Online Manual

Retrieval of Spot and Non-Spot Market Exchange Rates[1]

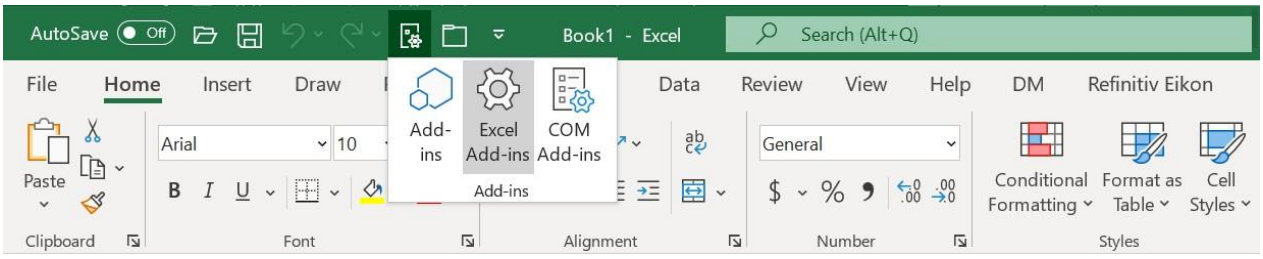
Step by Step: Refinitiv Eikon[2]

I. Spot Transactions

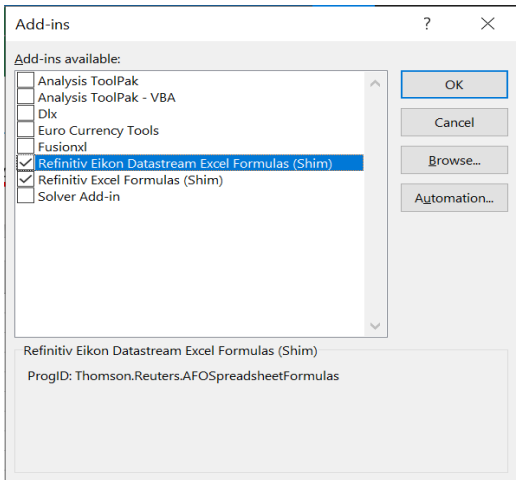
The retrieval of the **spot** market exchange rate data from Refinitiv Eikon should be done by following the steps outlined below.

Step 1: Log in to your Refinitiv Eikon account in Excel.

1. Open Excel and click Add-ins.



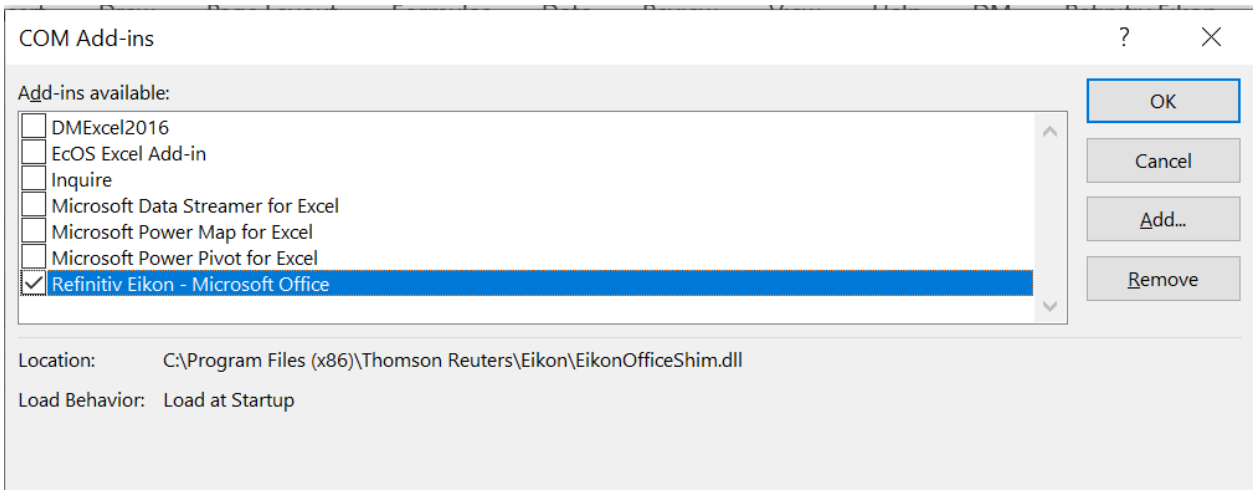
2. Click "Excel Add-ins", then select "Refinitiv Eikon Datastream Excel Formulas" and "Refinitiv Excel Formulas" in the pop-up tab and click OK.



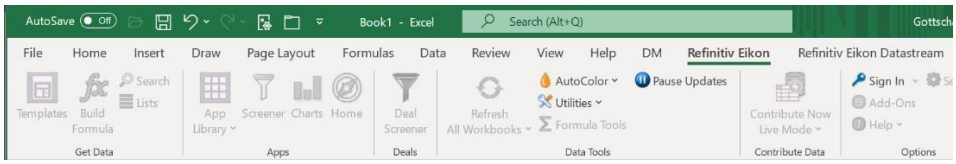
[1] As noted in the Guidance Note for the Fund's Policy on Multiple Currency Practices, IMF staff utilize exchange rate data provided by Refinitiv Eikon as the primary source and Bloomberg as the secondary source. Retrieval of data from Bloomberg relies on access through the IMF's Library, which is not available to external users. Therefore, the Online Manual provided to external audiences details the retrieval process using Refinitiv Eikon, which is accessible to any individual/institution with a license to Refinitiv Eikon.

[2] For external audiences, the retrieval of exchange rate market data from Refinitiv Eikon for the purpose of the MCP Monitoring File by individuals/institutions not affiliated to the IMF is subject to the permissions of the data license the individual/institution has with Refinitiv Eikon.

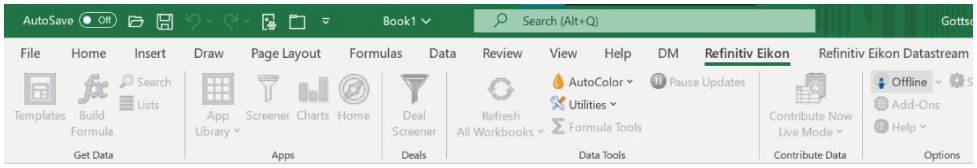
3. Click Add-in, select “Com Add-ins, select Refinitiv Eikon - Microsoft Office.” Click OK.



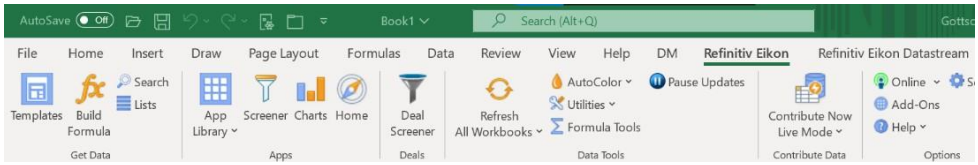
4. Refinitiv Eikon add-in should show up in your Add-ins.



5. Click Refinitiv Eikon, click Sign In and enter your account information to log in.



6. If you log in successfully, the Online tab should show up.

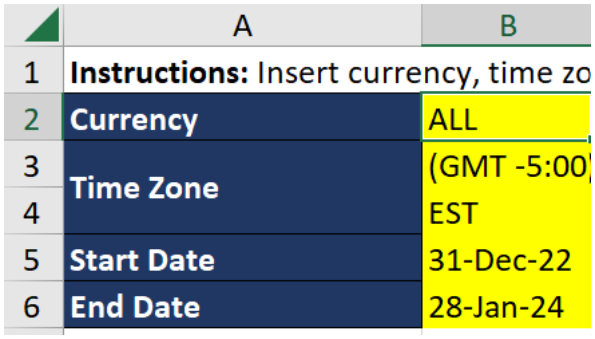


Step 2: Download daily highest and lowest exchange rate.

