



Final Rate of return Return on debt illustrative model

Handbook

December 2019

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1 Introduction

This handbook covers the return on debt illustrative model ('the model'). The model is intended to be used as a tool to help users understand and calculate the return on debt for a network business. It does not replace the 2018 rate of return instrument.¹ If there are any differences between the model and the instrument, the instrument should be deemed as the correct version.

The model is a series of Microsoft Excel worksheets developed to provide an estimate that is in line with the 2018 rate of return instrument. It should however be noted that the model does not factor all the possible scenarios laid out in the instrument. The likelihood of some of these scenarios occurring is low, and attempting to cover all these contingencies would greatly increase the complexity—and greatly decrease the accessibility—of the model. The ordering of clauses and contingencies not factored into this model is clearly laid out in this handbook.

Users should note that due to licensing requirements, the model does not contain any confidential information sourced from third party data providers. To calculate the return on debt the user will have to supply their own.

1.1 What is the purpose of this model?

The objective of the illustrative model is to allow stakeholders to explore the calculations that would be undertaken by the AER when it sets the regulated return on debt for a network business.² Stakeholders can use the model to understand these calculations and test outcome under different input scenarios.

This handbook explains how to update the data used in the model, interpret the output from the model, and details the limitations of the model.

1.2 What data is used in the model?

The inputs required for this model need to be sourced from the relevant data service providers mentioned in the 2018 rate of return instrument. As the instrument uses proprietary data that the AER cannot provide, the version of the model published on the AER website contains sample placeholder data that is not actual data.³

The RBA data is publicly available and is not confidential. The data provided in the model was downloaded on the 11th of June 2019. The user will need to download the data based on the guidelines provided in the instrument and paste over the data provided in the model.⁴

¹ AER, *Rate of return instrument*, December 2018. Available at www.aer.gov.au/networks-pipelines/guidelines-schemes-models-reviews/rate-of-return-guideline-2018/final-decision.

² The illustrative model is intended as an indicative calculation, and only attempts to address the more likely circumstances included in the Instrument.

³ The model can be downloaded at www.aer.gov.au/networks-pipelines/guidelines-schemes-models-reviews/models-draft-return-on-debt-illustrative-model/initiation.

⁴ AER, *Rate of return instrument*, December 2018, clauses 32, 33, 34 and 35.

The averaging period entered in this model needs to be in line with the specifications provided in the 2018 rate of return instrument.⁵ The dates currently in the model are not confidential as they have been entered arbitrarily and do not refer to any business.

1.3 What are the limitations of the model?

Table 1 provides a description of the clauses from the instrument that we have not included in this illustrative model.

The illustrative model is one of a number of models and databases the AER uses to calculate the regulated rate of return in a reset determination or annual debt update. The AER uses these other tools because it needs to deal with:

- all the possible contingencies specified in the Instrument
- complexities such as multiple overlapping averaging periods across different service providers
- the management of confidential and proprietary data used as an input to the rate of return process.

Hence, the illustrative tool is intended to be an accessible means for a particular stakeholder to deal with the most common scenarios they face. It is not a binding calculation of the regulated rate of return under the 2018 instrument.

⁵ AER, *Rate of return instrument*, December 2018, clauses 7, 8, 23, 24, 25, and 36.

A detailed explanation of the clauses not included is provided in section 4.

