Discussion paper

Estimating the allowed return on debt

May 2018

AUSTRALIAN ENERGY REGULATOR

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Shortened forms

Shortened form	Extended form
ABS	Australian Bureau of Statistics
AEMC	Australian Energy Market Commission
AER	Australian Energy Regulator
ATO	Australian Tax Office
CCP	Consumer Challenge Panel
COAG	the Council of Australian Governments
DGM	dividend growth model
energy networks	electricity and gas network service providers
the Guideline	the allowed rate of return guideline
MRP	market risk premium
NEL	national electricity law
NEO	national electricity objective
NER	national electricity rules
NGL	national gas law
NGO	national gas objective
NGR	national gas rules
RBA	the Reserve Bank of Australia
regulatory period	an access arrangement period for gas network service providers and/or a regulatory control period for electricity network service providers
the rules	collectively, the NER and NGR

Contents

1 Introduction

The Rate of Return Guideline (Guideline) outlines our approach to setting the allowed rate of return for regulated gas and electricity network service providers (service providers). We are currently reviewing the Guideline.

As noted in our issues paper, as part of the Guideline review process, we have:

- sought further information on the available third party yield curves to estimate the return on debt
- sought actual debt information from privately owned service providers to assist our choice of yield curve and to provide a 'sense check' of our approach. For this exercise, we engaged Chairmont Group (Chairmont) to assist us in gathering the required information and to aggregate and analyse the data for comparison to the broader corporate debt market

At the time of publishing our previous discussion papers in this review, these new sources of information were not yet finalised and available. Now that we have advanced our analysis, we are of the view that stakeholders should have an opportunity to consider and comment on this information prior to the draft guideline.

As such, the purpose of this discussion paper is to present the findings as well as other new evidence on the return on debt approach that have become available since the last Guideline review and seek views on potential refinements to the current approach.

The contents of this discussion paper including the questions contained should not be taken to imply the AER has yet formed views on the appropriate methodological approaches to apply, or numerical values to take, in the 2018 Guideline in determining the allowed rate of return. The Chairmont report is published on our website, together with this discussion paper.

We are currently inviting written submissions on our evidence sessions, transcripts and discussion papers. We wish to add this discussion paper to the same submission invitation. Submissions on this discussion paper should be sent by **Wednesday 30 May 2018**, to rateofreturn@aer.gov.au

Alternatively, submissions can be sent to:
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We prefer that all submissions be sent in an electronic format (Microsoft Word) and are publicly available, to facilitate an informed, transparent and robust consultation process. Accordingly, submissions will be treated as public documents and posted on our website, unless prior arrangements are made with us to treat the submission, or portions of it, as confidential. Those wishing to submit confidential information are requested to:

- clearly identify the information that is the subject of the confidentiality claim, and
- provide a non-confidential version of the submission.

Concurrent expert evidence session

We recognise that, having access to this new evidence and analysis, stakeholders may reach the view that a concurrent expert evidence session on debt issues would be valuable. We are open to hosting such a session and welcome stakeholder views on this issue. However, as all data underlying the request of actual return on debt data remains confidential on the basis of commercial sensitivity, we will be limited to hosting such a session on the basis of aggregated information.

2 Stakeholders submissions on issues paper

In response to our issues paper, submissions from various stakeholders were received. The following table summarises the submissions made on issues relating to the return on debt approach.

Table 1 Summary of submissions on issues relating to the return on debt approach

Submission	Comment
Australian Pipeline and Gas Association (APGA)	The transition and trailing average approach will better achieve the allowed rate of return objective compared to the on-the-day approach. The AER should consider pros and cons of all third-party debt sources and engage on those that are reliable, with each series being separately weighted. The benchmark term of ten years reflects the long term investment horizon of network owners. To change benchmark term at this point would require substantial unwinding of hedging contracts.
Energy Network Australia (ENA)	There should be no change to the ten year trailing average return on debt. It is important for service providers to set their own return on debt averaging periods in order to issue (or price) their debt to reasonably match their allocated allowance. ENA agrees with the AER's proposal to review the additional data sources available. The criteria used to assess appropriateness of the new data sources should include whether the data source: • matches the characteristics of debt issued by a benchmark efficient entity, • is derived from a sufficiently large data set, • is published regularly by an independent reputable organisation and that a sufficiently long history of estimates is available. There should be no change to the return on debt transition arrangements as it would be very difficult for firms to manage and some would need to unwind debt and related hedging which could impose a significant cost on networks and consumers. Changing the approach before the current transition was complete could raise the prospect of regulatory risk. This would be inconsistent with achieving the national gas and electricity objectives by discouraging efficient investment in the long term interests of consumers.
Ergon Energy and Energex (EE&E)	EE&E supports the current approach to return on debt averaging periods but submits that the further conditions set out in revenue determinations (no later than 25 business days before a service provider submits a pricing proposal and commence no earlier than 12 months and 25 business days) should be specified. Regulated asset lives are usually 30 to 60 years and debt is refinanced several times over their life - setting the term at ten years is appropriate and replicates what service providers actually practice. EE&E support a review of all four debt data series as it will reduce the risk of material error. EE&E submit that changes are not required to the transition approach.
Major Energy Users	Averaging periods should be set by the AER and be consistent. A sharing scheme should be implemented to share benefits of debt efficiency improvements with consumers. The length of debt should not be ten years, rather it should be set on the average tenor of each debt. The return on debt should be set on multiple debt sources rather than just corporate bonds.
Spark Infrastructure	The current approach to setting the benchmark term is appropriate. Spark Infrastructure support the review of third-party debt data series, want only data that is sourced through a transparent methodology with a comparable data set that appropriately reflects the risks of an efficient service provider. There should not be a transition – the trailing average should be implemented as soon as