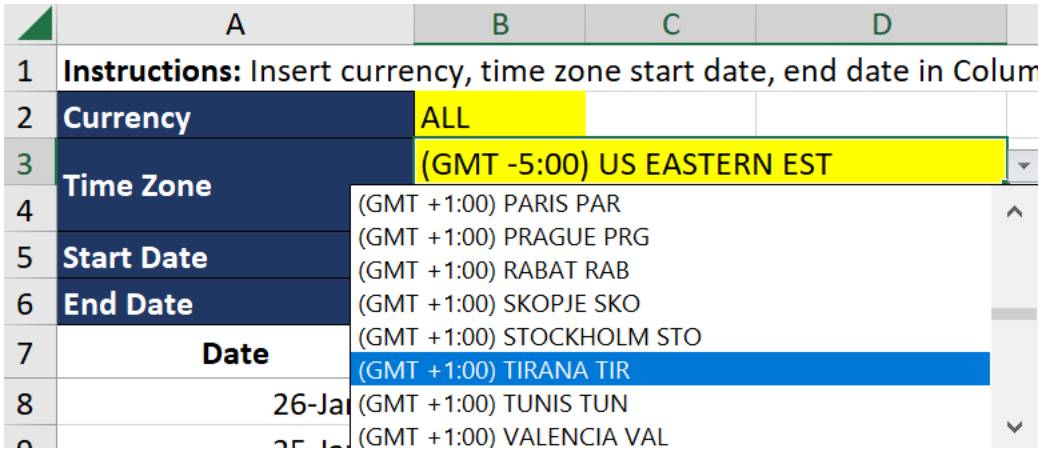
1. Open the MCP Assessment Test – Eikon Excel file.

2. Open the *Spot* tab and enter the currency code (RIC) of interest in cell B2. For example, if you are interested in US Dollar/Albanian Lek, enter RIC "ALL".

Note: The RICs for spot rates are constructed using the standardized ISO 4217 currency codes. See the *RICs* tab for a complete list of standard RICs available.

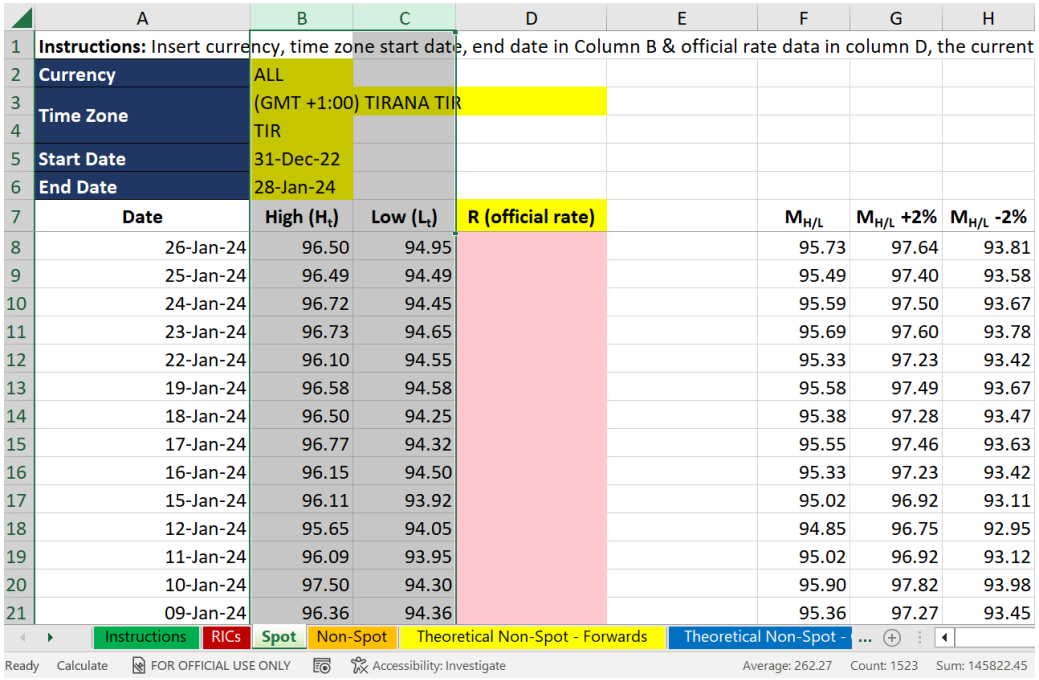


3. After selecting the currency code, select the time zone in cell B3 to reflect the country's local time. For example, for Albania, select GMT +1:00 Tirana.



4. The start and end date will automatically set to de done 12 months backwards from t-1 date. Additionally, the file will automatically refresh the H_t and L_t wholesale spot market rate the in the *Spot* tab (columns B and C respectively).[3]

[3] Screenshots are based on Refinitiv Eikon services. References to specific data providers do not imply any endorsement or recommendation by the IMF. The screenshots published in this manual are for illustration purposes only. The IMF does not warrant or guarantee the accuracy, completeness, or fitness for purpose of any information or material included in this manual. In case of data required to replicate the steps documented in this manual, the necessary licenses must be purchased directly from the provider(s). The IMF is not responsible for providing access to the data.

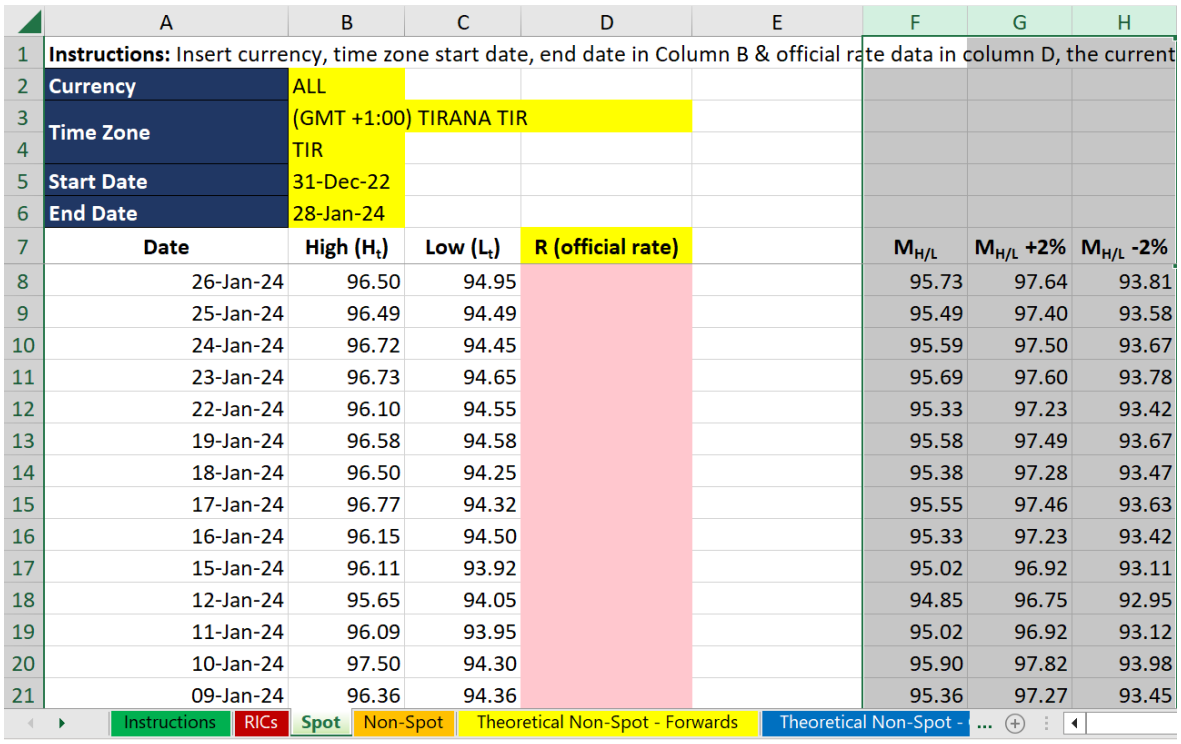


	A	B	C	D	E	F	G	H
1	**Instructions:** Insert currency, time zone start date, end date in Column B & official rate data in column D, the current							
2	**Currency**	ALL						
3	**Time Zone**	(GMT +1:00) TIRANA TIR						
4		TIR						
5	**Start Date**	31-Dec-22						
6	**End Date**	28-Jan-24						
7	**Date**	**High (H_t)**	**Low (L_t)**	**R (official rate)**		**$M_{H/L}$**	**$M_{H/L}$ +2%**	**$M_{H/L}$ -2%**
8	26-Jan-24	96.50	94.95			95.73	97.64	93.81
9	25-Jan-24	96.49	94.49			95.49	97.40	93.58
10	24-Jan-24	96.72	94.45			95.59	97.50	93.67
11	23-Jan-24	96.73	94.65			95.69	97.60	93.78
12	22-Jan-24	96.10	94.55			95.33	97.23	93.42
13	19-Jan-24	96.58	94.58			95.58	97.49	93.67
14	18-Jan-24	96.50	94.25			95.38	97.28	93.47
15	17-Jan-24	96.77	94.32			95.55	97.46	93.63
16	16-Jan-24	96.15	94.50			95.33	97.23	93.42
17	15-Jan-24	96.11	93.92			95.02	96.92	93.11
18	12-Jan-24	95.65	94.05			94.85	96.75	92.95
19	11-Jan-24	96.09	93.95			95.02	96.92	93.12
20	10-Jan-24	97.50	94.30			95.90	97.82	93.98
21	09-Jan-24	96.36	94.36			95.36	97.27	93.45

Instructions | RICs | Spot | Non-Spot | Theoretical Non-Spot - Forwards | Theoretical Non-Spot - ...

