Markit USD Interest Rate Curve XML Specification

Monday, 30 March 2009

Document Updates

This section lists the changes made to this document as of March 26, 2009

Below table outlines the changes to this document.

Change Date	Change Description
Mar 30, 2009	- Spot Date logic updated to be Trade Date + 2 weekdays
Mar 27, 2009	- Changed source for deposit rates to be BBA. - Added the publish time in the File Availability section.
Mar 26, 2009	- Re-phrased the File Availability time. - Language updates in other sections.

1 Introduction

This chapter provides a brief introduction into the requirements for sourcing and publishing the USD interest rates to be used as input into the ISDA CDS Standard Model available at http://www.cdsmodel.com

1.1 Standardization of the Interest Rate Curve

Markit will be hosting the CDS Converter, a tool to convert between spreads and upfronts as part of the new standard 100/500 CDS contract. In order to value the new contract consistently across dealers, dealers must use standardized inputs into the ISDA CDS Standard Model. Markit will publish the standard interest rates daily, as the interest rate is one of the inputs into the ISDA CDS Standard Model as well as the Markit CDS Converter. Initially Markit will just be posting the USD Deposit and Swap rates, other currencies will follow.

1.2 Markit's Role

Markit will source the interest rate curve from its existing snaps through various data providers. Finally, Markit will publish an XML file on its website which can be downloaded through an automated script or by directly hitting the provided URL.

1.3 About Markit Group Ltd

Markit was founded in 2001 as the first independent source of credit derivative pricing. Today, our data, valuations, and trade processing services are regarded as the market standard in the global financial markets, helping our clients to reduce risk and improve operational efficiency.

As a private company with privileged relationships with 16 shareholder banks, Markit has unparalleled access to a valuable dataset spanning credit, equities, and the broader OTC derivative universe. Our unique relationships with the bank shareholders give us the opportunity to work closely with these leading market makers to develop innovative solutions for the marketplace.

With close to 1,000 institutions as clients - including investment banks, hedge funds, asset managers, central banks, regulators, rating agencies, and insurance companies - we provide round-the-clock support from our offices in London, New York, Chicago, Toronto, Amsterdam, Brussels, Luxembourg, Tokyo, and Singapore.

2 Project Overview

2.1 Purpose

This document details the XML message and definitions of the fields in the interest rate curve.

2.2 Definition of Terms Used

ACT/360 - Actual-360 Day Count Convention
30/360 - 30-360 Day Count Convention
Business Day Calendar - To avoid calendar maintenance, distribution, and agreement issues, all computations will assume a business day calendar of weekdays (Monday to Friday) only; weekends (Saturday, Sunday) will be the only non-business days.

3 Calculation Overview

This chapter provides an overview of the sourcing of interest rates and calculations used to derive yield curves.

3.1 Summary of the Calculations

Markit receives a feed from various data sources and snaps the values of the interest rate curves to its database.

3.2 Interest Rate Sourcing

In the body of the XML we will produce interest rates from the indicated sources for the following maturities:

USD Interest Rate Types		
Maturity	**USD Source**	**Day Count/Accrual Convention**
1MO	LIBOR	ACT/360
2MO	LIBOR	ACT/360
3MO	LIBOR	ACT/360
6MO	LIBOR	ACT/360
9MO	LIBOR	ACT/360
1Y	LIBOR	ACT/360
2Y	SWAP RATE	30/360 Semi-Annual
3Y	SWAP RATE	30/360 Semi-Annual
4Y	SWAP RATE	30/360 Semi-Annual
5Y	SWAP RATE	30/360 Semi-Annual
6Y	SWAP RATE	30/360 Semi-Annual
7Y	SWAP RATE	30/360 Semi-Annual
8Y	SWAP RATE	30/360 Semi-Annual
9Y	SWAP RATE	30/360 Semi-Annual
10Y	SWAP RATE	30/360 Semi-Annual
12Y	SWAP RATE	30/360 Semi-Annual
15Y	SWAP RATE	30/360 Semi-Annual
20Y	SWAP RATE	30/360 Semi-Annual
25Y	SWAP RATE	30/360 Semi-Annual
30Y	SWAP RATE	30/360 Semi-Annual

Note: The above table is specific to USD currency only.

