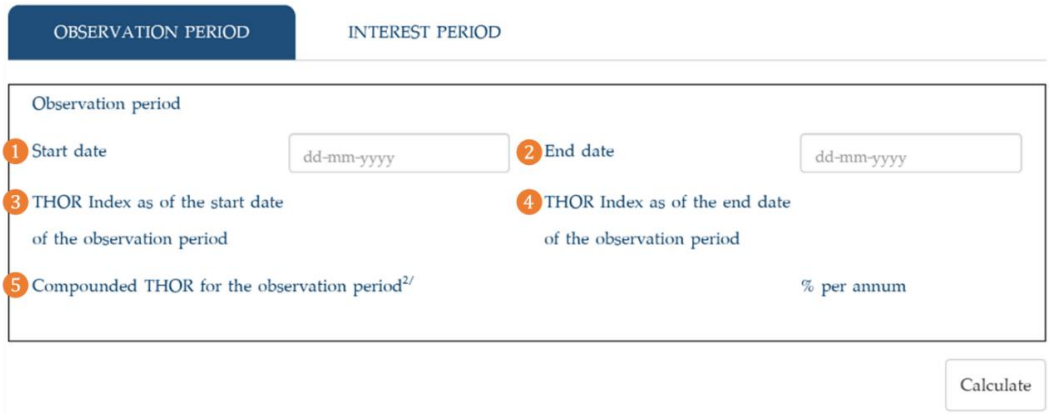
THOR Calculator Manual

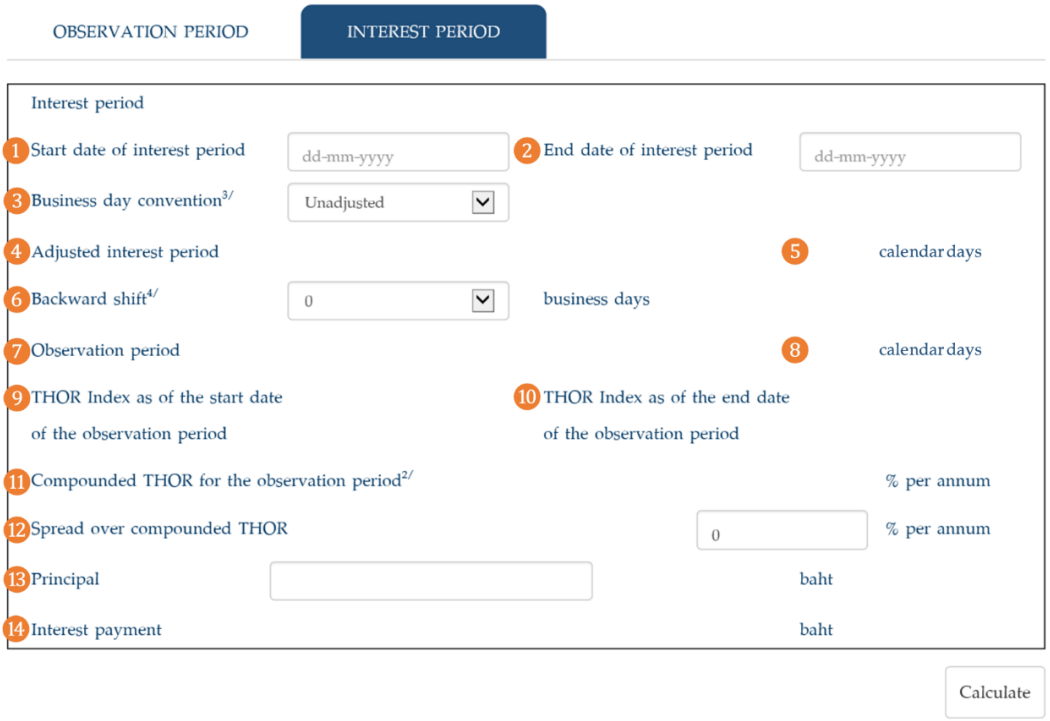
THOR Calculator is a tool for calculating the compounded THOR for a specified period by compounding the daily values of THOR which will use compound average method for business days and use simple average method for non-business days.