	possible. Any further delays would be unnecessary and against the long-term interests of consumers. Spark Infrastructure do not support a revenue neutral approach and submit that service providers have a right to recover efficient costs.
APA	The current approach to transitioning to a trailing average approach should be continued allowing service providers and users the opportunity to gain experience with it. The AER should assess additional third-party data sources.
ATCO	Additional data sets should be used only where the benefits are considered to outweigh their detriments. It is more appropriate to skip the transition and immediately move to the hybrid trailing average approach.
Cheung Kong Infrastructure Holdings (CKI)	CKI support the consideration of additional data sources where they are reliable as this will result in a better estimate. The current transition approach should be maintained as any changes in approach where most service providers are already part way through the transition would result in uncertainty and risk. This would also likely to result in significant additional (and inefficient) financing costs if, for example, hedging arrangements had to be unwind. The 10 year benchmark term should be maintained reflecting the long life of the distribution service assets.
Energy Users Association of Australia (EUAA)	EUAA do not believe any change is required to the current approach of a trailing average with an NPV neutral 10 year transition and support the AER approach of reviewing the four third party debt data series.
Queensland Treasury Corporation (QTC)	The current approach using equally weighted RBA and Bloomberg curves is appropriate and incorporating data sets such as Standard & Poor's is likely to provide only a small incremental benefit. The ten year benchmark debt tenor is essential for the proper allocation of the trailing average return on debt. The change in approaches is beneficial to consumers and they see a large amount of value in the trailing average approach. The AER statement "…we consider past financing practices are largely neither relevant nor appropriate to our consideration of efficient financing costs of a benchmark efficient entity…" is in contrast to the trailing average return on debt approach and the AER could provide some guidance on how to reconcile these concepts. The trailing average approach is superior and the AER should express this view.
AusNet Services (AS)	AS support the transition to a trailing average approach as it more accurately reflects the costs of networks enabling better cash flow management and that contracts entered into as a result of service providers believing there would be a transition may result in a one-off cost or gain to the network business depending on prevailing market rate. This would not be desirable and may require a separate transition.

Source: ; Australian Pipelines and Gas Association, *Submission to the Issues Paper*, December 2017, p4 – 6; Energy Networks Australia, *AER Rate of Return Guideline*, December 2017, p16-17, p19-20; Ergon Energy and Energex, *Issues paper – review of the rate of return guidelines*, December 2017, p4-5; Major Energy Users, *Review of the rate of return guidelines*, December 2017, p10-11, 15; Spark Infrastructure, *Response to issues paper on the review of the Rate of Return Guideline*, December 2017, p8-9; APA, *APA submission responding to AER issues paper*, December 2017, p8; ATCO Gas Australia, *Review of rate of return guideline – issues paper*, December 2017, p6-7; Cheung Kong Infrastructure, *Submission on rate of return issues paper*, December 2017, p3, Energy Users Association of Australia, *EUAA submission – AER Rate of Return Review Issues Paper*, October 2017, p8; Queensland Treasury Corporation, *Rate of Return Guideline Review Issues Paper*, December 2017, p3, AusNet Services, *Review of Rate of Return Guideline – Issues Paper*, December 2017, p1;

3 How the allowed return on debt is currently estimated

This section summarises how we currently estimate the allowed return on debt and how each component in the calculation is arrived at.

3.1 Trailing average portfolio approach

The allowed return on debt is estimated using a trailing average portfolio approach following the completion of a transitional period, and has the following features:

- The trailing average is for the period of 10 years
- Equal weighting is applied to all the elements of the trailing average
- The trailing average is updated automatically every regulatory year within the regulatory control period.

For each regulatory year within a regulatory period, it is determined with the following formula:

$$ {}_{x}kd_{X+1} = \frac{1}{10} \cdot \sum_{t=1}^{10} {}_{x-10+t}R_{X+t} $$

where:

- ${}_{x}kd_{X+1}$ refers to the allowed return on debt for regulatory year *x+1*
- ${}_{x-10+t}R_{X+t}$ refers to the estimated rate of return on debt that was entered into in year *(x-10+t)* and matures in year *(x+t)* (in the formula above all debt has a ten year term); and
- weights of 1/10 apply to each element of the trailing average.