The interest rates as provided can be used directly with the ISDA CDS Standard Model.

Markit snaps interest rates from various data providers into the Markit Data Warehouse. Below, please find a summary of the sources for the USD interest rates.

Currency	Type	Source
USD	Deposit	BBA
USD	Swap	ICAP

3.3 Yield Curve Calculation

3.3.1 Yield Curve Input

In order to interpolate the yield curve the following parameters are needed as inputs. The example for the yield curve calculation assumes the USD currency:

Field	Value
Today	Tue 03-Feb-09
Spot days	2
Spot date	Trade Date + 2 weekdays
MM dcc	ACT/360
Swap dcc	30/360
Float dcc	ACT/360
Swap ivl	6M
Float ivl	3M
Bad day conv	M
Holidays	**none**

Below please find a summary of the inputs into the yield curve

Name	Type	Description
Spot Date	Date	Trade Date + 2 weekdays
Spot Days	Integer	2 weekdays
MM dcc	String	Money market day count convention, e.g. ACT/360
Swap DCC	String	Day count convention for swap curve
Float DCC	String	Day count convention for floating coupon payments
Swap IVL	String	Interval between fixed coupon payments
Float IVL	String	Interval between floating coupon payments
Bad Day Conv	String	Bad day convention for adjusting coupon payment dates, in the above example M represents Modified Following
Holidays	String	Calendar used when adjusting coupon dates

3.3.2 Yield Curve Calculation for Cash Rates

The cash rates are directly converted into discount factors (*df*) using ACT/360 day count convention using the following equation:

$$df_t = \frac{1}{1 + depositRate_t * daycountfraction_t}$$

As an example, consider the 3-Month LIBOR Rate. Assume today is Feb-03-2009, implying the spot date is Feb-05-2009. The maturity date for the 3-Month LIBOR Rate is May-05-2009, which is 89 days from today. **Note**: If the maturity date for a deposit rate falls on a weekend, the maturity date is the next weekday. The maturity dates for swap rates are not adjusted for weekends. Maturity dates are not adjusted for holidays.

The *daycountfraction* is calculated as follows

$$daycountfraction = \frac{89 days}{360 days} = 0.247222$$

Suppose the depositRate is 0.0123375. The discount factor is then calculated as

$$df_t = \frac{1}{1 + \frac{89}{360} * 0.0123375} = 0.996959171$$

Zero Rates can then be derived from discount factors by the following formula

$$zeroRate_t = \frac{1}{df_t^{(1/tp)}} - 1$$

where *tp* = time from spot date to maturity date in years.
In the example then,

$$zerorate_t = \frac{1}{(0.996959171)^{(1/(89/365))}} - 1 = 0.01256814$$

3.3.3 Yield Curve Calculation for Swap Rates

The discount factor is defined in the same way as above:

$$df_t = \frac{1}{1 + depositRate_t * daycountfraction_t}$$

The 1-Month, 2-Month, 3-Month, 6-Month, 9-Month, and 1-Year discount factors have been calculated as above. The remaining discount factors can then be bootstrapped using an iterative process as described in the table below:

Inputs	Equation	Result
2Y Swap rate; 1M, 2M, 3M, 6M, 9M, 1Y discount factor;	$\sum_{i=1}^{N=1Y}[coupon_{(i)} \times df_{(i)}] + df_{(2Y)} = 1$	2Y discount factor
3Y Swap rate; 1M, 2M, 3M, 6M, 9M, 1Y, 2Y discount factor;	$\sum_{i=1}^{N=2Y}[coupon_{(i)} \times df_{(i)}] + df_{(3Y)} = 1$	3Y discount factor
4Y Swap rate; 1M, 2M, 3M, 6M, 9M, 1Y, 2Y, 3Y discount factor;	$\sum_{i=1}^{N=3Y}[coupon_{(i)} \times df_{(i)}] + df_{(4Y)} = 1$	4Y discount factor
……	……	……

As part of this process, intermediate discount factors are needed to discount coupons that do not fall on swap or deposit maturity dates - for example the 2Y calculation requires that the coupon at 18 months be discounted. The intermediate discount factor, in this case for 18 months, is interpolated between the 1Y and 2Y discount factors on the basis of a constant forward rate over the period from 1Y to 2Y i.e. the discount factor is log-linearly interpolated. The correct value for the forward rate is determined by an iterative search using Brent's method.