Ready Calculate FOR OFFICIAL USE ONLY Accessibility: Investigate Average: 262.27 Count: 1523 Sum: 145822.45

5. The $Mid_{H/L}$ and the +/- 2% tolerance margin as well will automatically populate once the H_t and L_t have been retrieved (columns F, G, and H respectively).



	A	B	C	D	E	F	G	H
1	**Instructions:** Insert currency, time zone start date, end date in Column B & official rate data in column D, the current							
2	**Currency**	ALL						
3	**Time Zone**	(GMT +1:00) TIRANA TIR						
4		TIR						
5	**Start Date**	31-Dec-22						
6	**End Date**	28-Jan-24						
7	**Date**	**High (H_t)**	**Low (L_t)**	**R (official rate)**		**$M_{H/L}$**	**$M_{H/L}$ +2%**	**$M_{H/L}$ -2%**
8	26-Jan-24	96.50	94.95			95.73	97.64	93.81
9	25-Jan-24	96.49	94.49			95.49	97.40	93.58
10	24-Jan-24	96.72	94.45			95.59	97.50	93.67
11	23-Jan-24	96.73	94.65			95.69	97.60	93.78
12	22-Jan-24	96.10	94.55			95.33	97.23	93.42
13	19-Jan-24	96.58	94.58			95.58	97.49	93.67
14	18-Jan-24	96.50	94.25			95.38	97.28	93.47
15	17-Jan-24	96.77	94.32			95.55	97.46	93.63
16	16-Jan-24	96.15	94.50			95.33	97.23	93.42
17	15-Jan-24	96.11	93.92			95.02	96.92	93.11
18	12-Jan-24	95.65	94.05			94.85	96.75	92.95
19	11-Jan-24	96.09	93.95			95.02	96.92	93.12
20	10-Jan-24	97.50	94.30			95.90	97.82	93.98
21	09-Jan-24	96.36	94.36			95.36	97.27	93.45

Instructions | RICs | Spot | Non-Spot | Theoretical Non-Spot - Forwards | Theoretical Non-Spot - ...

II. Non-Spot Transactions

The retrieval of the market exchange rate data for **non-spot** transactions from Refinitiv Eikon should be done according to the type of transaction from those outlined below.

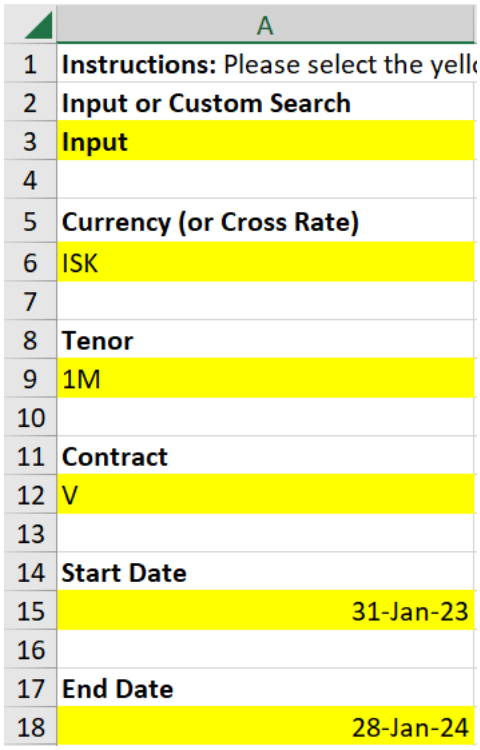
A. Forwards

For the assessment of daily rates for foreign exchange forwards, the forward outright price should be retrieved. The inputs to extract non-spot exchange rate data is similar to those applied for the retrieval of spot exchange rate data.

Retrieving Daily Highest and Lowest FX Forwards Exchange Rates

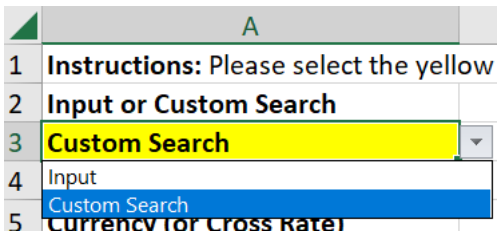
Open the Non-*Spot* tab and enter the currency code of interest in cell A6 followed by tenor of the forward contract (e.g., one, month, six months, one year, etc.) in cell A9, followed by 'V' in the cell A12.

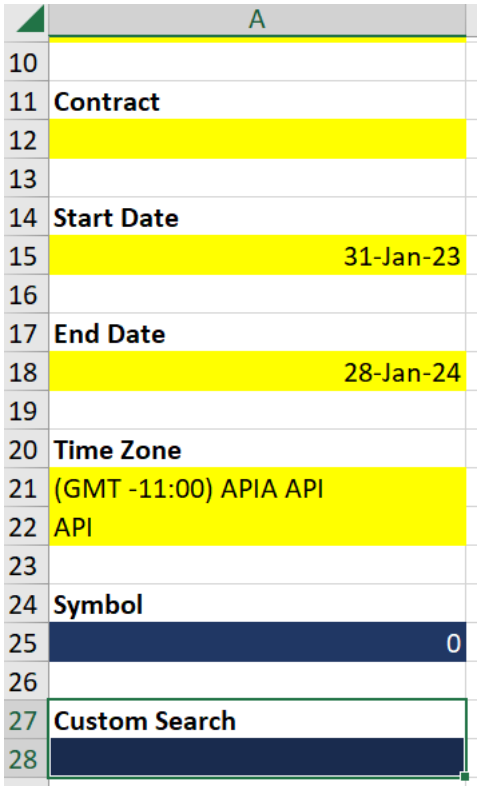
1. For example, if the assessment is on a one-month forward contract quoted as US Dollar/Iceland Krona, enter (1) ISK in cell A6; (2) 1M in cell A9; and (3) V in cell A12. Cell A25 concatenates those inputs to create the RIC.



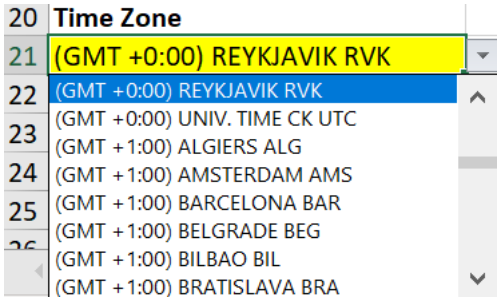
	A
1	**Instructions:** Please select the yell
2	**Input or Custom Search**
3	**Input**
4	
5	**Currency (or Cross Rate)**
6	ISK
7	
8	**Tenor**
9	1M
10	
11	**Contract**
12	V
13	
14	**Start Date**
15	31-Jan-23
16	
17	**End Date**
18	28-Jan-24

2. Alternatively, if users wish to type in their own RIC, select the drop-down tab in A3 and select "Custom Search". Once this is selected, the user can type in their RIC of interest in cell A28.

