $1M notional, and a EUR bond that pays EURIBOR + spread on the equivalent $759k notional (as of February 22, 2013). We find the adjusted IRR on the EUR bond given that the forward FX market expects EUR to appreciate 32bps. Next, we set the spread such that the adjusted IRRs on each leg are equivalent. The resultant -25 basis point spread is equal to market pricing on February 22.

The calculations above suggest that FX forwards and CCBS are inherently linked, with one implying the other and vice versa assuming liquid markets for both. In reality, however, liquidity in FX forwards diminishes sharply beyond two-year maturities, whereas long-dated CCBS remain fairly observable. Thus short-dated CCBS are generally implied from the FX forward market and long-dated CCBS are used to back into FX forwards of longer maturities.

Using the USDJPY CCBS to Avail Favorable Funding

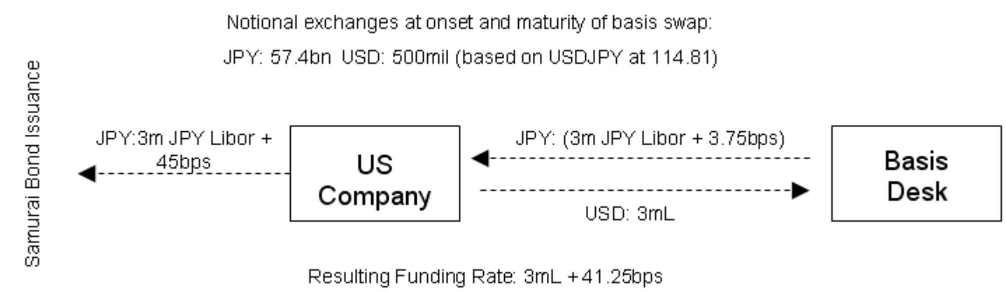
Japanese funding markets have been attractive, especially for highly rated issuers given the extremely low rates for a prolonged period of time. An American issuer can avail cheaper USD funding in the Japanese yen (JPY) markets with the help of the USDJPY basis swap. In order to do so, an issuer can first raise JPY funds and then swap the exposure back into USD with the help of a CCBS.

For example, on September 28, 2007, assuming a US pharmaceutical company needed $500 million for five years, it could have raised the funds in the Japanese yen market (by issuing a Samurai bond[1]) at 3m JPY LIBOR + 45bps (based on prevailing rates). The rate for the same size issue in the US markets for a similarly rated issuer was around 3mL +68bps.

The US company could have then swapped the JPY exposure back into USD by using a 5-year USDJPY basis swap with a 3.75bp spread, resulting in a funding rate of 3mL+41.25bp, almost 27bp cheaper than raising the same funds in the local USD market. Exhibit 10 shows the mechanics of the transaction.

1 A bond issued in JPY by a foreign issuer.

Exhibit 10: Using a CCBS to avail better funding rates in the Samurai market



Source: Credit Suisse, the BLOOMBERG PROFESSIONAL™ service

Using the EURUSD CCBS to Express a View on Funding Stresses

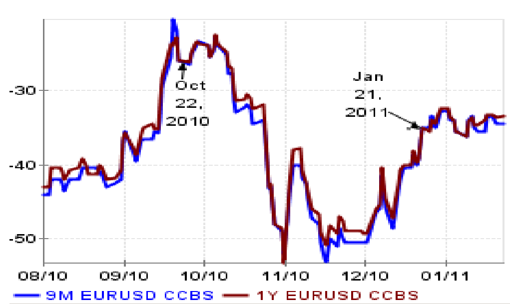
The lower the cross-currency basis swap spread – for a CCBS with one USD leg – the lower the interest rate an investor is willing to accept in return for USD-denominated funding. Therefore, the cross-currency basis swap spread captures market perceptions of funding stresses in the foreign currency. For example, if euro credit risk were to rise substantially, we would see a significant move lower in the EURUSD cross-currency basis swap spread – as was the case during the sovereign debt crisis of 2010 and 2011.

A view that European funding concerns would resurge, driving up demand for USD funds versus EUR funds could be expressed by lending EUR and borrowing USD through a EURUSD basis swap. If the view materialized, the spread would decrease further and the position could be unwound at a profit by borrowing EUR and lending USD in another basis swap with overlapping maturity.

Specifically, if an investor, on October 22, 2010, thought there was a potential for the funding concerns in Europe to re-emerge, he/she could enter a short position in the 1-year EURUSD CCBS spread (by borrowing USD and lending EUR). Three months later, on January 21, 2011, if the investor closed the trade based on the view that the situation in Europe was nearing stability, he/she would have gained approximately 10bp (with the nine-month EURUSD basis swap spread at -36bps). Exhibit 12 presents the trade mechanics.