The two models of THOR Calculator are as follows:

1) **"Observation period" is recommended when the period referencing THOR is known.**



2) **"Interest period" is recommended when interest period indicated in the contract is known. Lookback with observation shift (Backward shift) may be applied in order to calculate compounded THOR for the specified observation period.**



THOR Calculator can be accessed via https://www.bot.or.th/App/THORCalculator/en

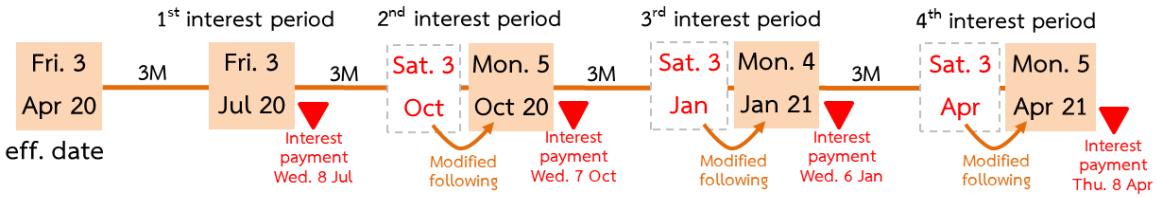
1) Metadata for "observation period" model

Data	Description
① is the start date of the observation period ② is the end date of the observation period	① and ② can be any day (including non-business day) from 1st April 2020 which is the first publication date of THOR Index to the latest business day that THOR Index is available. **Both fields are required fields.** • If selected dates are non-business days, the dates will be displayed in red. • ① and ② cannot be the same day. (If the dates are the same, the following message will pop up: "*Compounded THOR for the observation period cannot be calculated because the start date and end date are the same.*") • ① and ② cannot be the date without THOR Index value. ○ ① cannot be the date prior to 1st April 2020. ○ ② cannot be a future date. (If THOR Index value of that date is not available, the following message will pop up: "*Please select a different start date or end date as there is no valid data of THOR Index value for the specified observation period*" and the red borders will appear on ① and ② so that users can re-select or key-in the date in those fields before clicking Calculate button again.) • If the date selected in ② is before that in ①, THOR Calculator will automatically switch the dates of ① and ②.
③ is THOR index as of the start date of observation period ④ is THOR index as of the end date of observation period	THOR Calculator will display values in ③ and ④ when ① and ② are both filled-in and the user clicks Calculate button • ③ will display the value of THOR Index published as of the date indicated in ① • ④ will display the value of THOR Index published as of the date indicated in ② • Both ③ and ④ will display values of THOR Index in 8 decimal places according to THOR Index published in Historical data table FM_RT_014 THOR Index
⑤ is compounded THOR for the observation period	Value in ⑤ will be displayed, when ① and ② are both filled-in and the user clicks Calculate button. Compounded THOR for the observation period is calculated from THOR Index displayed in ③ and ④ by using the following formula: Compounded THOR for the observation period $= \left(\frac{④\ \text{THOR Index}_{\text{end date}}}{③\ \text{THOR Index}_{\text{start date}}} - 1 \right) \times \left(\frac{365}{\text{number of calendar days between ① and ②}} \right) \times 100$

Data	Description
	Compounded THOR for the observation period is displayed in % per annum rounded to 5 decimal places. If compounded THOR for the observation period in 5 is less than 0 % per annum, value in 5 will be displayed in red. --- Remark: value in 5 will equal to compounding the daily value of THOR from the start date of the observation period to 1 calendar day before the end date of the observation period.
Calculate button	After 1 and 2 are both filled-in and the user clicks Calculate button, THOR Calculator will display the values in 3 4 and 5

Example for the usage of the observation period model

One-year Overnight Index Swap (OIS) transaction referencing THOR has an effective date on 3rd April 2020, which has the conventions as follows; modified following business day convention, two business days delayed payment, and payment frequency of 3 months.



