

# Nasdaq Calypso Bloomberg DL Market Data Integration Guide

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## **Document History**

Revision	Published	Summary of Changes
1.0	May 2021	First edition – Updates for version 11.3.0.
2.0	February 2022	Second edition – Updated for version 11.8.5.
3.0	May 2022	Third edition – Updated for version 11.8.9

This document describes how to integrate Calypso with Bloomberg Data License for market data.

For information on integrating products, corporate actions, and trades from Bloomberg DL, please refer to the *Calypso Bloomberg DL Products Integration Guide* for details.

For installation and setup requirements, please refer to the *Calypso Bloomberg DL Products Integration Guide* for details.

NOTE: The Calypso License to use this Calypso Integration Module does not include a license for any third-party data services to which this module can interface. Clients are responsible for contracting with the appropriate third-party data service(s) prior to using this Calypso Integration Module.

IMPORTANT NOTE: For Cloud deployments please contact your application management team as the deployment procedure for Cap Cloud is different.



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## Quotes via the Feed Address Window

## 1.1 Feed Configuration

You need to specify a Feed Configuration to access the Bloomberg platform.

If you are using multiple user accounts, create a feed config for each user account for the Bloomberg type.

🥖 FeedConfig Window			×
Name Bloomberg	Type Bloomber	g ~ [	🖊 Is Default
Name		Value	
HostName		dtsftp.bloomberg	.com
Port		30206	
Log			
UserName		dl904	
Password			
SSHPrivateKeyPath		C:\bbg\bbg_id_rs	a
SSHPassPhrase		calypso	

HostName replaces BLOOMBERG\_FTP\_HOST

Port replaces BLOOMBERG\_FTP\_PORT

UserName replaces BLOOMBERG\_FTP\_USER

**Password** replaces BLOOMBERG\_FTP\_PASSWORD

SSHPricateKeyPatch replaces BLOOMBERG\_SFTP\_PRIVATE\_KEY\_FILENAME

SSHPassPhrase replaces BLOOMBERG\_SFTP\_PASSPHRASE

The Feed Config can be selected in the Bloomberg Connect and Bloomberg Update windows.

### 1.2 Feed Address Mapping

Clients can use the Feed Address window to map and define a list of quotes to their corresponding Bloomberg fields for a given feed config.



Feed Address Window (User: ca	lypso_user)						-DX
Feed Bloomberg 💌	Quote Address Equ	uity.IBM					
Quote Type Price	Feed Address IBN	1 US Equity	*		1.0 +	0.0	
Names Like	Bid PX	BID	Ask PX_ASK	High	PX_HIGH	Last P	X_LAST
	Open PX	_OPEN	Close	Low	PX_LOW	Date	
Ad	Quote Address	Type Fe	eed Feed Address	Mult	Add Bid Name	Ask Name	Open
Equity.IBE.MC	Equity.AMZN	Price Bloon	nberg AMZN US Equity	1	0 PX_BID	PX_ASK	PX_OPE
Equity.IBM	Equity.IBM	Price Bloon	nberg IBM US Equity	1	0 PX_BID	PX_ASK	PX_OPE
Equity.ICE							
Equity.IFF							
Equity.IFL.AX							

Quote Address is a Calypso quote name.

**Feed Address** specifies the Bloomberg code for the quote corresponding to a Calypso Quote Address.

#### Examples

• Currency Quote Address

Calypso: FX.USD.JPY

Bloomberg: USDJPY Curncy

- Equity Quote Address (required for gethistory)
- Calypso: Equity.IBM

Bloomberg: IBM US Equity

You can then use the specified feed address config in the Bloomberg Update Window, "Template" field to request the corresponding quotes.

Ensure that you also create Scheduled Tasks for making the request and processing the response.

#### (I) [NOTE: Requesting additional fields invokes a normal Equity or Equity Index update.]

From the Feed dropdown, select the previously defined Bloomberg feed. Click **Load All** to display existing mappings.

Click **Refresh** to load the Addresses list (i.e., Calypso quote names). You can filter the list by selecting a quote type from the Quote Type dropdown or by entering a search string in Names Like (e.g., MM.USD.LIBOR) and clicking Refresh.

#### To Add a New Mapping

#### () [NOTE: It is possible to map multiple assets to a single feed address.]

Select a Calypso quote name from the Addresses list.

Enter the corresponding Bloomberg quote name in the Feed Address. Enter a multiplier value and spread value as applicable.

Enter Bloomberg real-time field names as applicable.



#### () [NOTE: The default date that the system saves with the quote is Today.]

Click Add.

Repeat for other quote names.



## Historical Data

## 2.1 Overview

The **gethistory** program retrieves various historical data fields for a specified list of securities within a given date range. Bloomberg support for historical data includes Quotes (End-of-Day pricing) and Swaption Volatility.

Calypso Bloomberg Integration supports Quotes (End-of-Day pricing) at this time. The following table provides a listing of Bloomberg fields available via the **gethistory** program:

Field Mnemonic	Field Description
PX_ASK	Ask Price
PX_BID	Bid Price
PX_MID	Mid Price
PX_LOW	Low Price
PX_HIGH	High Price
PX_OPEN	Open Price
PX_LAST	Last Price

Use the Calypso Feed Address window to map Calypso Quote Addresses to Bloomberg Quote Addresses.