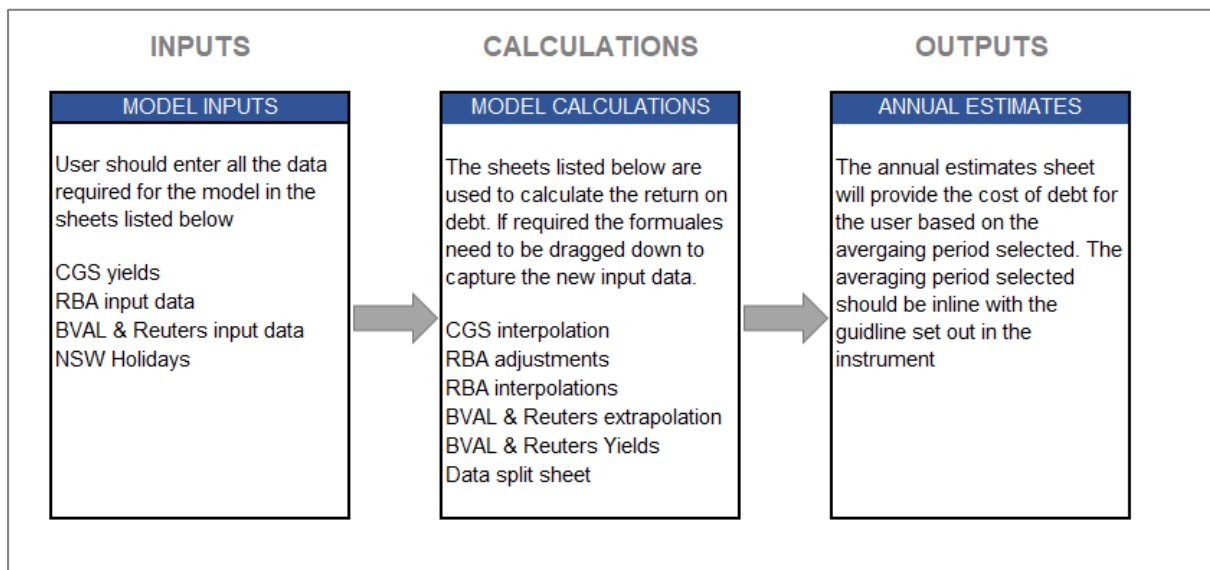
Table 1 Clauses not covered in the model

Clauses	Description
Clause 13	Calculation of daily CGS and ADSWAP yields using linear extrapolation.
Clause 20	Calculation of the CGS or ADSWAP YTM using a historical average.
Clause 21	Calculation of the curve provider YTM using a historical approach.
Clause 22	Calculation of the spread to swap for curve providers.
Clause 26 (b) (i) (ii) (iii)	Calculation where there is no data from any provider for a specific business day for a given rating band. This is dependent on clause 21 above.
Clause 26 (c) (d)	Curve provider revises or updates its methodology; or revises or updates its historical yield estimates.
Clause 26 (e) (f)	Data providers alter publication frequency.
Clause 29 (c)	Calculation using linear extrapolation from two CGS YTM with a term to maturity between 7 and 10 years. This is dependent on clause 13 above.
Clause 29 (d)	Calculation of CGS using historical averages. This is dependent on clause 20 above.
Clause 30 (b)	Calculation of daily ADSWAP yields using linear interpolation.
Clause 30 (c)	Calculation using linear extrapolation from two ADSWAP YTM with a term to maturity between 7 and 10 years. This is dependent on clause 13 above.
Clause 30 (d)	Calculation of ADSWAP using historical averages. This is dependent on clause 20 above.
Clause 31 (b) (iv)	Calculation of YTM in case of a curve not being published. The model partially covers this clause through clause 26 (a) but not clause 26 (b).

2 Model overview

The illustrative model is used to calculate the estimated return on debt. Specifically, the model is a set of Microsoft Excel worksheets (combined into one spreadsheet file) that perform calculations to derive the return on debt for the agreed averaging period for each regulatory control period. The model allows the user to enter these inputs and then displays the outputs. Figure 1 provides an overview of this process.

Figure 1 Overview of the spreadsheet



3 Model inputs

The return on debt illustrative model input sheets capture information that is required to estimate the return on debt. As mentioned in section 1.3, this model does not attempt to include all possible clauses laid out in the 2018 rate of return instrument. The output is therefore based on the clauses defined in section 4.1.