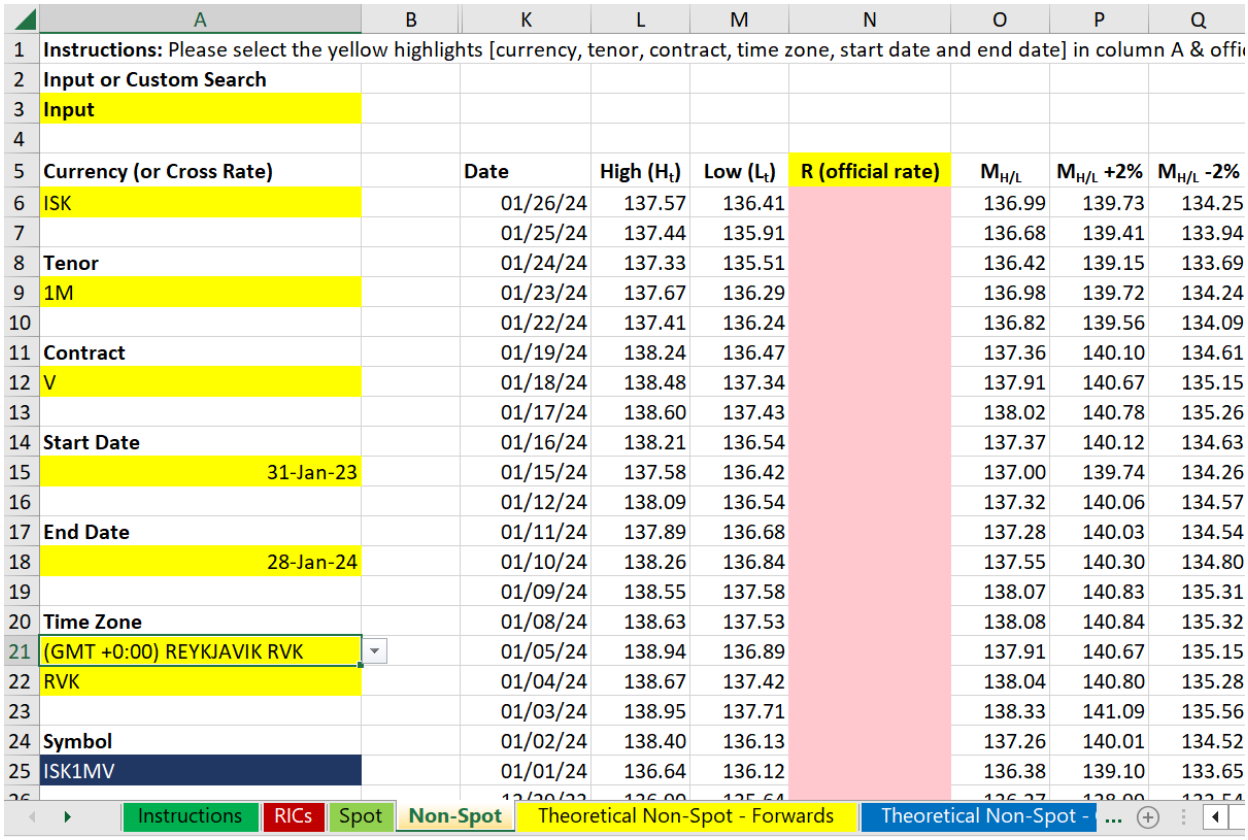




3. After selecting the currency code, tenor, and contract, select the time zone in cell A21 to reflect the country's local time. For example, for Iceland, select GMT +0:00 Rekyjavik.



4. Like the *Spot* tab, the start and end date alongside the H_t, L_t, and $Mid_{H/L}$ (and +/-2% tolerance margin) will automatically populate once the above-mentioned parameters are selected.



	A	B	K	L	M	N	O	P	Q
1	**Instructions:** Please select the yellow highlights [currency, tenor, contract, time zone, start date and end date] in column A & offi								
2	**Input or Custom Search**								
3	**Input**								
4									
5	**Currency (or Cross Rate)**		**Date**	**High (H_t)**	**Low (L_t)**	**R (official rate)**	**$M_{H/L}$**	**$M_{H/L}$ +2%**	**$M_{H/L}$ -2%**
6	ISK		01/26/24	137.57	136.41		136.99	139.73	134.25
7			01/25/24	137.44	135.91		136.68	139.41	133.94
8	**Tenor**		01/24/24	137.33	135.51		136.42	139.15	133.69
9	1M		01/23/24	137.67	136.29		136.98	139.72	134.24
10			01/22/24	137.41	136.24		136.82	139.56	134.09
11	**Contract**		01/19/24	138.24	136.47		137.36	140.10	134.61
12	V		01/18/24	138.48	137.34		137.91	140.67	135.15
13			01/17/24	138.60	137.43		138.02	140.78	135.26
14	**Start Date**		01/16/24	138.21	136.54		137.37	140.12	134.63
15	31-Jan-23		01/15/24	137.58	136.42		137.00	139.74	134.26
16			01/12/24	138.09	136.54		137.32	140.06	134.57
17	**End Date**		01/11/24	137.89	136.68		137.28	140.03	134.54
18	28-Jan-24		01/10/24	138.26	136.84		137.55	140.30	134.80
19			01/09/24	138.55	137.58		138.07	140.83	135.31
20	**Time Zone**		01/08/24	138.63	137.53		138.08	140.84	135.32
21	(GMT +0:00) REYKJAVIK RVK		01/05/24	138.94	136.89		137.91	140.67	135.15
22	RVK		01/04/24	138.67	137.42		138.04	140.80	135.28
23			01/03/24	138.95	137.71		138.33	141.09	135.56
24	**Symbol**		01/02/24	138.40	136.13		137.26	140.01	134.52
25	ISK1MV		01/01/24	136.64	136.12		136.38	139.10	133.65

Instructions | RICs | Spot | Non-Spot | Theoretical Non-Spot - Forwards | Theoretical Non-Spot - ...

Note: If Refinitiv Eikon does not provide a forward outright, staff can calculate a forward outright price by adding the spot exchange rate + forward swap points.

Forward swap points follow a similar RIC as a forward outright. Enter the currency code of interest in cell A6 followed by the tenor of the forward contract in cell A9, then leave cell A12 blank. In the above example, US dollar/Iceland Krona 1M Forward Swap Points would appear as "ISK1M" in cell A25.

B. Non-Deliverable Forwards

As stated in the Guidance Note, NDFs arising from official action are generally not assessed under the new MCP policy. NDFs arising from official action will only be assessed if they are sufficiently closely related to an actual exchange transaction. The benefit from the NDF (subsidy) or the cost of the NDF (tax) is considered as part of the effective spot exchange rate of the exchange transaction.

Retrieving Daily Highest and Lowest FX Non-Deliverable Forward Exchange Rates

The procedure follows the same exact procedure as an FX forward. Enter the currency code of interest in cell A6 followed by tenor of the non-deliverable forward contract (e.g., one, month, six months, one year, etc.) in cell A9, followed by 'NDFOR' in the cell A12 (or custom search in cell A28).

1. For example, if the assessment is on a one-month non-deliverable forward contract quoted as US Dollar/Brazilian Real, after entering the parameters above, cell A25 would appear as "BRL1MNDFOR=". Like FX forwards, common tenors include 1M, 2M, 3M, 6M, 1Y, and 2Y.

	A
1	**Instructions:** Please select the yell
2	**Input or Custom Search**
3	**Input**
4	
5	**Currency (or Cross Rate)**
6	BRL
7	
8	**Tenor**
9	1M
10	
11	**Contract**
12	NDFOR
13	
14	**Start Date**
15	31-Jan-23
16	
17	**End Date**
18	28-Jan-24
19	
20	**Time Zone**
21	(GMT -3:00) SAO PAULO SAO
22	SAO
23	
24	**Symbol**
25	BRL1MNDFOR

2. After adjusting the time zone, the start and end date alongside the H_t, L_t, and $Mid_{H/L}$ (and +/-2% tolerance margin) will automatically populate once the above-mentioned parameters are selected.