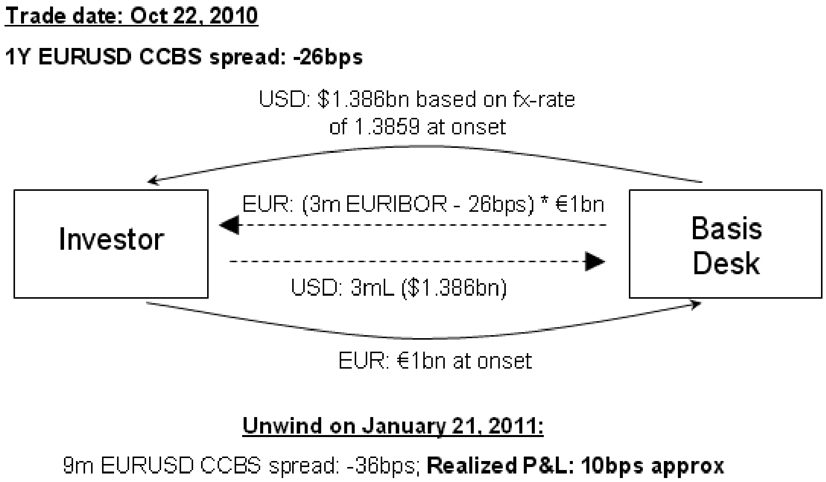
Exhibit 11: Funding concerns push down EURUSD CCBS spreads

Spread in basis points



Source: Credit Suisse

Exhibit 12: Using CCBS to express view on funding stresses



Source: Credit Suisse

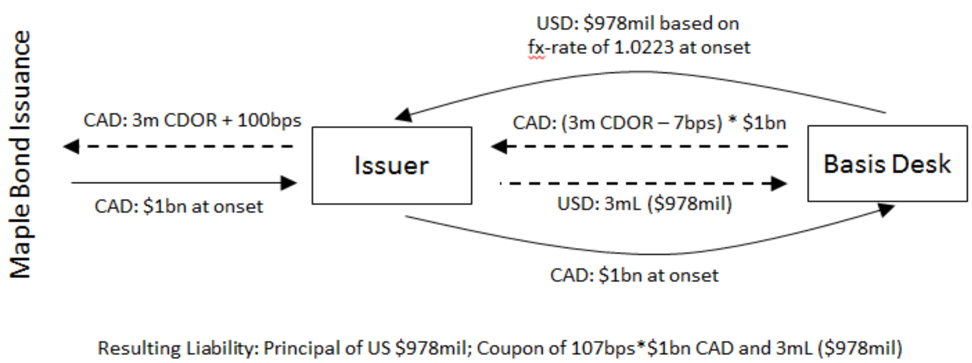
Using CCBS to Hedge Foreign Currency Issuance

A US-dollar-denominated bank borrowing in foreign currency markets can swap back exposure to USD through the basis swap markets. For example, US banks can issue bonds denominated in CAD ("Maple bonds"[2]) to allow Canadian investment without exposing debt holders to currency risks.

The bank could then use USDCAD basis swaps to transform most of its liability back into USD. Specifically, if a US company issued CAD $1bn notional of 2-year Maple bonds with a floating rate of 3m CDOR + 100bp, it could switch the CAD liability, both principal and coupon, to USD by receiving the spread in a 2-year USDCAD basis swap (-7bp), i.e., receiving the CAD leg and paying the USD leg. Exhibit 13 shows the structure of the swap based on February 22, 2013 market levels. The effective currency exposure in CAD would now be limited to 107bp of CAD $1bn instead of the entire principal and interim interest payments.

Exhibit 13: Swapping a CAD liability to mostly USD

Based on market exchange rates and basis spread levels as of COB February 22, 2013



Source: Credit Suisse

2 A CAD-denominated bond issued by a foreign issuer.

Using CCBS to Express a Speculative Convergence View

As cross-currency basis swaps gained broader awareness through the funding crisis in recent years, a new class of non-traditional investors has started to trade in these markets. Fast money clients and hedge funds are increasingly expressing speculative relative value views through either outright or convergence trades.

An example of a convergence opportunity can currently be found between EURUSD and CHFUSD basis swaps. Historically the two cross-currency basis tend to trade closely, as shown in Exhibit 14. However, since the middle of last year, the EURUSD basis has rebounded sharply as European financial stress improved while CHFUSD basis lagged due to issuance activity. As a convergence trade, investors can receive five-year EURUSD basis and pay five-year CHFUSD and look for the dislocation to normalize either with renewed funding stress in Europe or a slowdown in such issuance activity.