## 2.2 Using Gethistory

To obtain historical pricing information, first open the Bloomberg Update window from Bloomberg Connect.

🛃 Bloomberg Update				- 🗆 X
Bloomberg Updates	🖣 🗆 Update Defin	ition	_	
oneshot     MBS_FLOWS	Program:	gethistory ~	Template Type:	Quote $\vee$
🚽 🐓 UpEquities	Name:	one_history	Template Name	Bloomberg $\sim$
UpdateIndex	Frequency:	oneshot ~	Run Date:	(YYYYMMDD)
	Period:	daily ~	Exec Time:	(HHMM)
	Currency:	ANY ~	Date Range:	(YYYYMMDD)
	Pricing So	~	Snapshot	. ~
		Exclusive Pricing S		
		Add Custom Header		
	Feed:	~		



Historical pricing is retrieved using the **gethistory** program.

When the **gethistory** program is selected, the following additional fields are available:

- Delay Limit The nominal frequency of use for this update template.
- Period The nominal pricing period.
- Currency The desired pricing currency.
- Date Range An inclusive range of days to retrieve historical pricing. The limit set by Bloomberg is seven days before the Run date (typically, today). When Frequency is **oneshot**, Date Range is mandatory. gethistory will return a single day if Date Range is left blank (except for **oneshot** requests).
- Feed You can select a feed config if you are using multiple user accounts. Otherwise, BLOOMBERG\_STP\_USER is used.

After saving, request the data either via a scheduled task or from the Bloomberg Connect window.



## **Snapshot Pricing Data**

## 3.1 Overview

Calypso's Bloomberg Integration Module supports the retrieval of quote snapshots from the Bloomberg Data License Server using the **Getsnap** program. This includes the following:

- Use Getsnap to request, receive, and process a quote snapshot.
- Process Bloomberg quote snapshots of past dates.

In conjunction with the ability to create daily scheduled requests, users can now reliably retrieve daily quote values with a precisely defined timestamp and with the possibility of a correct recovery in case of a failure.

Bloomberg's Data License Pricing Snapshot offers a service to satisfy existing Data License Per Security clients needing a price returned with higher precision at a specified time or valuation point.

## 3.2 Getsnap Feed Config

You need to define a different Feed Config for getsnap as the Feed Address Mapping differs from which of the other programs.

🛃 FeedConfig Window	×
Name BDL237 Type Bloo	mberg 🗸 🗸 v
Name	Value
HostName	dlsftp.bloomberg.com
Port	30206
Log	
UserName	dl237
Password	•••••
SSHPrivateKeyPath	C:\blp\bbg_id_rsa
SSHPassPhrase	••••••
BloombergUserNumber	12345

## 3.3 Getsnap Feed Address Mapping

In the Feed Address Window (**Configuration > Market Data > Feed Address Mapping** from the Calypso Navigator), define a mapping for each security you wish to use with Getsnap for this new Feed Config. When the **Getsnap** program is run, it will not execute for securities that do not have an appropriate mapping defined.



🖌 Feed Addre	ess Window (User: calypso_	user)								_ 0
Feed	BloombergDataLicen 💌	Quote Addres	ss Bond.UKT 5 03,	/07/18.03	3-07-2018.5.0000	0				
Quote Type	CleanPrice	Feed Addres	ss EG4569042 CU	SIP	*	1	.0 +	0.0		
Names	s Like	Bid	BID PRICE	Ask	ASK PRICE	High H	IGH PRICE	Last	LAST PRICE	
		Open	OPEN PRICE	Close	PREVIOUS CL	Low	OW PRICE	Date	PREVIOUS C	1
	Addres	sses	Qu	ote Addr	ess	Туре		Feed		Feed Address
Bond.T 2 3/4	02/15/19.02-15-2019.2.75000		Bond.UKT 5 03/03	7/18.03-0	7-2018.5.00000	CleanPrice	Bloomberg	ataLicense	e EO	4569042 CUS
Bond.T 3 1/2	02/15/18.02-15-2018.3.50000		Bond.UKT 5 03/03	7/18.03-0	7-2018.5.00000	CleanPrice	Bloomberg	ataLicense	GetSnap E0	4569042 CUS
Bond.T 4 1/2	08/15/39.08-15-2039.4.50000									
Bond.T 6 3/4	08/15/26.08-15-2026.6.75000									
Bond.UKT 3 3	3/4 09/07/19.09-07-2019.3.750	000								
Bond.UKT 3 3	3/4 09/07/20.09-07-2020.3.750	000								
Bond.UKT 4 (	03/07/22.03-07-2022.4.00000									
Bond.UKT 43	3/4 03/07/20.03-07-2020.4.750	000								
Bond.UKT 5 (	03/07/18.03-07-2018.5.00000									
Bond, UKT 8 (	06/07/21.06-07-2021.8.00000									

Take note that the fields for **Getsnap** differ from those available for other programs:

Calypso Field	Bloomberg Getsnap Field (Typical)
Bid	BID PRICE
Ask	ASK PRICE
High	HIGH PRICE
Last	LAST PRICE
Open	OPEN PRICE
Close	PREVIOUS CLOSE PRICE
Low	LOW PRICE
Date	PREVIOUS CLOSE DATE

It is possible to map the Close field with "LAST PRICE" if the user wants to feed LAST PRICE into the close instance of a quote. If the user wants to feed data on Today's market data set, then while defining mapping, the Date field can be left empty and the quote received will be fed in Today's quote set. The response file can also be used to feed the previous close price into the previous close date. In that case, Close should be mapped to "PREVIOUS CLOSE PRICE" and Date should be mapped to "PREVIOUS CLOSE DATE". This setting will feed the value in the Previous Close price field into the close instance of quote set for date corresponding to "PREVIOUS CLOSE DATE" field of the response file.

Below is an example that shows how to feed LAST PRICE in the close instance for today.



Feed	d Addr	ess Window																-		>
Fe	eed	BDLIRD	~	Quote Address	Swap.1	IOY.EUR.I	EURIBOR	.3M/1Y.CURV	E											
Quote T	Type	Yield	~	Feed Address	EUSW 1	.0V3 Curr	су	-		0.0	1 +	0								
Names	Like			Bid			Ask		Hig	ph [		Last L	AST PRICE							
				Open			Close	LAST PRICE	Lo	w		Date								
	Quote	e Address			Туре	Feed	Feed	Address	Mult	Add	Bid Name	Ask Name	Open Name	Close Name	High Name	Low Name	Last Name	Date Name		
~	Swap.	10Y.CNY.REPO. 1W	USD.LIBO	DR.3M.CURVE	Yield	BOLIRD	CNBS1	0 Curncy	0.0001	(	0	1		LAST PRICE			LAST PRICE	1	1	^
	Swap.	10Y.DKK.CIBOR.3M	USD.LIB	OR.3M.CURVE	Yield	BOLIRD	DKBS1	0 Curncy	0.0001	. (	0			LAST PRICE			LAST PRICE		1	
	Swap.	10Y.DKK.CIBOR.6M	/1Y.CUR	VE.	Yield	BOLIRD	DKSW1	0 Curncy	0.01	. (	0			LAST PRICE			LAST PRICE		1	
	Swap.	10Y.DKK.DKKOIS. 1	D/1Y.CUR	VE	Yield	BDLIRD	DKSWT	N10 Curncy	0.01	. (	)			LAST PRICE			LAST PRICE		1	
	Swap.	10Y.EUR.EONIA. 10	/IY.CURV	VE.	Yield	BOLIRD	EUSWE	10 Curncy	0.01	(	D			LAST PRICE			LAST PRICE		1	
	Swap.	10Y.EUR.EURIBOR.	3M/1Y.CL	JRVE	Yield	BOLIRD	EUSW1	LOV3 Curncy	0.01	(	)			LAST PRICE	1		LAST PRICE			
	Swap.	10Y.EUR.EURIBOR.	3M/USD.L	LIBOR. 3M. CURVE	Yield	BOLIRD	EUBS 1	0 Curncy	0.0001					LAST PRICE			LAST PRICE			

## 3.4 Using Getsnap

To obtain Snapshot pricing from Bloomberg, open the Bloomberg Update window:

	🛃 Bloomberg Update						_			$\times$
ſ	Bloomberg Updates	Update Defir	nition							
	🗄 🛄 oneshot	Program:	getsnap	$\sim$	Template Type:	Quote			$\sim$	
		Name:	getsnapUpdate		Template Name	Bloomber	gDataLicer	nse	$\sim$	
		Frequency:	oneshot	$\sim$	Run Date:		(YYYYMN	4DD)		
		Pricing So		$\sim$	Snap Time:	0800	(HHMM)			
			Exclusive Pricing S		Delay Limit:					
			Add Custom Header							
		Feed:	~							

Snapshot pricing is retrieved using the **Getsnap** program.

When the **Getsnap** program is selected, the following additional field is available:

- Delay Limit The number of minutes in which Bloomberg must produce a response file. Securities having longer embargoes are not included in the response and reply files.
- (I) [NOTE: Calypso provides a means to automatically convert the SNAPTIME sent in the Request file to the Data License Server timezone.]
  - Feed You can select a feed config if you are using multiple user accounts. Otherwise, BLOOMBERG\_STP\_USER is used.

After saving, request the data either via a scheduled task or from the Bloomberg Connect window.

The user must also create a Feed Config and Feed Address mapping for **Getsnap**.

#### [] [NOTE: Make sure that all currencies have an ISO code.]



### 3.5 Send and Receive Getsnap Updates via BLOOMBERG\_UPDATE

The Scheduled Task window (**Configuration > Scheduled Tasks** from the Calypso Navigator) can be used to define a BLOOMBERG\_UPDATE scheduled task. Parameters can be set to include **getsnap** updates in the Scheduled Task.