	A	B	K	L	M	N	O	P	Q
1	**Instructions:** Please select the yellow highlights [currency, tenor, contract, time zone, start date and end date] in column A & off								
2	**Input or Custom Search**								
3	**Input**								
4									
5	**Currency (or Cross Rate)**		**Date**	**High (H_t)**	**Low (L_t)**	**R (official rate)**	**$M_{H/L}$**	**$M_{H/L}$ +2%**	**$M_{H/L}$ -2%**
6	BRL		01/26/24	4.94	4.92		4.93	5.03	4.8
7			01/25/24	4.96	4.92		4.94	5.04	4.8
8	**Tenor**		01/24/24	4.95	4.92		4.94	5.03	4.8
9	1M		01/23/24	5.02	4.96		4.99	5.09	4.8
10			01/22/24	5.01	4.94		4.97	5.07	4.8
11	**Contract**		01/19/24	4.96	4.92		4.94	5.04	4.8
12	NDFOR		01/18/24	4.97	4.94		4.95	5.05	4.8
13			01/17/24	4.96	4.94		4.95	5.05	4.8
14	**Start Date**		01/16/24	4.95	4.90		4.93	5.02	4.8
15	31-Jan-23		01/15/24	4.90	4.87		4.88	4.98	4.7
16			01/12/24	4.90	4.85		4.87	4.97	4.7
17	**End Date**		01/11/24	4.91	4.88		4.89	4.99	4.8
18	28-Jan-24		01/10/24	4.92	4.89		4.91	5.01	4.8
19			01/09/24	4.93	4.89		4.91	5.01	4.8
20	**Time Zone**		01/08/24	4.92	4.88		4.90	5.00	4.8
21	(GMT -3:00) SAO PAULO SAO		01/05/24	4.96	4.88		4.92	5.02	4.8
22	SAO		01/04/24	4.96	4.91		4.94	5.03	4.8
23			01/03/24	4.96	4.92		4.94	5.04	4.8
24	**Symbol**		01/02/24	4.94	4.87		4.90	5.00	4.8
25	BRL1MNDFOR		12/28/23	4.89	4.84		4.86	4.96	4.7

Instructions | RICs | Spot | Non-Spot | Theoretical Non-Spot - Forwards | Theoretical Non-Spot - ...

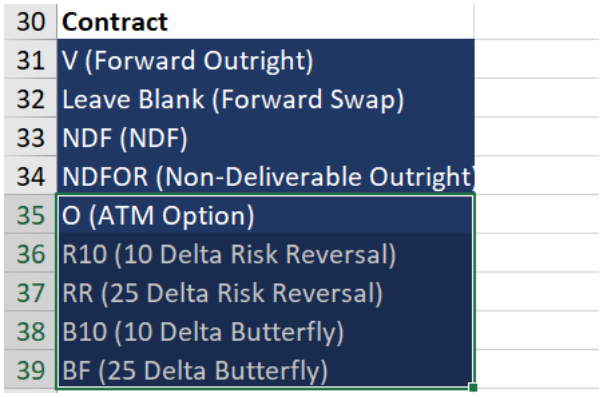
C. Options

The retrieval of the market exchange rate data for FX options from Refinitiv Eikon should be done following the same steps outlined for FX forwards and non-deliverable forwards above. However, due to the bespoke nature of a typical FX option contract, retrieval of FX options exchange rates for assessment may primarily rely on theoretical calculation.

Retrieving Daily Highest and Lowest FX Option Rates

Although options are often idiosyncratic in their composition and typically not standardized enough to provide relevant market data from benchmark providers, Refinitiv Eikon does carry FX options data.

The standard ticker for Refinitiv Eikon is the currency code of interest followed by the length of the contract and the implied volatility. The Excel file offers several standard volatilities in cells A35 – A39 in the *Non-Spot* tab.



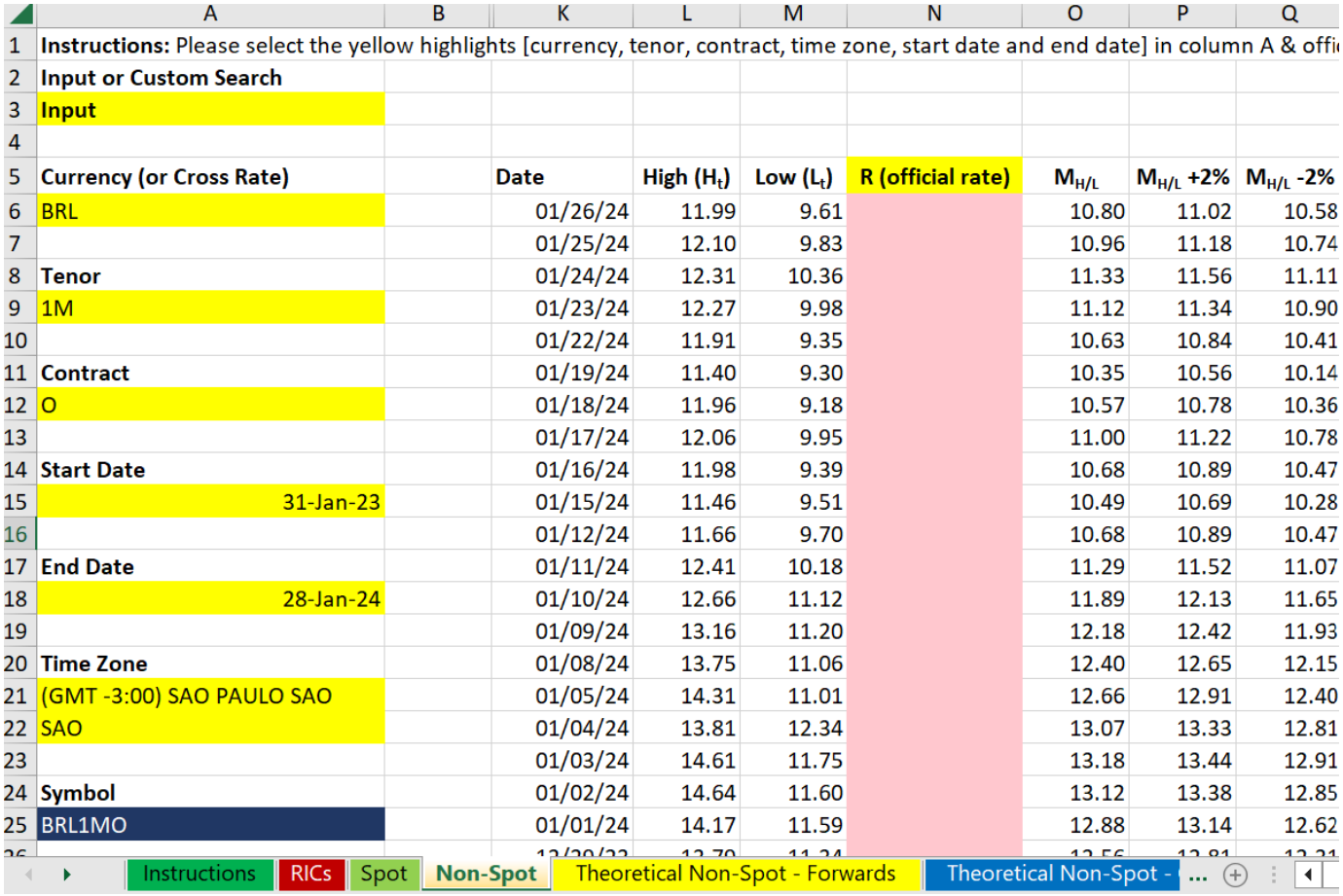
	Contract
30	**Contract**
31	V (Forward Outright)
32	Leave Blank (Forward Swap)
33	NDF (NDF)
34	NDFOR (Non-Deliverable Outright)
35	O (ATM Option)
36	R10 (10 Delta Risk Reversal)
37	RR (25 Delta Risk Reversal)
38	B10 (10 Delta Butterfly)
39	BF (25 Delta Butterfly)

1. For example, a US Dollar/Brazilian Real 1 Month at the Money Option, you would select 'O' in cell A12 (or custom search in cell A28), which cell A25 would be presented as "BRL1MO=".

	A	B
1	**Instructions:** Please select the yellow highligh	
2		
3	**Currency (or Cross Rate)**	
4	BRL	
5		
6	**Tenor**	
7	1M	
8		
9	**Contract**	
10	O	
11		
12	**Start Date**	
13	31-Jan-23	
14		
15	**End Date**	
16	21-Jan-24	
17		
18	**Time Zone**	
19	(GMT -3:00) RIO DE JANIERO RIO	
20	RIO	
21		
22	**Symbol**	
23	BRL1MO=	
24		

RICs | Spot | Non-Spot | Theore

2. After adjusting the time zone, the start and end date alongside the H_t, L_t, and $Mid_{H/L}$ (and +/-2% tolerance margin) will automatically populate once the above-mentioned parameters are selected.