Exhibit 14: As a convergence trade, investors can receive five-year EURUSD basis and pay five-year CHFUSD

Source: Credit Suisse Locus

CREDIT SUISSE

INTEREST RATE STRATEGY

Eric Miller, Managing Director
Global Head of Fixed Income and Economic Research
+1 212 538 6480
eric.miller.3@credit-suisse.com

US RATES

Carl Lantz, Managing Director
US Head
+1 212 538 5081
carl.lantz@credit-suisse.com

Ira Jersey, Director
+1 212 325 4674
ira.jersey@credit-suisse.com

Michael Chang, Director
+1 212 325 1962
michael.chang.2@credit-suisse.com

Carlos Pro, Associate
+1 212 538 1863
carlos.pro@credit-suisse.com

William Marshall, Analyst
+1 212 325 5584
william.marshall@credit-suisse.com

EUROPEAN RATES

Helen Haworth, CFA, Director
European Head
+44 20 7888 0757
helen.haworth@credit-suisse.com

Sabine Winkler, Director
+44 20 7883 9398
sabine.winkler.2@credit-suisse.com

Panos Giannopoulos, Director
+44 20 7883 6947
panos.giannopoulos@credit-suisse.com

Thushka Maharaj, Vice President
+44 20 7883 0211
thushka.maharaj@credit-suisse.com

Florian Weber, Associate
+44 20 7888 3779
florian.weber@credit-suisse.com

Marion Pelata, Associate
+44 20 7883 1333
marion.pelata @credit-suisse.com

Adam Dent, Associate
+44 20 7883 7455
adam.dent@credit-suisse.com

TECHNICAL ANALYSIS

David Sneddon, Managing Director
+44 20 7888 7173
david.sneddon@credit-suisse.com

Christopher Hine, Director
+1 212 538 5727
christopher.hine@credit-suisse.com

Pamela McCloskey, Vice President
+44 20 7888 7175
pamela.mccloskey@credit-suisse.com

Cilline Bain, Vice President
+44 20 7888 7174
cilline.bain@credit-suisse.com

David Robertson, Analyst
+44 20 7888 7172
david.robertson@credit-suisse.com

TOKYO

Tomohiro Miyasaka, Director
Japan Head
+ 81 3 4550 7171
tomohiro.miyasaka@credit-suisse.com

Disclosure Appendix

Analyst Certification

I, Michael Chang and Carl Lantz, certify that (1) the views expressed in this report accurately reflect my personal views about all of the subject companies and securities and (2) no part of my compensation was, is or will be directly or indirectly related to the specific recommendations or views expressed in this report.

Important Disclosures

Credit Suisse's policy is only to publish investment research that is impartial, independent, clear, fair and not misleading. For more detail, please refer to Credit Suisse's Policies for Managing Conflicts of Interest in connection with Investment Research: http://www.csfb.com/research-and-analytics/disclaimer/managing_conflicts_disclaimer.html
Credit Suisse's policy is to publish research reports as it deems appropriate, based on developments with the subject issuer, the sector or the market that may have a material impact on the research views or opinions stated herein.
The analyst(s) involved in the preparation of this research report received compensation that is based upon various factors, including Credit Suisse's total revenues, a portion of which are generated by Credit Suisse's Investment Banking and Fixed Income Divisions.
Credit Suisse may trade as principal in the securities or derivatives of the issuers that are the subject of this report.
At any point in time, Credit Suisse is likely to have significant holdings in the securities mentioned in this report.
As at the date of this report, Credit Suisse acts as a market maker or liquidity provider in the debt securities of the subject issuer(s) mentioned in this report.
For important disclosure information on securities recommended in this report, please visit the website at https://firesearchdisclosure.credit-suisse.com or call +1-212-538-7625.
For the history of any relative value trade ideas suggested by the Fixed Income research department as well as fundamental recommendations provided by the Emerging Markets Sovereign Strategy Group over the previous 12 months, please view the document at http://research-and-analytics.csfb.com/docpopup.asp?ctbdocid=330703_1_en. Credit Suisse clients with access to the Locus website may refer to http://www.credit-suisse.com/locus.
For the history of recommendations provided by Technical Analysis, please visit the website at http://www.credit-suisse.com/techanalysis.
Credit Suisse does not provide any tax advice. Any statement herein regarding any US federal tax is not intended or written to be used, and cannot be used, by any taxpayer for the purposes of avoiding any penalties.

Emerging Markets Bond Recommendation Definitions

Buy: Indicates a recommended buy on our expectation that the issue will deliver a return higher than the risk-free rate.
Sell: Indicates a recommended sell on our expectation that the issue will deliver a return lower than the risk-free rate.