The data sources have been defined in the instrument and need to be downloaded accordingly.⁶

3.1 CGS Yield input sheet

The CGS yields worksheet needs to be updated with data sourced from the RBA website. The user will need refer to the statistics table web page and source interest rates. The file the user will need to download is the [Indicative Mid Rates of Australian Government Securities - F16](#). The Treasury Bonds data should be copied across to the model and Treasury Indexed Bonds need to be excluded. The user needs to be aware that new bonds could be added to the series published and would need to be accounted for when updating the model. This would mean that the user will need to add another column when updating the sheet.

Figure 2 CGS Input sheet

Update instructions:							
Don't update EDATE (Row 8)							
Insert data in shaded area							
Treasury Bond Numbers		TB 122	TB 143	TB 126	TB 146	TB 124	TB 151
EDATE		43539	43759	43936	44156	44331	44551
Maturity		15-Mar-2019	21-Oct-2019	15-Apr-2020	21-Nov-2020	15-May-2021	21-Dec-2021
Date	Count	% per annum	% per annum	% per annum	% per annum	% per annum	% per annum
31-Dec-18	1	1.87	1.95	1.92	1.90	1.85	1.8
02-Jan-19	2	1.85	1.90	1.88	1.87	1.81	1.7
03-Jan-19	3	1.83	1.87	1.83	1.81	1.75	1.7
04-Jan-19	4	1.84	1.86	1.85	1.86	1.80	1.7
07-Jan-19	5	1.84	1.86	1.87	1.87	1.81	1.7
08-Jan-19	6	1.84	1.87	1.89	1.89	1.84	1.8
09-Jan-19	7	1.84	1.87	1.90	1.90	1.86	1.8
10-Jan-19	8	1.89	1.88	1.91	1.89	1.84	1.8
11-Jan-19	9	1.86	1.85	1.89	1.89	1.84	1.8
14-Jan-19	10	1.87	1.85	1.88	1.86	1.81	1.7
15-Jan-19	11	1.87	1.85	1.89	1.88	1.83	1.8
16-Jan-19	12	1.87	1.85	1.88	1.87	1.81	1.7
17-Jan-19	13	1.88	1.86	1.88	1.86	1.82	1.7
18-Jan-19	14	1.87	1.86	1.90	1.88	1.84	1.8
21-Jan-19	15	1.87	1.85	1.90	1.89	1.84	1.8
22-Jan-19	16	1.88	1.85	1.90	1.89	1.84	1.8
23-Jan-19	17	1.87	1.85	1.91	1.88	1.82	1.7
24-Jan-19	18	1.88	1.85	1.90	1.85	1.80	1.7
25-Jan-19	19	1.87	1.84	1.87	1.81	1.75	1.7
29-Jan-19	20	1.88	1.88	1.88	1.82	1.76	1.7
30-Jan-19	21	1.86	1.86	1.89	1.85	1.79	1.7
31-Jan-19	22	1.87	1.87	1.88	1.84	1.79	1.7
01-Feb-19	23	1.87	1.86	1.88	1.83	1.78	1.7
04-Feb-19	24	1.86	1.87	1.88	1.84	1.79	1.7
05-Feb-19	25	1.88	1.89	1.87	1.85	1.81	1.7
06-Feb-19	26	1.85	1.84	1.81	1.78	1.71	1.6

⁶ AER, Rate of return Instrument, December 2018, clauses 32, 33, 34, 35 and 36.

3.2 RBA Data input sheet

The RBA Downloaded Data worksheet also needs to be updated with data sourced from the RBA website. The user will need to refer to the statistics table web page and look up interest rates. The file the user will need to download is the [Aggregate Measure of Australian Corporate Bonds Spreads and Yields - F3](#).

The date entered will need to be formatted when coping across to the sheet. The user will need to first paste values, double click the cell and then hit enter. The date entered at times will flag a check date message in column B. If this happens adjust column A to the closet business date prior in the month in CGS yields.