After this process, we have discount factors and zero rates for the 6 cash rates and 14 swap rates. The zero rates are then used as inputs in the converter

Note that the curve construction as described sets the value of the discount factor for the spot date to 1. Where a value is required for a day prior to spot (e.g. the curve date itself), this is obtained by extrapolating at the forward rate between spot and the first deposit maturity – thus the discount factor for the curve date is actually slightly greater than 1. To the extent that a user requires a present value calculated to the date to which the curve applies, rather than the spot date, this can be obtained simply by dividing the spot value by the curve date discount factor.

4 XML Production

This chapter describes the interest rate XML to be delivered to the users of the Markit CDS Converter. The example given is for the USD currency.

4.1 XML Header

The header section of the XML encompasses a summary of the data provided in the rest of the document. Below, please find a sample of the header of the XML message.

```
<?xml version="1.0" standalone="yes"?>
<interestRateCurve>
<effectiveasof>2009-02-03T05:00:00.000Z</effectiveasof>
<currency>USD</currency>
<baddayconvention>M</baddayconvention>
```

Below please find a description of the fields found in the header

Field	Type	Description
interestRateCurve	Element	Encapsulates the deposit and swap instruments for the curve.
effectiveasof	DateTime	Date and time from which the interest file takes effect in ISO 8601 format. The effectiveasof will always be the trade date
currency	String	Currency for the deposit and swap curve
baddayconvention	String	Convention for adjusting for Bad Days

Note: The character encoding will always be “UTF- 8”

4.2 XML Body

The constructed XML uses 20 curve points to display the information for the various maturities along the interest rate curves. For each of the 20 curve points we display the par rate of the interest curve, the maturity rate and the tenor.