Task Description										
Task 1	Гуре:	BLOOMBERG_UPDATE								
External Refere	ence:									
Comm	ents:									
Descrip	otion:									
Execution Parame	ters									
Attempts:	1	Retry After: 0 minutes Expected Execution Time (SLA):								
JVM Settings:	-Xms	512m -Xmx1024m								
Log Settings:										
Task Notification (	Options									
Send Emai	ils [	Publish Business Events To User:								
E Common Att	ribute	IG								
Task Attribut	tes									
Action		1 - Send Request for Updates								
DIFFFLAG										
Update Names	5	getsnapupdate								
Input Dir										
Input Files										
Update Known	Date									

**Getsnap** updates use the same workflow as the other Program types. When the BLOOMBERG\_UPDATE scheduled task is run and includes Getsnap Updates:

- Calypso generates request files for each selected update, including selected Getsnap updates.
- Calypso uploads the request files to the Bloomberg FTP.
- Bloomberg generates the response and reply files. The response files contain verification that each requested security has a valid ID, while the reply files contain the requested quotes as well as the verification.
- Calypso downloads the corresponding reply files. Calypso will not download or process the **Getsnap** response files since the verification information is already captured in the reply file.
- Calypso will refer to the Feed Address Mappings defined for Getsnap to map the Bloomberg Quotes in the Getsnap reply files to the appropriate Calypso Quotes.
- As with other program types, Bloomberg exceptions and information for **Getsnap** updates are viewable in Calypso Task Station.

### 3.6 Manually Importing a Getsnap Reply File

You can manually import and reprocess a Getsnap reply file obtained from the Bloomberg FTP.

To import the file, open the Bloomberg Connect window and select the Import From File tab:



BloombergConnect (User: calypso_user)	
Utilities	
Request Import From File	
Bloomberg File: C:\FIc_31418M2G6.out	Import

Select the reply file you wish to work with, then click Import.

#### Cancelling a Getsnap Request

You can cancel a periodic Getsnap request using the cancel program.

## 3.7 Getsnap Request File Format

#### Format:

START-OF-FILE Header START-OF-FIELDS Fields (Fixed and Additional) END-OF-FIELDS START-OF-DATA Data

END-OF-DATA END-OF-FILE

#### 3.7.1 Header

#### Getsnap Header Fields

Field	Value	Notes
SNAPTIME	If the environment property BLOOMBERG_SERVERTZ is not set, will be the value entered in Bloomberg Update Window Exec Time field. If BLOOMBERG_SERVERTZ is set, the application converts the value entered in Bloomberg Update Window Exec Time field from the local timezone to the timezone specified by BLOOMBERG_SERVERTZ.	Determines the time that Bloomberg will process request file.
DELAY_LIMIT	Entered in Bloomberg Update window Delay Limit field.	Requires Bloomberg to produce reply file within this number of minutes; securities with longer embargoes are not included in the response file.



Field	Value	Notes
PROGRAMFLAG	Entered in Bloomberg Update window	Determines how often to process the request.
	Frequency field	
PROGRAMNAME	getsnap	Identifies the request file as for the getsnap program.
FIRMNAME	Entered in Environment Property or Feed Config	BLOOMBERG_FTP_USER or BLOOMBERG_ACCOUNT_NAME if BLOOMBERG_FTP_USER is already used, or user name from Feed Config if specified
RUNDATE	Entered in Bloomberg Update window Run Date field	Determines the start date for which the request is to be processed.
REPORT	Yes	The Getsnap report generated by Bloomberg is neither downloaded nor processed by Calypso, however, this flag is set to remain consistent with other Bloomberg Update programs.
REPLYFILENAME	request_file_name without the .out.enc extension	
SN	Entered in Environment Property BLOOMBERG_SN	Serial number. Needed for terminal user designation. This field is included only if the Environment Property has a value.
WS	Entered in Environment Property BLOOMBERG_WS	Workstation number. Needed for terminal user designation. This field is included only if the Environment Property has a value.
USERNUMBER	Entered in Environment Property BLOOMBERG_USERNUMBER	Needed for terminal user designation. This field is included only if the Environment Property has a value.
VOL_SURFACE	Yes	Used for importing Money Market bonds.
CLOSINGVALUES	Yes	Used for importing Money Market bonds.

#### 3.7.2 Fields

#### Fixed Fields

The fields below are automatically included to return values in the reply file. They are not listed in the request file.

- SECURITIES
- ERROR CODE
- NUM FLDS



- OPEN PRICE
- HIGH PRICE
- LOW PRICE
- BID PRICE
- MID PRICE
- ASK PRICE
- BID YIELD
- MID YIELD
- ASK YIELD
- LAST PRICE
- LAST YIELD
- LAST UPDATE TIME
- PREVIOUS CLOSE PRICE
- PREVIOUS CLOSE DATE
- PRICING SOURCE

#### Additional Fields

Users can specify additional fields.

NOTE: Additional fields specified in this region will be included in the Bloomberg update files.

However, Calypso does not process these additional fields. Calypso uses pre-existing functionality to map and incorporate reference data from the Bloomberg Data Server. The function of **Getsnap** is to retrieve quote data from Bloomberg, not reference data.