User can calculate the compounded THOR for the observation period of each interest payment by selecting dates in field 1 and 2 on THOR Calculator as follows and then click Calculate button:

Interest period	1st period	2nd period	3rd period	4th period
Field 1 start date (choose adjusted start dates as shown in the orange boxes)	03-04-2020	03-07-2020	05-10-2020	04-01-2021
Field 2 end date (choose adjusted end dates as shown in the orange boxes)	03-07-2020	05-10-2020	04-01-2021	05-04-2021

2) Metadata for “interest period” model

Data	Description
1 is the start date of interest period	1 and 2 can be any day (including non-business day) from 1st April 2020 which is the first publication date of THOR Index to the following 10 business days after the latest business day that THOR Index is available*. **Both fields are required fields.** • If selected dates are non-business days, the dates will be displayed in red. • 1 and 2 cannot be the same day. (If the dates are the same, the following message will pop up: *“Please choose a different start date, end date, or business day convention because adjusted interest period cannot be calculated.”*) • If the date selected in 2 is before that in 1, THOR Calculator will automatically switch the dates of 1 and 2. --- * After selecting business day convention in 3 and/or selecting number of days for backward shift in 6, THOR Index values of the end of observation period would be available.
2 is the end date of interest period	
3 is business day convention	The business day convention determines how to proceed when the start date or end date of interest period falls on a non-business day. There are 5 business day conventions as follows: 1. Unadjusted: The start and end date can be non-business day. **This convention is the default value on THOR Calculator.** 2. Following: If the start or end date falls on non-business day, that date will be adjusted to the following business day. 3. Modified following: If the start or end date falls on non-business day, that date will be adjusted to the following business day provided that the latter is not in a different calendar month. Should that be the case, the date will be the preceding business day instead. 4. Preceding: If the start or end date falls on non-business day, that date will be adjusted to the preceding business day. 5. Modified preceding: If the start or end date falls on non-business day, that date will be adjusted to the preceding business day provided that the latter is not in a different calendar month. Should that be the case, the date will be the following business day instead.
4 is the adjusted interest period	THOR calculator will display value in 4 automatically after selecting 1 2 and 3 as follows: • The start date of adjusted interest period calculates from the date and the business day convention specified in 1 and 3 respectively. • The end date of adjusted interest period calculates from the date and the business day convention specified in 2 and 3 respectively. • If selected dates are non-business days, the dates will be displayed in red.

Data	Description
	• The start date and end date in 4 cannot be the same. (If the selected values in 1 2 and 3 result in the same start date and end date in 4, the following message will pop up: *"Please choose a different start date, end date, or business day convention because adjusted interest period cannot be calculated."*) Hence, • If 1 and 2 are business days, the date displayed in 4 will be the same date as in 1 and 2 regardless of business day convention selected in 3. • If 1 and 2 are non-business days and "Unadjusted" convention has been selected in 3, the dates in 4 will be the same dates as specified in 1 and 2 and will be displayed in red. • If 1 and 2 are non-business days and business day convention selected in 3 is not "Unadjusted", the date displayed in 4 will be adjusted to fall on a business day.
5 is the number of calendar days in adjusted interest period	5 will be automatically displayed when 1 2 and 3 have been selected. It is calculated from the difference between the end date and the start date in 4. The value in 5 will be used for interest payment in 14 calculation.
6 is backward shift	Backward shift specifies the number of days shifted backwards from the start date and end date in the adjusted interest period in 4 to obtain the observation period, which is displayed in 7. Value in 6 can be selected from 0 to 10 business days but the **default value is set at 0**. --- Remark: If the start date in 4 falls between 1st – 15th April 2020, THOR Calculator will only provide the number of days of backward shift that will not result in the start date in 7 prior to 1st April 2020 which is the first publication date of THOR Index.
7 is observation period	THOR Calculator will display the value for 7 after 1 2 3 and 6 are all selected and the user clicks Calculate button as follows: • The start date of observation period is calculated from the start date in 4 minus the number of business days selected in 6 and • The end date of observation period is calculated from the end date in 4 minus the number of business days selected in 6 • If the date is a non-business day, the date will be displayed in red. • The start date and end date in 7 cannot be the same. (If the selected value in 1 2 3 and 6 result in the same start date and end date in 7, the following message will pop up: "*Please choose a different start date, end date, business day convention, or backward shift because observation period cannot be calculated.*") • The start date and end date of the observation period cannot be the date that THOR Index value is not available.