	A	B	K	L	M	N	O	P	Q
1	**Instructions:** Please select the yellow highlights [currency, tenor, contract, time zone, start date and end date] in column A & offi								
2	**Input or Custom Search**								
3	**Input**								
4									
5	**Currency (or Cross Rate)**		**Date**	**High (H_t)**	**Low (L_t)**	**R (official rate)**	**$M_{H/L}$**	**$M_{H/L}$ +2%**	**$M_{H/L}$ -2%**
6	BRL		01/26/24	11.99	9.61		10.80	11.02	10.58
7			01/25/24	12.10	9.83		10.96	11.18	10.74
8	**Tenor**		01/24/24	12.31	10.36		11.33	11.56	11.11
9	1M		01/23/24	12.27	9.98		11.12	11.34	10.90
10			01/22/24	11.91	9.35		10.63	10.84	10.41
11	**Contract**		01/19/24	11.40	9.30		10.35	10.56	10.14
12	O		01/18/24	11.96	9.18		10.57	10.78	10.36
13			01/17/24	12.06	9.95		11.00	11.22	10.78
14	**Start Date**		01/16/24	11.98	9.39		10.68	10.89	10.47
15	31-Jan-23		01/15/24	11.46	9.51		10.49	10.69	10.28
16			01/12/24	11.66	9.70		10.68	10.89	10.47
17	**End Date**		01/11/24	12.41	10.18		11.29	11.52	11.07
18	28-Jan-24		01/10/24	12.66	11.12		11.89	12.13	11.65
19			01/09/24	13.16	11.20		12.18	12.42	11.93
20	**Time Zone**		01/08/24	13.75	11.06		12.40	12.65	12.15
21	(GMT -3:00) SAO PAULO SAO		01/05/24	14.31	11.01		12.66	12.91	12.40
22	SAO		01/04/24	13.81	12.34		13.07	13.33	12.81
23			01/03/24	14.61	11.75		13.18	13.44	12.91
24	**Symbol**		01/02/24	14.64	11.60		13.12	13.38	12.85
25	BRL1MO		01/01/24	14.17	11.59		12.88	13.14	12.62

Instructions | RICs | Spot | Non-Spot | Theoretical Non-Spot - Forwards | Theoretical Non-Spot - ...

Using Theoretical Calculators for Non-Spot Exchange Rates

If representative data from benchmark providers or the alternative sources are not available, staff should conduct the MCP assessment based on theoretical prices using calculators. The theoretical forward rate can be computed by adding the difference between the domestic and foreign interest rate for the maturity of the forward to the spot wholesale market rate. The Monitoring Tool includes a spreadsheet for such calculations.

Moreover, theoretical prices should be used in case of forwards which are infrequently traded on international currency markets, or in case rates are not available for longer tenors. In these instances, the theoretical forward exchange rate should be calculated utilizing spot wholesale market exchange rate and interest rate data provided by Refinitiv Eikon.

As mentioned in Paragraph 12 of Appendix V staff would need to assess whether the domestic and foreign interest rates used by the benchmark administrator is the most representative one among the available data. Staff may use alternative data sourced from local markets to change the parameters of the calculation if such data appears to be more representative of the market conditions in the country. For forwards, data sourced from local markets on the actual funding rate in

that market for a given maturity can be used. For options, in the absence of implied volatility, historical volatility based on prices formed in the domestic market that reflect exchange rate volatility and local interest rates based on actual cost of funding for the relevant maturities should be used.

The assessment based on theoretical prices is as follows and *R* must satisfy the condition to avoid an MCP:

$$T_t - 2\% \leq R_t \leq T_t + 2\%$$

where,
R is the official rate arising from official action settling at more than t+2
T is the exchange rate calculated using a theoretical model, and
t is a given trading day.

The theoretical forward exchange rate is computed by adding the difference between the domestic and foreign interest rate for the maturity of the forward to the spot wholesale market exchange rate. At the inception of the contract, the exchange rate arising from official action must remain in the tolerance buffer of the theoretical price. An MCP arises whenever the forward exchange rate is not within the tolerance buffer.

In practice the theoretical price *T* would be computed using the concept of covered interest parity, based on the following formula:

$$T = \frac{(1+i)S}{1+i^*}$$

where,
i is the interest rate at which a bank can place funds in domestic currency over the same horizon as the maturity of the swap (e.g., three months)
*i** is the domestic interest rate at which a bank can place funds in foreign currency over the same horizon as the maturity of the swap; and
S is the spot market exchange rate prevailing on the day of the transaction (day of inception of the contract).

I. Calculating the Theoretical Forward Exchange Rate via Covered Interest Parity

On Refinitiv Eikon, one can extract the referenced benchmark interest rate via the procedure detailed in the step-by-step for retrieving **spot** and **non-spot** market data. The Monitoring Tool provides a *Theoretical Non-Spot – Forwards* tab which follows takes the spot H_t and L_t rate followed by the mid yield of the domestic and foreign interest rate to create a theoretical forward.

The example below indicates the retrieval and application of data to calculate a forward exchange rate with covered interest parity on Refinitiv Eikon.

To calculate the theoretical forward exchange rate for a five-year forward contract priced in United States Dollar/Indian Rupee, follow the steps below:

1. Open the MCP Assessment Test – Eikon Excel file.

2. Open the *Theoretical Non-Spot -Forwards* tab and enter the currency code of interest in cell B2. In this

example, "INR".

3. Enter the respective domestic interest rate and associated maturity date in cell D4. In this example, it will be "US5YT=RR" (United States 5 Year Benchmark).

	A	B	C	D
1	**Instructions:** Insert currency, start date, end date in Column B , do			
2	**Currency**	INR		**Domestic Rate**
3	**Time Zone**	(GMT +5:30) MADRAS MDS		**Type RIC in D4**
4		MDS		US5YT=RR
5	**Start Date**	31-Dec-22		
6	**End Date**	28-Jan-24		

4. Repeat the same process for the domestic interest rate and associated maturity date in cell E4. In this example, it will be "IN5YT=RR" (India 5 Year Benchmark).

	A	B	C	D	E
1	**Instructions:** Insert currency, start date, end date in Column B , domestic and fore				
2	**Currency**	INR		**Domestic Rate**	**Foreign Rate**
3	**Time Zone**	(GMT +5:30) MADRAS MDS		**Type RIC in D4**	**Type RIC in E4**
4		MDS		US5YT=RR	IN5YT=RR
5	**Start Date**	31-Dec-22			
6	**End Date**	28-Jan-24			

Note: Once the user has retrieved the relevant domestic and foreign interest rate from Refinitiv Eikon, they may need to divide both the domestic and foreign interest rate time series in columns D and E by 100 to convert the values into percentage. Staff and authorities must determine what is the appropriate domestic and foreign interest rate to use for the theoretical calculation.

5. After adjusting for the appropriate the time zone, in this example, using the prevailing US Dollar/ Indian Rupee Spot Rate, the $Mid_{H/L}$ and the +/-2% tolerance margin theoretical forward exchange rate for a contract with a 5-year maturity would populate in columns G, H, and I respectively.

II. Calculating the Theoretical Forward Exchange Rate via Linear Interpolation

In some instances, benchmark rate yields may not be available on Refinitiv Eikon for the contract tenor of interest. In these cases, the theoretical yield can be obtained by interpolating the midpoint of two referenced benchmark rate yields with similar time durations.

For example, to source the yield of a Sri Lanka Generic Govt 8 Year, the unknown rate can be estimated by means of linear interpolation:

1. Let R_n denote the unknown government yield rate, with maturity n. The closed *designated maturities* available are 6-year (R_1) and 10-year (R_2) which bracket the unknown rate from above and below. Linear interpolation, which calculates the unknown rate as if it lies on a straight line between the two rates, proceeds as follows:

Today's date: January 01, 2019.
Maturity date of unknown rate: January 01, 2027. Days to maturity of unknown rate: 2,922.
Today's 6-year Sri Lanka Generic Government Yield (R_1): 11.58%. Maturity date of R_1: January 01, 2025.
Days to maturity of R_1 (t_1): 2,192.
Today's 10-year Sri Lanka Generic Government Yield (R_2): 11.8%. Maturity Date of R_2: January 01, 2029.
Days to maturity of R_2(t_2): 3,653.