The RBA downloaded sheet is split into two section, A rated and BBB rated bonds. The series ID in row 12 gives an indication of the data that needs to be extracted from the downloaded spreadsheet and inserted into the model.

Figure 3 RBA Data Input sheet

Update instructions:
 If DATE CHECK flags a 'Check Date' message in column B, the following steps need to be undertaken
 a) The relevant cell in column A would need to be formatted when copying across: "Copy from F3 | Paste Values | Double click into the cell and hit enter"
 b) Adjust column A to the closest business date prior in that month in CGS Yields (Refer comments on cell A17)
 If dates not available on the CGS yields spreadsheet, then calculation will not be correct for RBA calculations in that month or the month after.

Insert data in shaded area

Series ID			FNFTA7M
Title			Non-financial corporate A-rated bonds –
Month	DATE CHECK		Effective tenor – 7 year target tenor
			Years
31-Dec-18	31-Dec-18		6.60
31-Jan-19	31-Jan-19		6.58
28-Feb-19	28-Feb-19		6.59
29-Mar-19	29-Mar-19		6.60
30-Apr-19	30-Apr-19		6.64
31-May-19	31-May-19		6.65
28-Jun-19	28-Jun-19		6.68

MR Code Modifications | Intro | (ROR Instrument Clauses) | Annual Estimates | Data Splits | CGS Yields | CGS Interpolation | **RBA Downloaded Data** | RBA Adjustments | RBA Interpolation | BVAL & TR Downloaded Data | BVAL & TR

3.3 Bloomberg, Thomson Reuters and ADSWAP input sheet

The BVAL & TR Downloaded Data worksheet needs to be updated with data sourced from Bloomberg and Thomson Reuters.

The sheet is split into three sections: Bloomberg Downloaded Data, Thomson Reuters Downloaded Data and SWAP rates (also downloaded from Bloomberg). The user will need to update this sheet with information provided by the third party data providers.