Quote value mapping is handled in the data feed map window, and incorporating quotes only requires the security ID and quote values. The existing mapping functionality will remain in place for pulling reference data, but mapping simply does not apply to pulling quotes for **Getsnap**.

#### 3.7.3 Data

Securities listed here are from the Template selected in the Bloomberg Update Window. The securities must also have their mappings defined in the Data Feed Mapping window for the Getsnap feed. Securities without a defined mapping are ignored.

#### 3.7.4 Sample Request File

REFORT=yes FIRMNAME=dlxxxxx REPLYFILENAME=testgetsnap.out.enc SNAPTIME=0900 DELAY\_LIMIT=3 PROGRAMNAME=getsnap PROGRAMFLAG=oneshot

START-OF-FILE



START-OF-FIELDS MARKET\_SECTOR\_DES END-OF-FIELDS START-OF-DATA BMW GY Equity IBM US Equity AHA LN 03/18/11 C2600 Equity GB0033280339|ISIN| CH0114507210 Corp EQ0017443700001000|BB\_UNIQUE| END-OF-DATA

END-OF-FILE

## 3.8 Getsnap Reply File Format

Format:

START-OF-FILE Header START-OF-FIELDS Fields END-OF-FIELDS TIMESTARTED START-OF-DATA Data

END-OF-DATA TIMEFINISHED END-OF-FILE

Field	Value
PROGRAMFLAG	Same value as in request file
FIRMNAME	Same value as in request file
REPLYFILENAME	Same value as in request file
SNAPTIME	Same value as in request file
DELAY_LIMIT	Same value as in request file
RUNDATE	Same value as in request file
PROGRAMNAME	Same value as in request file
REPORT	Same value as in request file
SN	Same value as in request file
WS	Same value as in request file
USERNUMBER	Same value as in request file



#### 3.8.1 TIMESTARTED

Time Bloomberg started to process request file.

#### 3.8.2 Data

Security ID | Return Code | Number Fields | Fixed Fields (| Delimited) | Fields Listed in Request File (| Delimited)

#### The return codes are:

Return Code	Definition
0	Good return. No errors occurred.
10	Bloomberg cannot find the security as specified.
11	Restricted Security. Must link to Bloomberg Professional™ with access.
100	Maximum number of securities exceeded (20,000)
150	Security blocked due to embargo not being met
988	System Error on security level
989	Unrecognized pricing source
990	System Error (Contact Technical Support)
991	Invalid override value (e.g., bad date or number)
992	Unknown override field
993	Maximum number of overrides (20) exceeded
994	Permission denied.
995	Maximum number of fields exceeded.
996	Buffer Overflow (some data for this security is missing).
997	General override error (e.g., formatting error)
998	Security identifier type (e.g., CUSIP) is not recognized.
999	Unloadable security



#### 3.8.3 Fields

#### Fixed Fields

The Fixed Fields, in order, are:

- SECURITIES
- ERROR CODE
- NUM FLDS
- OPEN PRICE
- HIGH PRICE
- LOW PRICE
- BID PRICE
- MID PRICE
- ASK PRICE
- BID YIELD
- MID YIELD
- ASK YIELD
- LAST PRICE
- LAST YIELD
- LAST UPDATE TIME
- PREVIOUS CLOSE PRICE
- PREVIOUS CLOSE DATE
- PRICING SOURCE

#### Additional Fields

Users can specify additional fields.

NOTE: Additional fields specified in this region will be included in the Bloomberg update files.

However, Calypso does not process these additional fields. Calypso uses pre-existing functionality to map and incorporate reference data from the Bloomberg Data Server. The function of **Getsnap** is to retrieve quote data from Bloomberg, not reference data.

Quote value mapping is handled in the data feed map window, and incorporating quotes only requires the security ID and quote values. The existing mapping functionality will remain in place for pulling reference data, but mapping simply does not apply to pulling quotes for **Getsnap**.

#### 3.8.4 TIMEFINISHED

The time that Bloomberg finished processing request file.

Calypso uses the date and time of TIMEFINISHED as the quote date when entered into the Calypso database.



#### 3.8.5 Sample Reply File

This sample reply file corresponds is a response to the sample request file.

START-OF-FILE RUNDATE=20110311

PROGRAMFLAG=oneshot FIRMNAME=dlxxxxx REPLYFILENAME=testgetsnap.out.enc SNAPTIME=0900

DELAY\_LIMIT=3

PROGRAMNAME=getsnap

START-OF-FIELDS MARKET\_SECTOR\_DES END-OF-FIELDS

TIMESTARTED=Fri Mar 11 09:00:00 EST 2011

START-OF-DATA

SECURITIES | ERROR CODE | NUM FLDS | OPEN PRICE | HIGH PRICE | LOW PRICE | BID PRICE | MID PRICE | ASK PRICE | BID YIELD | MID YIELD | ASK YIELD | LAST YIELD | LAST UPDATE TIME | PREVIOUS CLOSE PRICE | PREVIOUS CLOSE DATE | PRICING SOURCE | MARKET\_SECTOR\_DES |

BMW GY Equity|150|16| | | | | | | | | | | | | | Equity| IBM US

Equity|0|16|164.640000|164.670000|161.380000|162.030000|162.025000|162.