2. Linear interpolation assumes that the unknown rate (R_n) lies on the line (R_1, R_2) between the two known rates. Because R_1, R_2 is linear, the slope of the line connecting R_1 and R_n is the same as the slope of line R_1, R_2. Using the "rise over run" formula for the slope of the line, we solve for R_n as follows:

$$\begin{aligned} R_n &= R_1 + \frac{R_2 - R_1}{t_2 - t_1} \times (t_n - t_1) \\ &= 11.58\% + \frac{11.8\% - 11.58\%}{3,653 - 2,192} \times (2,922 - 2,192) \\ &= 11.58\% + 0.00015\% \times (730) = 11.69\% \end{aligned}$$

III. Calculating Options on Refinitiv Eikon

In the case of options, representative exchange rates, including from the authorities, could be used when benchmark providers do not have the data. The option test would have to rely mainly on calculated price, as option markets are often not deep and standardized enough to provide relevant price benchmarks. Like the previous test, it would take the following form:

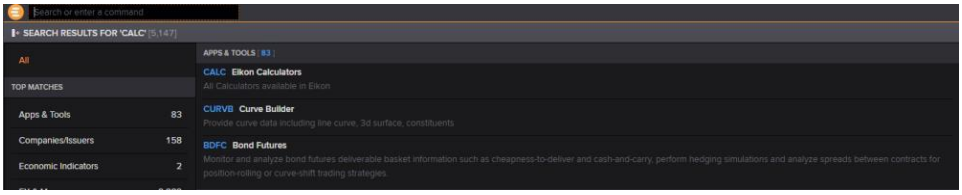
T – 2% ≤ R ≤ T + 2%

where,
R is the price at which the central bank transacts or instructs to transact (i.e., the option price),
T is the theoretical price of the option, calculated according to an option pricing model (e.g., Black-Scholes model).

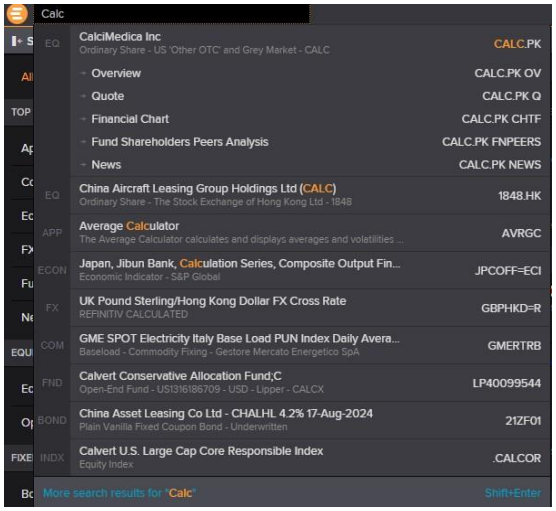
The calculation of theoretical option prices is as follows:

1. On your web browser, go to the Refinitiv Eikon homepage (https://eikon.refinitv.com/) and log into your account.

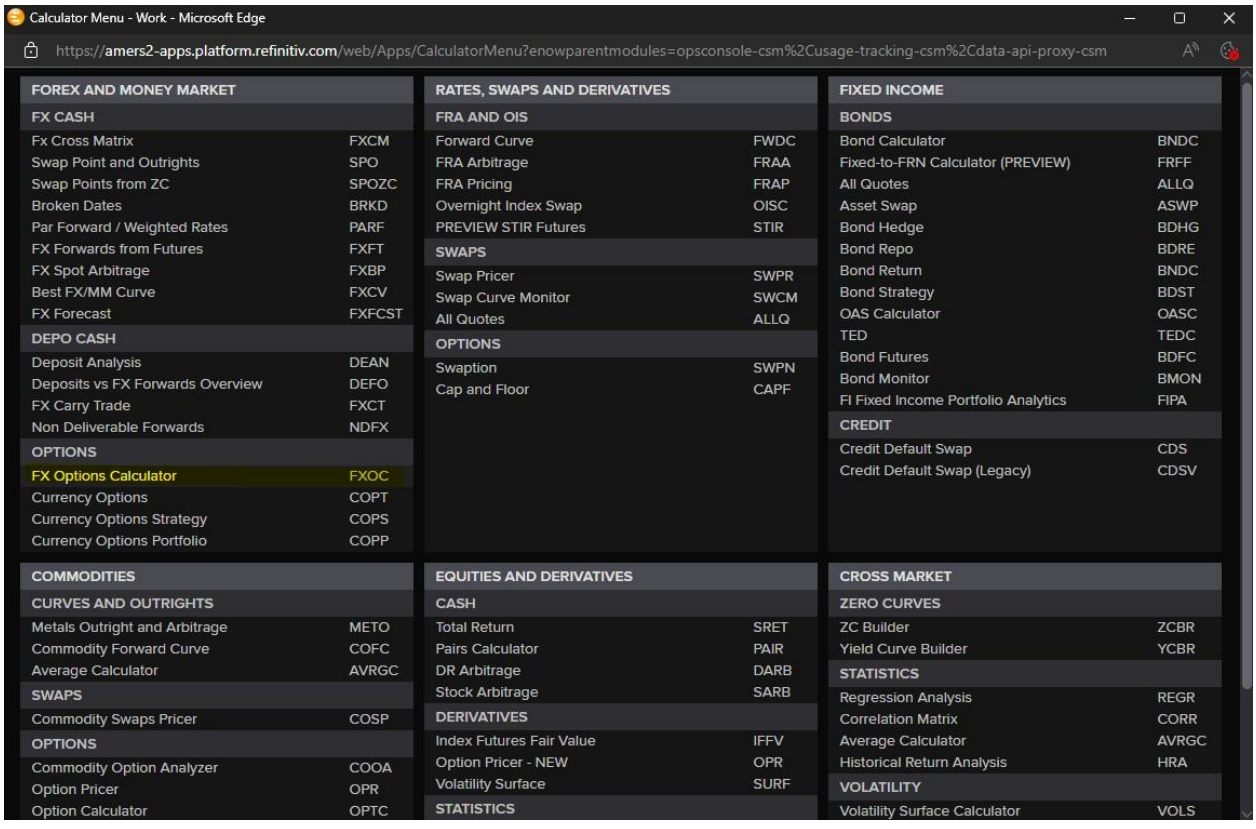
2. In the search bar in the left-hand corner, type "Calc" and select *More search results for "Calc"* at the bottom of the drop-down menu (or Shift + Enter).



3. In the search results menu, select “CALC Eikon Calculators” under the “APPS & TOOLS” tab.



4. A separate window will open, “Calculator Menu”. In this window select “FX Options Calculator – FXOC” under the “OPTIONS” tab.

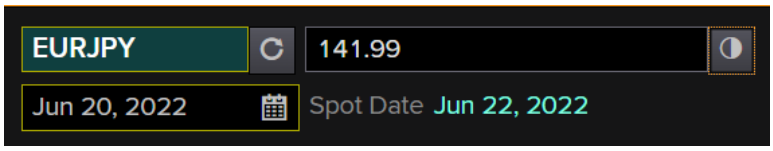


5. This will present the calculator with a host of parameters for staff to adjust for assessment. For example, if staff are interested in a Euro/Japanese Yen 5 Year Option, with a pricing date of June 20, 2022, the parameters include:

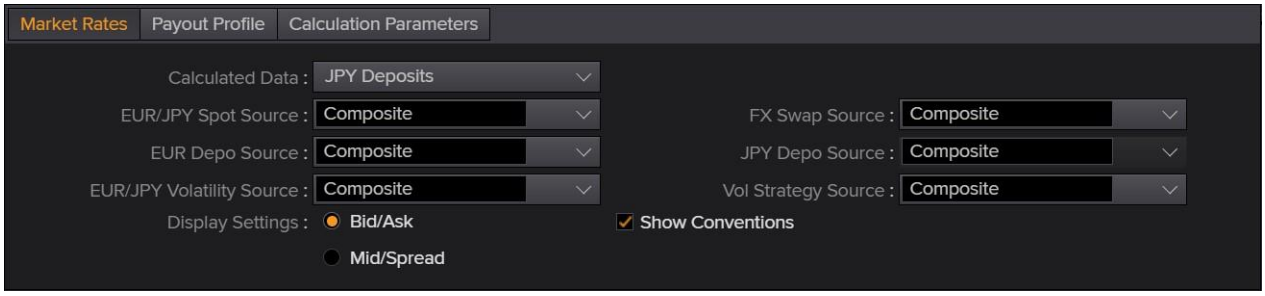
Asset: In the top left-hand corner staff will see the currency pair and the spot rate. This will auto-populate with the ask high and bid low price in the tabs to right (which can be adjusted). Click refresh or press enter to update the calculator with the latest market data. Alternatively, you can enter the date on which the option is price in DDMMYYYY format.