Figure 4 Bloomberg, Thomson Reuters and ADSWAP input sheet

Update instructions:		Bloomberg Downloaded Data											
Column B-X - BVAL Data													
Column AA-AW - Reuters Data													
Column AZ-BJ - ADSWAP Data													
Insert data in shaded area													
BBBAUD10Y		BBBAUD9Y		BBBAUD8Y		BBBAUD7Y		AAUD10Y					
Date	Yield	Date	Yield	Date	Yield	Date	Yield	Date	Yield	Date	Yield	Date	
22-Jun-09		22-Jun-09		22-Jun-09		22-Jun-09		22-Jun-09		22-Jun-09		22-Jun-09	
23-Jun-09		23-Jun-09		23-Jun-09		23-Jun-09		23-Jun-09		23-Jun-09		23-Jun-09	
24-Jun-09		24-Jun-09		24-Jun-09		24-Jun-09		24-Jun-09		24-Jun-09		24-Jun-09	
25-Jun-09		25-Jun-09		25-Jun-09		25-Jun-09		25-Jun-09		25-Jun-09		25-Jun-09	
26-Jun-09		26-Jun-09		26-Jun-09		26-Jun-09		26-Jun-09		26-Jun-09		26-Jun-09	
29-Jun-09		29-Jun-09		29-Jun-09		29-Jun-09		29-Jun-09		29-Jun-09		29-Jun-09	
30-Jun-09		30-Jun-09		30-Jun-09		30-Jun-09		30-Jun-09		30-Jun-09		30-Jun-09	
01-Jul-09		01-Jul-09		01-Jul-09		01-Jul-09		01-Jul-09		01-Jul-09		01-Jul-09	
02-Jul-09		02-Jul-09		02-Jul-09		02-Jul-09		02-Jul-09		02-Jul-09		02-Jul-09	
03-Jul-09		03-Jul-09		03-Jul-09		03-Jul-09		03-Jul-09		03-Jul-09		03-Jul-09	
06-Jul-09		06-Jul-09		06-Jul-09		06-Jul-09		06-Jul-09		06-Jul-09		06-Jul-09	
07-Jul-09		07-Jul-09		07-Jul-09		07-Jul-09		07-Jul-09		07-Jul-09		07-Jul-09	
08-Jul-09		08-Jul-09		08-Jul-09		08-Jul-09		08-Jul-09		08-Jul-09		08-Jul-09	
09-Jul-09		09-Jul-09		09-Jul-09		09-Jul-09		09-Jul-09		09-Jul-09		09-Jul-09	
10-Jul-09		10-Jul-09		10-Jul-09		10-Jul-09		10-Jul-09		10-Jul-09		10-Jul-09	
13-Jul-09		13-Jul-09		13-Jul-09		13-Jul-09		13-Jul-09		13-Jul-09		13-Jul-09	
14-Jul-09		14-Jul-09		14-Jul-09		14-Jul-09		14-Jul-09		14-Jul-09		14-Jul-09	
15-Jul-09		15-Jul-09		15-Jul-09		15-Jul-09		15-Jul-09		15-Jul-09		15-Jul-09	
16-Jul-09		16-Jul-09		16-Jul-09		16-Jul-09		16-Jul-09		16-Jul-09		16-Jul-09	
17-Jul-09		17-Jul-09		17-Jul-09		17-Jul-09		17-Jul-09		17-Jul-09		17-Jul-09	
20-Jul-09		20-Jul-09		20-Jul-09		20-Jul-09		20-Jul-09		20-Jul-09		20-Jul-09	
21-Jul-09		21-Jul-09		21-Jul-09		21-Jul-09		21-Jul-09		21-Jul-09		21-Jul-09	
22-Jul-09		22-Jul-09		22-Jul-09		22-Jul-09		22-Jul-09		22-Jul-09		22-Jul-09	
23-Jul-09		23-Jul-09		23-Jul-09		23-Jul-09		23-Jul-09		23-Jul-09		23-Jul-09	
24-Jul-09		24-Jul-09		24-Jul-09		24-Jul-09		24-Jul-09		24-Jul-09		24-Jul-09	

3.4 NSW Holidays input sheet

The 2018 Instrument specifies business days with regards to public holidays and bank holidays in New South Wales.⁷ The NSW holidays are subject to change and will need to be updated accordingly. If a new holiday needs to be added just add in a new row.

If the CGS Yields - Date Check flags a Public Holiday message, the respective row referencing to the date will need to be removed from the CGS Yields worksheet. Once the row is deleted drag down the 'count' column (column B) to remove #REF errors

⁷ AER, *Rate of return instrument*, December 2018, clause 36(d).


Figure 5 NSW Holidays input sheet

Holiday	Date	CGS Yields - Date Check
New Years Day (following Monday if weekend)	01-Jan-13	
Australia Day	28-Jan-13	
Good Friday	29-Mar-13	
Easter Monday	01-Apr-13	
Anzac Day	25-Apr-13	
Queen's Birthday	10-Jun-13	
Bank Holiday	05-Aug-13	
Labour Day	07-Oct-13	
Christmas Day equivalent holiday (additional day if weekend)	25-Dec-13	
Boxing Day equivalent holiday (additional day if on weekend)	26-Dec-13	
New Years Day (following Monday if weekend)	01-Jan-14	
Australia Day	27-Jan-14	
Good Friday	18-Apr-14	
Easter Monday	21-Apr-14	
Anzac Day	25-Apr-14	
Queen's Birthday	09-Jun-14	
Bank Holiday	04-Aug-14	
Labour Day	06-Oct-14	
Christmas Day equivalent holiday (additional day if weekend)	25-Dec-14	
Boxing Day equivalent holiday (additional day if on weekend)	26-Dec-14	
New Years Day (following Monday if weekend)	01-Jan-15	
Australia Day	25-Jan-15	
Good Friday	03-Apr-15	
Easter Monday	06-Apr-15	
Anzac Day	25-Apr-15	
Queen's Birthday	08-Jun-15	
Bank Holiday	03-Aug-15	
Labour Day	05-Oct-15	

Instructions:
 The NSW Holidays are subject to change going forward and would need to be updated. If an update is necessary, just add in a column.