Below, please find a sample of the XML:

```
<deposits>
      <daycountconvention>ACT/360</daycountconvention>
      <snaptime>2009-02-02T21:00:00.000Z</snaptime>
      <spotdate>2009-02-05</spotdate>
      <calendars>
      <calendar>none</calendar>
      </calendars>
      <curvepoint>
            <tenor>1M</tenor>
            <maturitydate>2009-03-05</maturitydate>
            <parrate>0.004375</parrate>
      </curvepoint>
      <curvepoint>
            <tenor>2M</tenor>
            <maturitydate>2009-04-06</maturitydate>
            <parrate>0.0094375</parrate>
       </curvepoint>
      <curvepoint>
            <tenor>3M</tenor>
            <maturitydate>2009-05-05</maturitydate>
            <parrate>0.01225</parrate>
       </curvepoint>
      <curvepoint>
            <tenor>6M</tenor>
            <maturitydate>2009-08-05</maturitydate>
            <parrate>0.0176</parrate>
       </curvepoint>
      <curvepoint>
           <tenor>9M</tenor>
           <maturitydate>2009-11-05</maturitydate>
           <parrate>0.0192</parrate>
       </curvepoint>
      <curvepoint>
            <tenor>1Y</tenor>
            <maturitydate>2010-02-05</maturitydate>
            <parrate>0.0207</parrate>
       </curvepoint>
</deposits>
<swaps>
      <fixeddaycountconvention>30/360</fixeddaycountconvention>
      <floatingdaycountconvention>ACT/360</floatingdaycountconvention>
      <fixedpaymentfrequency>6M</fixedpaymentfrequency>
      <floatingpaymentfrequency>3M</floatingpaymentfrequency>
      <snaptime>2009-02-02T21:00:00.000Z</snaptime>
      <calendars>
      <calendar>none</calendar>
      </calendars>
      <spotdate>2009-02-05</spotdate>
      <curvepoint>
           <tenor>2Y </tenor>
           <maturitydate>2011-02-05</maturitydate>
           <parRate>0.01588</parRate>
       </curvepoint>
```

```
    <curvepoint>
        <tenor>3Y</tenor>
        <maturitydate>2012-02-05</maturitydate>
        <parrate>0.01933</parrate>
    </curvepoint>
  <curvepoint>
        <tenor>4Y</tenor>
        <maturitydate>2013-02-05</maturitydate>
        <parrate>0.02184</parrate>
    </curvepoint>
  <curvepoint>
        <tenor>5Y</tenor>
        <maturitydate>2014-02-05</maturitydate>
        <parrate>0.02361</parrate>
</curvepoint>
    <curvepoint>
        <tenor>6Y</tenor>
        <maturitydate>2015-02-05</maturitydate>
        <parrate>0.02531</parrate>
    </curvepoint>
    <curvepoint>
        <tenor>7Y</tenor>
        <maturitydate>2016-02-05</maturitydate>
        <parrate>0.02661</parrate>
    </curvepoint>
    <curvepoint>
        <tenor>8Y</tenor>
        <maturitydate>2017-02-05</maturitydate>
        <parrate>0.02765</parrate>
    </curvepoint>
    <curvepoint>
        <tenor>9Y</tenor>
        <maturitydate>2018-02-05</maturitydate>
        <parrate>0.02855</parrate>
    </curvepoint>
    <curvepoint>
        <tenor>10Y</tenor>
        <maturitydate>2019-02-05</maturitydate>
        <parrate>0.02927</parrate>
    </curvepoint>
    <curvepoint>
        <tenor>12Y</tenor>
        <maturitydate>2021-02-05</maturitydate>
        <parrate>0.03067</parrate>
    </curvepoint>
    <curvepoint>
        <tenor>15Y</tenor>
        <maturitydate>2024-02-05</maturitydate>
        <parrate>0.03212</parrate>
    </curvepoint>
    <curvepoint>
        <tenor>20Y</tenor>
        <maturitydate>2029-02-05</maturitydate>
        <parrate>0.03254</parrate>
    </curvepoint>
```

```
        <curvepoint>
            <tenor>25Y</tenor>
            <maturitydate>2034-02-05</maturitydate>
            <parrate>0.03246</parrate>
        </curvepoint>
      <curvepoint>
            <tenor>30Y</tenor>
            <maturitydate>2039-02-05</maturitydate>
            <parrate>0.03233</parrate>
       </curvepoint>
      </swaps>
</interestRateCurve>
```

Below find a definition of the fields found in the XML file.

Field	Type	Description
deposits	Element	Encapsulates the deposit instruments
swaps	Element	Encapsulates the swap instruments
calendars	Element	Encapsulates the holiday calendars
tenor	String	Maturity of Interest Rate Curve Input, the tenor is meant for readability purposes.
maturitydate	Date	Maturity Date for the Points of the Interest Rate Curve specified in yyyy-mm-dd format, this date is directly input into the ISDA CDS standard model. Maturity dates for deposit rates are adjusted for weekends (using the 'modified following' convention), maturity dates for spot rates are not adjusted.
parrate	Double	Raw Interest Rate Curve Point
daycountconvention	String	Day count convention for deposits
fixedpaymentfrequency	String	Assumed frequency for the fixed leg payments for swap instruments
floatingpaymentfrequency	String	Assumed frequency for the floating leg payments for swap instruments
snaptime	Date/Time	The exact date and time that the interest rates were snapped into the Markit Data Warehouse
spotdate	Date	Trade Date + 2 weekdays
calendar	String	Effective holiday calendar for the deposit or swap instruments

5 File Transmission

The interest rate file will be available as a zipped archive from the following address https://www.markit.com/news/InterestRates_*yyyymmdd*.zip [1]. While several programming/scripting languages can be used to download the file, Curl is an easy to use utility for this purpose, example provided below.