020000| | | |162.020000| |03/10/2011|162.020000|03/10/2011|US|Equity| AHA LN 03/18/11 C2600 Equity|0|16| | |

|519.500000|534.000000|548.500000| | | |513.500000|

|03/10/2011|513.500000|03/10/2011|LN|Equity| GB0033280339|0|16|109.962500|110.230000|109.962500|110.155000|110.16500 0|110.175000|2.349000|2.346800|2.344500|110.165000|2.346800|08:58:58|10

9.840000|03/10/2011|BGN|Govt| CH0114507210

Corp|0|16|100.439000|100.780000|100.439000|100.446000|100.648000|100.85 1000|2.159000|2.119000|2.078000|100.648000|2.119000|08:58:53|100.597000

|03/10/2011|BGN|Corp|

EQ0017443700001000|0|16|212.000000|215.000000|208.250000|211.700000|211

.500000|211.300000| | | |211.300000|

|06:06:18|211.300000|03/11/2011|IN|Equity| END-OF-DATA

TIMEFINISHED=Fri Mar 11 09:00:10 EST 2011

END-OF-FILE



## Volatility Surfaces

## 4.1 Swaption Lognormal

Add Custom Header       Run Date:       (YYYYMMDD)         Feed:       ~       Exec Time:       (HHMM)         Vol Model:       Lognormal       ~         Columns       Name       Type	Bloomberg Updates	Update Definition			
Frequency:       oneshot       Rate Index:       LIBOR       Tenor:       6M         Add Custom Header       Run Date:       (YYYYMMDD)         Feed:       V       Exec Time:       (HHMM)         Vol Model:       Lognormal       V         Name       Type	- i oneshot	Program: getdata		Swaption	$\sim$
Add Custom Header       Run Date:       (YYYYMMDD)         Feed:       ~       Exec Time:       (HHMM)         Vol Model:       Lognormal       ~         Columns       Name       Type		Name: swaption	Currency	USD	$\sim$
Feed:     Vol Model:     Lognormal       Columns     Type		Frequency: oneshot	<ul> <li>Rate Index:</li> </ul>	LIBOR Tenor: 6M	$\sim$
Columns Name Type		Add Custom Header	Run Date:	(YYYYMMDD)	
Columns Name Type		Feed:	Exec Time:	(HHMM)	
Name Type			Vol Model:	Lognormal ~	
		Columns			
BVOL DATA TIME STAMP		Name	Туре		
by be_brint_rine_brintin		nume			
		BVOL_DATA_TIME_STAMP BVOL_OIS_SWAPTION		- No Task - No Task	

#### BLOOMBERG\_UPDATE:

Attribute	Value
Action	1 - Send Request for Updates
DIFFFLAG	
Update Names	
Input Dir	
Input Files	swaption

Attribute	Value
Action	2 - Process Updates Received
DIFFFLAG	
Update Names	
Input Dir	
Input Files	swaption



VolatilitySurface3	D VOL - USD_Swaption_OIS - BBG USD CLOSE LIBOR 6M U	Iser(calypso_user)(PE OFFICIAL)	
Surface Utilities	Help		
Name OL - USD_Swa	ption_OIS - BBG CLOSE   Date 05/24/2016	3:03:49 PM	
Definition Offsets	Points Graph		
Comment	Generated from Bloomberg data on 05/25/2016		
Vol Type	RATE 🗸	Vol Model Black	
Currency	USD 🗸	Generator Derived Default	
Index	LIBOR V 6M V	Interpolator Interpolator 3DLinear	
Point Underlying	None 🗸		
	☑ Include Tenor Axis	Parameter Valu	le
Strike Type	Strike Offset bp 🗸	Spot Lag  SYNTHETIC_EXPIRY	
DateRoll	MOD_FOLLOW	SYNTHETIC_TENOR	
Holidays	NYC,LON		
Pricing Environment			