If the CGS Yields - Date Check flags a Public Holiday message, the row should be deleted. (Once the row is deleted drag down the 'count' column (column B) to re-index the rows.)

Insert Holiday & Date in shaded area (Blue-Grey)



Annual Estimates | Data Splits | **CGS Yields** | CGS Interpolation | RBA Downloaded Data | RBA Adjustments | RBA Interpolation | BVAL & TR Downloaded Data | BVAL & TR Extrapolation | BVAL & TR Yields | **NSW Holidays**

4 Model calculations

4.1 How is the return on debt calculated?

4.1.1 Daily 10-year YTM CGS

The output sheet ('CGS Interpolation' tab) has been built with reference to clause 29 (a) and (b).

The downloaded data from the RBA website will first need to be inserted in the 'CGS Yields' tab as instructed in section 3.1. The data inserted will flow through to the CGS interpolation sheet which will provide a daily 10-year YTM for CGS on a specific business day.

The interpolation tab will first detect if a 10-year YTM for CGS is directly observable. If the information is available it will be converted to the effective annual rate in accordance with clause 6 of the instrument.

If a 10-year YTM for CGS is not directly observable then a CGS YTM with a longer term to maturity than the target term to maturity, and a CGS YTM with a shorter term to maturity than the target term to maturity will be linearly interpolated in accordance with clause 16 of the instrument. The interpolated 10-year YTM for CGS will then be converted to the effective annual rate in accordance with clause 6 of the instrument

4.1.2 10-year daily YTM for RBA

The output tabs ('RBA adjustments' and 'RBA Interpolation') have been built with reference to clause 31 (b) (iii).

The downloaded data from the RBA website will first need to be inserted in the RBA downloaded tab as instructed in section 3.2. The data inserted will flow through to the RBA adjustment and interpolation tab which will provide a daily 10-year YTM for RBA on a specific business day.

The RBA currently publishes curves with a non-daily publication frequency (monthly) and does not publish a 10-year YTM with effective tenor of 10 years. It does however publish two non-daily YTM with target tenors greater than or equal to 7 years but less than or equal to 10 years on the relevant publication frequency-end dates. This data is linearly extrapolated in the RBA adjustment sheet in accordance with clause 14 of the instrument.

The non-daily band 10-year YTM on the relevant publication frequency end dates are then converted into a daily band 10-year YTM through linear interpolation in accordance with clause 17, 18 and 19.

4.1.3 10-year daily YTM for BVAL & Thomson Reuters

The output tabs ('BVAL & TR Extrapolation' and 'BVAL & TR Yields') have been built with reference to clause 31 (a) & 31 (b) (i).

The downloaded data from Bloomberg and Thomson Reuters will first need to be inserted in the Bloomberg and TR Downloaded data tab as instructed in section 3.3. The data inserted will flow through to the BVAL & TR extrapolation and yield sheets which will provide a daily 10-year YTM for Bloomberg and Thomson Reuters on a specific business day.

If a daily 10-year YTM for the curve provider on business day is directly observable, then the YTM from this data point will be used and converted to the effective annual rate in accordance with clause 12 of the instrument.

If the curve provider does not publish a 10-year YTM on business day, but publishes two YTM's with greater than or equal to 7 years but less than 10 years on that business day, then the daily 10-year YTM for that curve provider on that business day will be calculated using linear extrapolation in accordance with clause 15. The extrapolated value is then converted to an effective annual rate based on clause 12.

4.2 What are the limitations of the model?

The likelihood of the circumstances detailed in the clauses below occurring is considered to be low, therefore they have not been incorporated into the illustrative model. This avoids additional complexity and improves the accessibility of the model.