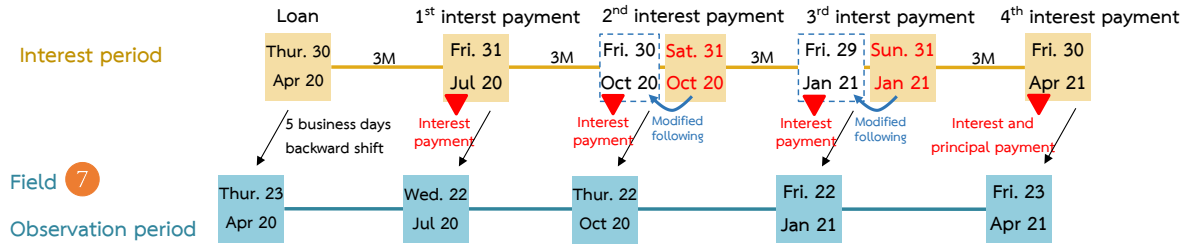
Data	Description
	(If the selected values in 1 2 3 and 6 result in the start date or end date that THOR Index value is not available in 7, the following message will pop up: "THOR Index of the specified observation period is not yet available."and red borders will appear around 1 2 3 and 6 to indicate the fields that need to be edited before clicking Calculate button again.)
8 is the number of calendar days in observation period	Value in 8 will be displayed after 1 2 3 and 6 are all selected and the user clicks Calculate button. The value in 8 is calculated from the difference between the end date and the start date in 7 and will be used to calculate compounded THOR for observation period in 11.
9 is THOR Index as of the start date of the observation period 10 is THOR Index as of the end date of the observation period	THOR Calculator will display the values in 9 and 10, after 1 2 3 and 6 are all selected and the user clicks Calculate button • 9 will display THOR Index as of the start date of the observation period specified in 7 • 10 will display THOR Index as of the end date of the observation period specified in 7 • THOR Index values will be displayed in 8 decimal places according to THOR Index published in Historical data table FM_RT_014 THOR Index
11 is compounded THOR for observation period[1]	THOR Calculator will display the value of 11 after 1 2 3 and 6 are all selected and the user clicks Calculate button. Compounded THOR for the observation period is calculated from THOR Index indicated in 9 and 10 by using the following formula: Compounded THOR for the observation period $= \left(\frac{\text{4 THOR Index}_{\text{end date}}}{\text{3 THOR Index}_{\text{start date}}} - 1 \right) \times \left(\frac{365}{\text{number of calendar days between 1 and 2}} \right) \times 100$ Compounded THOR for the observation period is displayed in % per annum rounded to 5 decimal places. If compounded THOR for the observation period in 11 is less than 0 % per annum, value in 11 will be displayed in red. --- Remark: value in 11 will equal to compounding the daily value of THOR from the start date of the observation period to 1 business day prior to the end date of the observation period.

[1] When "Unadjusted" convention has been selected in 3 and 0 business day has been selected for backward shift in 6, "the start date of interest period" in 1 and "the end date of interest period" in 2 will equal to "adjusted interest period" in 4 and "observation period" in 7 respectively.