Tenor Ex	piry 🔘 Strike	Tenor 1Y	<b>•</b>		Volatili	ityModel: Black	1ID 🖣
Expiry/Offset bp	0	-200	-100	-50	-25	25	50
06/24/2016	45.2218000000	20.7736000000	20.7736000000	20.7736000000	6.9459000000	-3.1438000000	-4.21
08/24/2016	44.2877000000	206.2047000000	206.2047000000	18.0156000000	6.1875000000	-2.8490000000	-3.82
11/24/2016	46.0637000000	88.1483000000	88.1483000000	15.3891000000	5.6937000000	-3.3342000000	-5.24
02/24/2017	48.0753000000	48.0753000000	48.0753000000	48.0753000000	48.0753000000	48.0753000000	48.0
05/24/2017	49.3014000000	54.0394000000	54.0394000000	12.9338000000	5.1110000000	-3.4756000000	-5.89
05/24/2018	53.1901000000	38.7856000000	38.7856000000	11.4960000000	5.1284000000	-3.6211000000	-6.0
05/24/2019	57.5886000000	57.5886000000	57.5886000000	57.5886000000	57.5886000000	57.5886000000	57.5
05/24/2020	54.2070000000	54.2070000000	54.2070000000	54.2070000000	54.2070000000	54.2070000000	54.2
05/24/2021	50.2588000000	20.9568000000	20.9568000000	7.7493000000	3.6429000000	-2.9154000000	-4.9
05/24/2022	46.5512000000	46.5512000000	46.5512000000	46.5512000000	46.5512000000	46.5512000000	46.5
05/24/2023	43.7305000000	43.7305000000	43.7305000000	43.7305000000	43.7305000000	43.7305000000	43.7
05/24/2024	41.0422000000	41.0422000000	41.0422000000	41.0422000000	41.0422000000	41.0422000000	41.0
05/24/2025	38.7223000000	38.7223000000	38.7223000000	38.7223000000	38.7223000000	38.7223000000	38.7
05/24/2026	36.5602000000	58.9290000000	9.6045000000	3.9912000000	1.9708000000	-1.6434000000	-2.7
05/24/2031	30.2179000000	38.9310000000	6.8106000000	2.9299000000	1.4927000000	-1.2487000000	-2.0
05/24/2036	27.5348000000	49.6726000000	6.3183000000	2.7227000000	1.4064000000	-1.1655000000	-1.8
05/24/2041	25.8184000000	25.8184000000	25.8184000000	25.8184000000	25.8184000000	25.8184000000	25.8
05/24/2046	25.9184000000	8.4873000000	8.4873000000	3.3464000000	1.6332000000	-1.3124000000	-2.2



## 4.2 Swaption Normal

🥖 Bloomberg Update					_		>
Bloomberg Updates	Update Definition						
🗄 🔲 oneshot	Program: getdata	$\sim$	Template Type:	Swaption		~	/
	Name: swaption_normal		Currency	USD		~	1
	Frequency: oneshot	$\sim$	Rate Index:	LIBOR	Tenor:	6M >	1
	Add Custom H	leader	Run Date:		(YYYYMM	1DD)	
			Exec Time:	()	HMM)		
	Feed:	$\sim$	Vol Model:	Normal	- - -		
				1	?		
	Columns						
	Name		Туре				
	BVOL_DATA_TIME_STAMP		▼ Update -	- No Task			
	BVOL_OIS_SWAPTION		✓ Update -				
	REFERENCE_DATE		✓ Update -	- No Task			

#### BLOOMBERG\_UPDATE:

Attribute	Value	
Action	1 - Send Request for Updates	
DIFFFLAG		
Update Names		
Input Dir		
Input Files	swapn_normal	

Attribute	Value
Action	2 - Process Updates Received
DIFFFLAG	
Update Names	
Input Dir	
Input Files	swapn_normal



VolatilitySurface3	D VOL - USD_Swaption_OIS - BBG USD CLOSE LIBOR 6M User(calypso_user)(PE OFFICIAL)	
Surface Utilities	Help	
Name 'OL - USD_Swa	ption_OIS - BBG CLOSE   Date 05/24/2016 3:03:49 PM  Current	nt
Definition Offsets	Points Graph	
Comment	Generated from Bloomberg data on 05/25/2016	
Vol Type	RATE Vol Model BpVol	
Currency	USD  Generator Derived Default	
Index	LIBOR	
Point Underlying	None	
	☑ Include Tenor Axis Parameter	Value
Strike Type	Strike Offset bp	<b>v</b>
DateRoll	MOD_FOLLOW	
Holidays	NYC,LON	
Pricing Environment	OFFICIAL	

Definition Offsets Points Graph

Expiry/Offset bp	0	-200	-100	-75	-50	-25
06/24/2016	4213.6200000000	4213.6200000000	4213.6200000000	4213.6200000000	4213.6200000000	4213.620000
08/24/2016	4460.6000000000	1566.710000000	538.530000000	283.5000000000	74.4700000000	-39.230000
11/24/2016	4993.250000000	734.1000000000	179.8200000000	55.0600000000	-33.7100000000	-60.460000
02/24/2017	5558.000000000	5558.0000000000	5558.0000000000	5558.0000000000	5558.0000000000	5558.000000
05/24/2017	5984.370000000	80.7100000000	-127.2100000000	-148.010000000	-138.8900000000	-91.400000
05/24/2018	7523.850000000	7523.850000000	7523.8500000000	7523.8500000000	7523.8500000000	7523.850000
05/24/2019	8472.130000000	8472.130000000	8472.130000000	8472.130000000	8472.130000000	8472.130000
05/24/2020	8841.1800000000	8841.180000000	8841.1800000000	8841.1800000000	8841.1800000000	8841.180000
05/24/2021	8966.830000000	8966.830000000	8966.8300000000	8966.8300000000	8966.8300000000	8966.830000
05/24/2022	8892.360000000	8892.360000000	8892.360000000	8892.360000000	8892.360000000	8892.36000
05/24/2023	8806.500000000	8806.500000000	8806.500000000	8806.500000000	8806.5000000000	8806.500000
05/24/2024	8642.610000000	8642.610000000	8642.610000000	8642.610000000	8642.6100000000	8642.610000
05/24/2025	8482.100000000	8482.100000000	8482.100000000	8482.100000000	8482.1000000000	8482.100000
05/24/2026	8315.350000000	8315.350000000	8315.3500000000	8315.3500000000	8315.3500000000	8315.350000
05/24/2031	7230.650000000	7230.650000000	7230.6500000000	7230.6500000000	7230.6500000000	7230.650000
05/24/2036	6337.2500000000	6337.2500000000	6337.2500000000	6337.2500000000	6337.2500000000	6337.250000
05/24/2041	5754.090000000	5754.0900000000	5754.0900000000	5754.0900000000	5754.0900000000	5754.090000
05/24/2046	5411.5600000000	5411.5600000000	5411.5600000000	5411.5600000000	5411.5600000000	5411.560000