4.2.1 Calculation of daily GGS and ADSWAP yields using linear extrapolation

The calculation of daily GGS and ADSWAP yields using linear extrapolation is specified under clause 13 and has not been factored into the model.

This clause will only come into effect if the curve providers don't publish an observable 10 year term to maturity (Target term) or if the curve providers do not publish a longer term to maturity than the target term to maturity and a shorter term to maturity than the target term to maturity on a business day. These occurrences appear unlikely in the short term.

The exclusion of clause 13 means that clauses 29 (c) and 30 (c) are not included in the model.

4.2.2 Calculation of daily ADSWAP yields using linear interpolation

The calculation of the GGS and ADSWAP YTM using linear interpolation is specified under clause 16. This clause has been factored into the model but will only be used to estimate a daily 10-year YTM for CGS. It is not used in the model to estimate a daily ADSWAP YTM. This results in clause 30 (b) not being included in the model.

4.2.3 Calculation of the GGS and ADSWAP YTM using historical average

The calculation of the GGS and ADSWAP YTM using historical averages is specified under clause 20 and has not been factored into the model.

This clause will only come into effect if the curve providers don't publish an observable 10 year term to maturity (Target term) or if the curve providers do not publish a longer term to maturity than the target term to maturity and a shorter term to maturity than the target term to maturity on business day or if the curve providers do not publish two YTM's with a term to maturity greater than or equal to 7 years but less than 10 years.

The exclusion of clause 20 also means that clauses 29 (d) and 30 (d) are not included in the model.

4.2.4 Calculation of the curve provider YTM's using a historical approach

The calculation of the curve provider YTM's using a historical approach is specified under clause 21 and has not been factored into the model.

This clause will only come into effect if the data provided by all curve providers cannot be used to calculate a single daily 10-year YTM estimate in accordance with clause 31 a) and subclauses 31 b) (i-iii), such that there is either not a single A-rated, or not a single BBB-rated yield estimate or both.

The exclusion of clause 21 also means that sub-clauses 26 (b) (i-iii) are not included in the model.

The exclusion of sub-clauses 26 (b) (i-iii) therefore results in clause 31 (b) (iv) only being partially included in the model.

4.2.5 Calculation of the spread to swap for curve providers

The calculation of the spread to swap for curve providers is specified under clause 22 and has not been factored into the model.

This clause would only come into effect if we were required to calculate a daily 10-year YTM's using a historical approach.

4.2.6 Curve provider revises or updates its methodology

Clause 26 (c) is a contingency that has been put in place in the event any curve provider revises or updates its methodology listed in clauses 32 - 35. The methodology can be an entirely new series not identified in the data source clauses listed above.

The specific changes to the model that would be necessary in the event that this contingency arose cannot be known in advance, and so has not been factored into the model.

4.2.7 Curve provider revises or updates its historical yield estimate

Clause 26 (d) is a contingency that has been put in place in the event any curve provider revises or updates its historical yield estimates. Users will need to use the correct data sources (including the specified download dates) detailed in clauses 32 to 35 to ensure the appropriate annual estimates.

4.2.8 The curve providers replaces its publication frequency

Clause 26 (e) and (f) are contingencies that has been put in place in the event any curve provider replaces its publication frequency. The codes that would be necessary in the event that either of these contingencies arose cannot be known in advance, and so have not been factored into the model.

5 Model outputs

5.1 Interpretation of the annual estimate sheet

The annual estimate sheet will provide an indicative allowed return on debt for an averaging period determined by the user. The appropriate averaging period to be used should be in line with the relevant clauses in the instrument.⁸

If the input date entered in column E or H falls on a public holiday, a check date message will be flagged.

If the input date entered in column E or H does not have data in CGS Yields a 'No valid data' message will be flagged.

If the averaging period selected includes days where for all curve providers a YTM estimate cannot be calculated due to insufficient data then "Insufficient Data" will be flagged.

⁸ AER, *Rate of return Instrument*, December 2018, clauses 23, 24