Corporate Bond Fundamental Recommendation Definitions

Buy: Indicates a recommended buy on our expectation that the issue will be a top performer in its sector.
Outperform: Indicates an above-average total return performer within its sector. Bonds in this category have stable or improving credit profiles and are undervalued, or they may be weaker credits that, we believe, are cheap relative to the sector and are expected to outperform on a total-return basis. These bonds may possess price risk in a volatile environment.
Market Perform: Indicates a bond that is expected to return average performance in its sector.
Underperform: Indicates a below-average total-return performer within its sector. Bonds in this category have weak or worsening credit trends, or they may be stable credits that, we believe, are overvalued or rich relative to the sector.
Sell: Indicates a recommended sell on the expectation that the issue will be among the poor performers in its sector.
Restricted: In certain circumstances, Credit Suisse policy and/or applicable law and regulations preclude certain types of communications, including an investment recommendation, during the course of Credit Suisse's engagement in an investment banking transaction and in certain other circumstances.
Not Rated: Credit Suisse Global Credit Research or Global Leveraged Finance Research covers the issuer but currently does not offer an investment view on the subject issue.
Not Covered: Neither Credit Suisse Global Credit Research nor Global Leveraged Finance Research covers the issuer or offers an investment view on the issuer or any securities related to it. Any communication from Research on securities or companies that Credit Suisse does not cover is factual or a reasonable, non-material deduction based on an analysis of publicly available information.

Corporate Bond Risk Category Definitions

In addition to the recommendation, each issue may have a risk category indicating that it is an appropriate holding for an "average" high yield investor, designated as **Market**, or that it has a higher or lower risk profile, designated as **Speculative** and **Conservative**, respectively.

Credit Suisse Credit Rating Definitions

Credit Suisse may assign rating opinions to investment-grade and crossover issuers. Ratings are based on our assessment of a company's creditworthiness and are not recommendations to buy or sell a security. The ratings scale (AAA, AA, A, BBB, BB, B) is dependent on our assessment of an issuer's ability to meet its financial commitments in a timely manner. Within each category, creditworthiness is further detailed with a scale of High, Mid, or Low – with High being the strongest sub-category rating: **High AAA, Mid AAA, Low AAA** – obligor's capacity to meet its financial commitments is extremely strong; **High AA, Mid AA, Low AA** – obligor's capacity to meet its financial commitments is very strong; **High A, Mid A, Low A** – obligor's capacity to meet its financial commitments is strong; **High BBB, Mid BBB, Low BBB** – obligor's capacity to meet its financial commitments is adequate, but adverse economic/operating/financial circumstances are more likely to lead to a weakened capacity to meet its obligations; **High BB, Mid BB, Low BB** – obligations have speculative characteristics and are subject to substantial credit risk; **High B, Mid B, Low B** – obligor's capacity to meet its financial commitments is very weak and highly vulnerable to adverse economic, operating, and financial circumstances; **High CCC, Mid CCC, Low CCC** – obligor's capacity to meet its financial commitments is extremely weak and is dependent on favorable economic, operating, and financial circumstances. Credit Suisse's rating opinions do not necessarily correlate with those of the rating agencies.

Structured Securities, Derivatives, and Options Disclaimer

Structured securities, derivatives, and options (including OTC derivatives and options) are complex instruments that are not suitable for every investor, may involve a high degree of risk, and may be appropriate investments only for sophisticated investors who are capable of understanding and assuming the risks involved. Supporting documentation for any claims, comparisons, recommendations, statistics or other technical data will be supplied upon request. Any trade information is preliminary and not intended as an official transaction confirmation.

OTC derivative transactions are not highly liquid investments; before entering into any such transaction you should ensure that you fully understand its potential risks and rewards and independently determine that it is appropriate for you given your objectives, experience, financial and operational resources, and other relevant circumstances. You should consult with such tax, accounting, legal or other advisors as you deem necessary to assist you in making these determinations. In discussions of OTC options and other strategies, the results and risks are based solely on the hypothetical examples cited; actual results and risks will vary depending on specific circumstances. Investors are urged to consider carefully whether OTC options or option-related products, as well as the products or strategies discussed herein, are suitable to their needs.

CS does not offer tax or accounting advice or act as a financial advisor or fiduciary (unless it has agreed specifically in writing to do so). Because of the importance of tax considerations to many option transactions, the investor considering options should consult with his/her tax advisor as to how taxes affect the outcome of contemplated options transactions.

Use the following link to read the Options Clearing Corporation's disclosure document: http://www.theocc.com/publications/risks/riskstoc.pdf

Transaction costs may be significant in option strategies calling for multiple purchases and sales of options, such as spreads and straddles. Commissions and transaction costs may be a factor in actual returns realized by the investor and should be taken into consideration.