Data	Description
12 is spread over compounded THOR	Value in 12 is the spread specified in the contract over compounded THOR (11) which should be in form of % per annum. This field is optional field. • The valid range of spread over compounded THOR is from 0.00000 to 30.00000 where **the default value is 0.** • 14 will be calculated using specified spread over compounded THOR 12 rounded to 5 decimal places (If the value contains more than 5 decimal places, THOR Calculator will automatically adjust the value to 5 decimal places by rounding only the 6th decimal place before calculating 14. For example, the input value of 0.0000349 will be rounded to 0.00003.)
13 is principal	Value in 13 is principal amount in Thai Baht according to the contract. This field is optional field. • The value can be from 0 onwards without a comma (,) between numbers. • 14 will be calculated after specifying the principal amount in 2 decimal places. (If the value contains more than 2 decimal places, THOR Calculator will automatically adjust the value to 2 decimal places by rounding only the 3rd decimal place before calculating 14. For example, the input value of 12000.3246 will be rounded to 12000.32.)
14 is interest payment	Value in 14 will be displayed after 1 2 3 6 12 and 13 are all filled-in and the users click Calculate button. The interest payment is calculated using the following formula: $$\textit{Interest payment} = \left(\frac{11\ \textit{compounded THOR during observation period} + 12\ \textit{spread over compounded THOR}}{100}\right) \times \left(\frac{5\ \textit{number of calendar days of adjusted interest period}}{365}\right) \times 13\ \textit{principal amount}$$ Interest payment will be displayed in 2 decimal places. --- Remark: If compounded THOR for the observation period in 11 is less than 0 % per annum, value in 14 will be displayed as "N.A." and the following message will pop up will pop up: "*compounded THOR for the observation period has negative value*."
Calculate button	• After 1 2 3 and 6 are all selected and the user clicks Calculate button, THOR Calculator will display the values of 7 8 9 10 and 11 • If the value in 13 and/or 12 has also been specified and user clicks Calculate button, THOR Calculator will then display the value of 14 as well.

Example for the usage of the interest period model

One-year loan contract referencing compounded THOR pays interest every 3 months (at the end of each month), uses modified following convention, and 5 business day backward shift for the specified observation period.



User can calculate compounded THOR for the observation period of each interest payment by selecting dates in field 1 2 3 and 6 on THOR Calculator and click Calculate button as follows:

Interest period	1st period	2nd period	3rd period	4th period
Field 1 start date (choose start dates as shown in to the yellow boxes)	03-04-2020	31-07-2020	31-10-2020	31-01-2021
Field 2 end date (choose end dates as shown in to the yellow boxes)	31-07-2020	31-10-2020	31-01-2021	30-04-2021
Field 3 business day convention	modified following	modified following	modified following	modified following
Field 4 displays adjusted interest period	Thur. 30 Apr 20 – Fri. 31 Jul. 20	Fri. 31 Jul 20 – Fri. 30 Oct 20	Fri. 30 Oct 20 – Fri. 29 Jan 21	Fri. 29 Jan 21 – Fri. 30 Apr 21
Field 6 Backward shift	5 business days	5 business days	5 business days	5 business days
Field 7 displays observation period	Thur. 23 Apr 20 – Wed. 22 Jul 20	Wed. 22 Jul 20 – Thurs. 22 Oct 20	Thur. 22 Oct 20 – Fri. 22 Jan 21	Fri. 22 Jan 21 – Fri. 23 Apr 21
Remark				
THOR Calculator can be used to calculate field 11 since	Wed. 22 Jul 20	Thurs. 22 Oct 20	Fri. 22 Jan 21	Fri. 23 Apr 21

To calculate the interest payment in 14, users must fill in the principal amount in 13 and spread over compounded THOR specified in the contract in 12 (if any) and click Calculate button again.