A half-moon symbol indicates that there are only a handful of possible values for a field. Click or use spacebar to cycle through the different values. All other fields in the calculator can be manually edited as well. These edited values can be reverted to the default value with a double click.

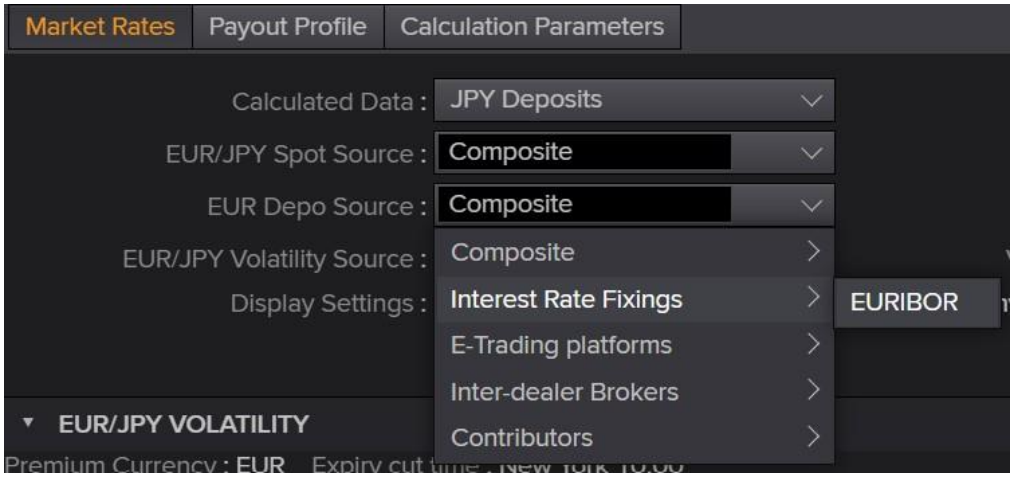
Additionally, for fields with two values, click the half-moon will provide the mid-rate. For example, instead of the bid/ask values, clicking the half-moon will provide the user the mid- rate of the two values.



On the right-hand side of the calculator, will provide the source of the market rates. The defaults are Refinitiv Eikon's composite rates. However, staff can adjust utilize data from options such as e-trading platforms, inter-dealer brokers, or individual Refinitiv Eikon contributors (and interest rate fixing for the deposit sources).

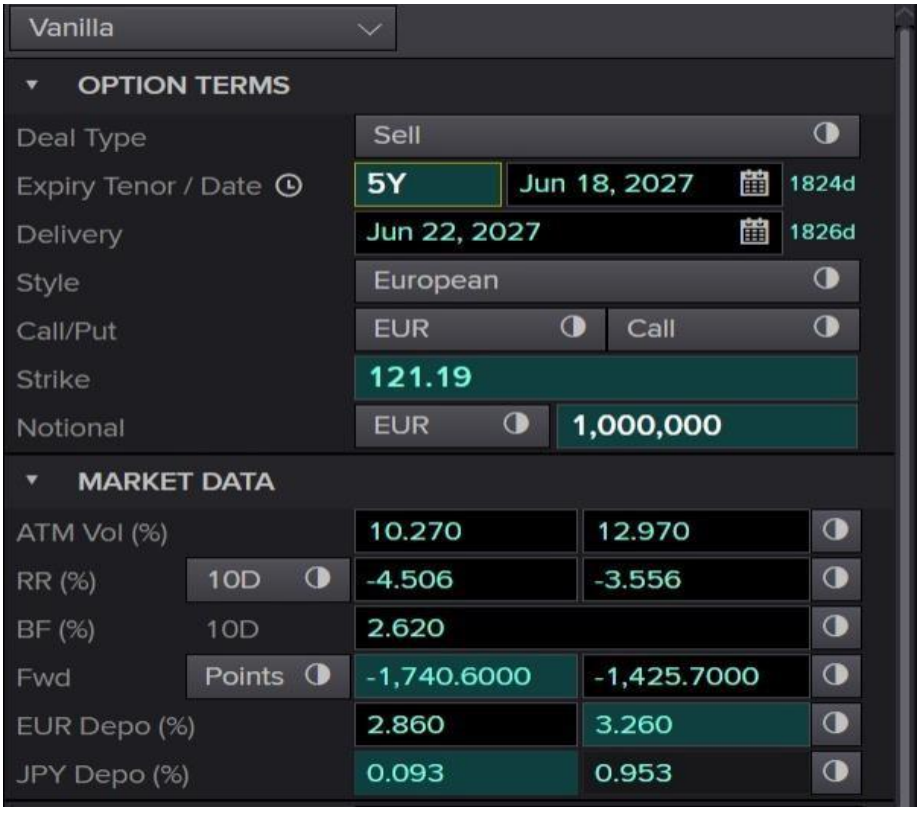


For example, one can change the EUR deposit source from Refinitiv Eikon's composite rate to EURIBOR.



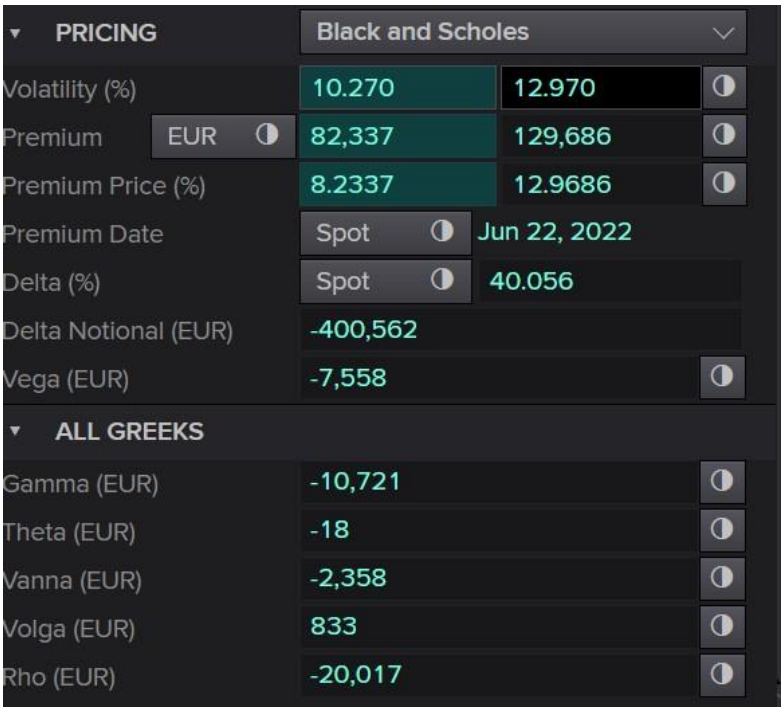
Staff can use the panel on the left to define the terms of the option, which are as follows:

Option Terms: Deal type (buy/sell), tenor, style (European, American), call/put, strike price, notional value (in currency of interest).
Market Data: At the money volatility, risk reversal, butterfly spread, forward rates/points, deposit rate.



The results of the calculation are shown in the pricing subsection with Greeks, those parameters include as follow:

Pricing: Pricing model (default setting uses the Black-Scholes formula), premium (in currency of interest), premium price, premium date (spot/forward), delta (spot/forward), delta notional, and Vega.
All Greeks: Adjustable Greeks (Gamma, Theta, Vanna, Volga, Rho) to adjust option's risk parameters.



6. Once all fields are adjusted, click the "Solve for" tab in the bottom left-hand corner of the calculator, and (1) select a field to be solved and then (2) a field to be the target. For the MCP assessment, *R* should remain within the theoretical option price (strike rate plus option premium).

7. Proceed to input the strike rate and option premium the in the *Theoretical Non-Spot Options* tab of the MCP Assessment Monitoring Tool (columns B and C respectively).