## 4.3 Cap Floor

🛃 Bloomberg Update					—		×
Bloomberg Updates	🚽 🛛 Update Defini	ition					
🗄 🛄 oneshot	Program:	getdata $\vee$	Template Type:	CapFloor		$\sim$	
	Name:	CapFloor	Currency	USD		$\sim$	
	Frequency:	oneshot ~	Rate Index:	LIBOR	Tenor:	6M 🖂	
		Add Custom Header	Run Date:		(YYYYMM		
	Feed:		Exec Time:	(	(HHMM)		
	Columns						
	Name		Tuno				
			Туре				
		TIME_STAMP	▼ Update ·				
	REFERENCE_		▼ Update ·				
	BVOL_IBOR_C	CAP	⊤ Update ·	No Fask			

#### BLOOMBERG\_UPDATE:

Attribute	Value				
Action	1 - Send Request for Updates				
DIFFFLAG					
Update Names					
Input Dir					
Input Files	CapFloor				
Attribute	Value				
Action	2 - Process Updates Received				
DIFFFLAG					
Update Names					
Input Dir					

CapFloor

Input Files



29.01830000

28.23520000

28.03320000

VolatilitySurface3	3D VOL - USD_CapFloor	r_IBOR - BBG USD CLO	SE LIBOR 6M Us	er(calypso_u	user)(PE OFFI	CIAL)			
Surface Utilities	Help								
Name )L - USD_CapF	loor_IBOR - BBG CLOS	E 👻 Date	05/24/2016	3:0	3:49 PM	Curre	nt		
Definition Offsets	Points Graph								
Comment	Generated from Bloomb	erg data on 05/25/2016						-	
Vol Type	RATE		-	Vol Mode	Black				
Currency	ь. -		· .	Generator	٠	Defeult			
		T	•					-	
Index	LIBOR		•	Interpolator	Interpolator	3DLinear			
	Include Tenor Axis		1	Parameter			Value		
Strike Type				pot Lag			<b>.</b>	_	
	L		s	SYNTHETIC_E				_	
	MOD_FOLLOW		<b></b>	_					
	NYC,LON								
Pricing Environment	OFFICIAL		▼.						
Definition Offs	sets Points Grap	ph							
								VolatilityModel: Bl	ack MID 👻
								,	
Expiry/Strike	0	1	1.5	2		3		3.5	4
05/24/2017	49.6026000000	48.6870000000	42.2571000	0000 40.	71130000	00 41.3377	000000	42.0495000000	42.78540000
05/24/2018	49.2584000000	51.0996000000	44.7427000	0000 41.	91910000	39.7751	000000	39.4752000000	39.40850000
05/24/2019	54.3301000000	59.0319000000	50.4257000	0000 46.	31300000	00 42.6292	000000	41.7817000000	41.24790000
05/24/2020	57.6891000000	64.9588000000	54.3182000	0000 49.	06660000	00 44.1571	000000	42.9331000000	42.10290000
05/24/2021	58.830000000	68.8298000000	56.5580000	0000 50.	34110000	00 44.3648	000000	42.8187000000	41.73880000
05/24/2022	58.0732000000	70.5305000000	57.1967000	0000 50.	27660000	00 43.4061	000000	41.5673000000	40.25890000
05/24/2023	56.8381000000	71.4885000000	57.3661000	0000 49.	96260000	0 42.5551	000000	40.5721000000	39.16650000
05/24/2024	55.0998000000	71.6154000000	56.9406000	0000 49.	17450000	0 41.2880	000000	39.1500000000	37.63030000
05/24/2025	53.5288000000	71.7055000000	56.5596000	0000 48.	52270000	0 40.3255	000000	38.1039000000	36.53080000
05/24/2026	52.120000000	71.8272000000	56.2397000	0000 47.	97880000	39.5566	000000	37.2857000000	35.68770000
05/24/2028	48.3451000000	70.1011000000	54.2055000	0000 45.	75580000	0 37.1269	000000	34.8319000000	33.24000000
05/24/2031	44.9588000000	69.3808000000	52.7387000		03080000			32.9919000000	31.44530000

49.6874000000

49.0578000000

49.4979000000

41.0039000000

40.0684000000

39.9899000000

32.4960000000

31.5479000000

31.2842000000

30.3996000000

29.5320000000

29.2917000000

05/24/2036

05/24/2041

05/24/2046

40.3699000000

38.7339000000

38.2487000000

66.6640000000

67.4581000000

70.2099000000