5.1 Curl Example

Curl is available as a source code or a binary from the following website:

http://curl.sourceforge.net/download.html
http://curl.haxx.se/download.html

The first step is to download the curl program and the OpenSSL packages (that enable curl to transmit information securely with SSL) appropriate for your computer from one of these websites.
Once the curl program has been successfully installed along with the SSL library, you can automate the process of downloading the file from Markit as follows:

curl https://www.markit.com/news/InterestRates_yyyymmdd.zip > 'local_path'

where yyyymmdd refers to the file publication date (please see examples below and in the Appendix). The output from the file can be directed to a local file path (file path must include the file name).

5.2 File Availability

The interest rate file will be published every week from Monday to Friday at 17:00 New York local time (including holidays). Let T represent the trade date. The file will be published on T-1 weekday, and will be effective on T (0:00 to 23:59.999 New York local time). Historical files will be made available. All files will be stored using the following format InterestRates_*yyyymmdd*.zip.
Below table provides an example of the files published for the week of March 9th, 2009.

Date	File Publication Date	Deposit/Swap Rates Snaptime [16:00 NY Time]	File Name
Mon 2009-03-09	Fri 2009-03-06	Fri 2009-03-06	InterestRates_20090306.zip
Tue 2009-03-10	Mon 2009-03-09	Mon 2009-03-09	InterestRates_20090309.zip
Wed 2009-03-11	Tue 2009-03-10	Tue 2009-03-10	InterestRates_20090310.zip
Thu 2009-03-12	Wed 2009-03-11	Wed 2009-03-11	InterestRates_20090311.zip
Fri 2009-03-13	Thu 2009-03-12	Thu 2009-03-12	InterestRates_20090312.zip

Note: No files will be published on a Saturday or Sunday. The file published on Friday can be used for Saturday and Sunday.

For further details regarding the availability of interest rate files and the snap times of interest rates on days surrounding holidays in 2009, please see the Appendix.

Note: The XML structure and file delivery mechanism presented above are provisional. In an effort to make the Interest Rates data available to be used as an input into the ISDA CDS Standard Model ahead of the April 8, 2009 deadline, Markit is making the XML available at the above mentioned URL and in the format as described above. Markit is currently designing a new framework to automate the generation of the Interest Rate Curve XML file. During a future date (expected to be May, 2009) the XML structure, URL location and transmission methodology may change, the data fields will not be impacted. Users may download and use this provisional format but should be prepared to make changes when the new format and other details are updated. Markit will communicate any future updates or changes to the file availability via changes to this document.

[1] For historical consistency the files available at https://www.markit.com/news/InterestRates_yyyymmdd.zip will continue to be made available until May 31, 2009

Contact

This section provides information about how to contact Markit for more information or support.

Address:
Markit
620 8th Avenue, 35th Floor
New York, NY 10018
United States
www.markit.com

For information not answered in this guide or any other issues/questions, please email
support@markit.com

Appendix: File Availability on Holidays

			File Publication Date	Deposit Snap Time	Swap Snap Time	Spot Date	File Name
Date	Holiday Location *	Trade Date + T	T-1 [17:00 NY Time]	[16:00 NY Time]	[16:00 NY Time]	Trade Date +2 weekdays	
Good Friday	U.K. U.S.	Fri April 10, 2009	Thu April 9, 2009	Thu April 9, 2009	Thu April 9, 2009	Tue April 14, 2009	InterestRates_USD_20090409.zip
Easter Monday	U.K.	Mon April 13, 2009	Fri April 10, 2009	Thu April 9, 2009	Thu April 9, 2009	Wed April 15, 2009	InterestRates_USD_20090410.zip
Day after Easter Monday		Tue April 14, 2009	Mon April 13, 2009	Thu April 9, 2009	Mon April 13, 2009	Thu April 16, 2009	InterestRates_USD_20090413.zip
May Day	U.K.	Mon May 4, 2009	Fri May 1, 2009	Fri May 1, 2009	Fri May 1, 2009	Wed May 6, 2009	InterestRates_USD_20090501.zip
Day after May Day		Tue May 5, 2009	Mon May 4, 2009	Fri May 1, 2009	Mon May 4, 2009	Thu May 7, 2009	InterestRates_USD_20090504.zip
Memorial Day/ Spring Bank Holiday	U.S. U.K.	Mon May 25, 2009	Fri May 22, 2009	Fri May 22, 2009	Fri May 22, 2009	Wed May 27, 2009	InterestRates_USD_20090522.zip
Day after Memorial Day/Bank Holiday		Tue May 26, 2009	Mon May 25, 2009	Fri May 22, 2009	Fri May 22, 2009	Thu May 28, 2009	InterestRates_USD_20090525.zip
Independence Day (observed)	U.S.	Fri Jul 3, 2009	Thu Jul 2, 2009	Thu Jul 2, 2009	Thu Jul 2, 2009	Tues Jul 7, 2009	InterestRates_USD_20090702.zip
Day after Independence Day		Mon Jul 6, 2009	Fri Jul 3, 2009	Fri Jul 3, 2009	Thu Jul 2, 2009	Wed Jul 8, 2009	InterestRates_USD_20090703.zip
Summer Bank Holiday	U.K.	Mon Aug 31, 2009	Fri Aug 28, 2009	Fri Aug 28, 2009	Fri Aug 28, 2009	Wed Sept 2, 2009	InterestRates_USD_20090828.zip
Day after Bank Holiday		Tue Sept 1, 2009	Mon Aug 31, 2009	Fri Aug 28, 2009	Mon Aug 31, 2009	Thu Sept 3, 2009	InterestRates_USD_20090831.zip
Labor Day	U.S.	Mon Sep 7, 2009	Fri Sep 4, 2009	Fri Sep 5, 2009	Fri Sep 5, 2009	Wed Sept 9, 2009	InterestRates_USD_20090904.zip
Day after Labor Day		Tue Sep 8, 2009	Mon Sep 7, 2009	Mon Sep 7, 2009	Fri Sep 5, 2009	Thu Sept 10, 2009	InterestRates_USD_20090907.zip
Columbus Day	U.S.	Mon Oct 12, 2009	Fri Oct 9, 2009	Fri Oct 10, 2009	Fri Oct 10, 2009	Wed Oct 14, 2009	InterestRates_USD_20091009.zip
Day after Columbus Day		Tue Oct 13, 2009	Mon Oct 12, 2009	Mon Oct 12, 2009	Fri Oct 10, 2009	Thu Oct 15, 2009	InterestRates_USD_20091012.zip
Veterans Day	U.S.	Wed Nov 11, 2009	Tue Nov 10, 2009	Tue Nov 10, 2009	Tue Nov 10, 2009	Fri Nov 13, 2009	InterestRates_USD_20091110.zip
Day after Veterans Day		Thu Nov 12, 2009	Wed Nov 11, 2009	Wed Nov 11, 2009	Tue Nov 10, 2009	Mon Nov 16, 2009	InterestRates_USD_20091111.zip
Thanksgiving Day	U.S.	Thu Nov 26, 2009	Wed Nov 25, 2009	Wed Nov 25, 2009	Wed Nov 25, 2009	Mon Nov 30, 2009	InterestRates_USD_20091125.zip
Day after Thanksgiving Day		Fri Nov 27, 2009	Thu Nov 26, 2009	Thu Nov 26, 2009	Wed Nov 25, 2009	Tues Dec 1, 2009	InterestRates_USD_20091126.zip
Christmas Day	U.S. U.K.	Fri Dec 25, 2009	Thu Dec 24, 2009	Thu Dec 24, 2009	Thu Dec 24, 2009	Tue Dec 29, 2009	InterestRates_USD_20091224.zip
Boxing Day	U.K.	Mon Dec 28, 2009	Fri Dec 25, 2009	Thu Dec 24, 2009	Thu Dec 24, 2009	Wed Dec 30, 2009	InterestRates_USD_20091225.zip
Day after Boxing Day		Tue Dec 29, 2009	Mon Dec 28, 2009	Thu Dec 24, 2009	Mon Dec 28, 2009	Thu Dec 31, 2009	InterestRates_USD_20091228.zip

* Holiday locations are defined as per the recommended close on holidays by SIFMA available at: http://www.sifma.org/services/holidays.html

+ All dates relative to trade date (T) are in weekdays.