Estimates of ${}_{x-10+t}R_{X+t}$ represent simple averages of the estimates for each business day within the averaging period in year *(x-10+t)*. Each daily estimate within the averaging period is obtained from an independent third party data provider in accordance with the estimation procedure specified in the guideline.

3.1.1 Transitional arrangement

The trailing average portfolio approach is initially implemented with a period of transition of 10 regulatory years for all regulated businesses. The trailing average portfolio approach and the transitional arrangement commences from the start of each service provider's first regulatory period starting after May 2014.

For the first year, we estimate a return on debt using the on-the-day approach (that is, based on prevailing market conditions near the commencement of the regulatory period), and then gradually transition this approach into a trailing average (that is, a moving historical average) over 10 years by annually updating 10 per cent of the return on debt to reflect prevailing market conditions in that year.

3.2 Estimating prevailing return on debt

The following benchmarks are applied in estimating the prevailing return on debt for each service provider:

- **Credit rating**: BBB+ from Standard and Poor's or the equivalent rating from other reputable rating agencies.
- **Debt term to maturity**: 10 years.
- **Yield data**: The debt yields published by independent third party data service providers are used. If the published yields are on a semi-annual basis, the figures are annualised by using the formula: $y_a = \left(1 + \frac{y_s}{2}\right)^2 - 1$, where y_a is the annualised yield and y_s is the semi-annual yield published by an independent third party data service provider.

  Our current approach is based on a simple average of the 10 year yield estimate of the non-financial corporate broad BBB rated data published by the RBA (the RBA curve) and the 10 year yield estimate of the Australian corporate BBB rated data published by Bloomberg Valuation Service (BVAL) (the BVAL curve). Adjustments using extrapolation and interpolation methods are made by the AER in arriving at the 10-year equivalent yield estimates.

  In case of situations whereby the published data by either BVAL or RBA or both, become temporarily or permanently unavailable or change, we have published in recent determinations a series of our contingency approaches, which is summarised in Table 2 below[1].

Table 2 Contingency approaches to choice of data series

Event	Contingency approach
Either the RBA or Bloomberg ceases publication, temporarily or permanently, of Australian yield curves that reflect a broad BBB rating.	We will estimate the annual return on debt using the remaining curve.
A different third party commences publication of a 10 year yield estimate (or we are made aware of a different third party publishing a 10 year yield estimate)	We will not apply estimates from a third party data provider that we have not evaluated and included in our final decision approach. We will consider any new data sources in future determinations.
Either Bloomberg or RBA substitutes its current methodology for a revised or updated methodology.	We will adopt the revised or updated methodology. Then, at the next regulatory determination, we will review this updated methodology. As noted above, we would also review any new data sources. However, if Bloomberg or the RBA backcasts or replaces data using a revised or updated methodology we will not use the backcasted data to re-estimate our estimates of the prevailing return on debt for previous years. This would be impractical and would create regulatory uncertainty over whether the allowed return on debt would at some point in the future be re-opened. Instead, we will continue to use the Bloomberg or RBA data that we downloaded at the time of estimating the prevailing return on debt for that point in time.

[1] AER, *AusNet Services Transmission determination 2017-2022 Attachment 3 Rate of Return,* April 2017, P3-145 – 3-146

Bloomberg reduces the maximum published BVAL term from 10 years	If Bloomberg still publishes the BVAL curve to 5 or more years, we will extrapolate the BVAL curve from the longest published term to 10 years using the corresponding yield margin from the RBA curve. If Bloomberg no longer publishes the BVAL curve to 5 years, we will rely entirely on the RBA curve.
The RBA ceases publication of a 10 year yield estimate.	If the RBA ceases publication of a 10 year yield estimate, we will extrapolate the RBA estimate to 10 years using: if available, the margin between spreads in the Bloomberg curve,from the RBA's longest published target term to 10 years otherwise, the actual CGS margin from the RBA's longest published estimate to 10 years, plus the average DRP spread for the same term margin over the last month prior to the end of its publication.
The RBA commences publication of daily estimates.	We will cease interpolating the RBA monthly yields. Instead, we will estimate both the RBA yield and the RBA year extrapolation margin (used with the BVAL curve) using these daily estimates.
Either Bloomberg or the RBA publishes a BBB+ or utilities specific yield curve.	We will adopt the BBB+ or utilities curve in place of the provider's existing curve, on the basis that it is a closer fit to a benchmark efficient entity for the service provider.

Source: AER analysis.

4 The overall approach to the return on debt issues

In our correspondence with stakeholders to date, and in the first concurrent expert evidence session, most stakeholders have indicated support for maintaining substantial parts of our current return on debt approach. As set out in our issues paper:[2]

> We are currently within a transitional period between two different approaches to setting the allowed return on debt —that is, a transition from an 'on-the-day' approach to a 'trailing average' approach. Based on the information currently before us, we do not consider changing this approach will better contribute to the achievement of the national gas and electricity objectives or the allowed rate of return objective.
>
> We have recognised that the trailing average approach may have particular benefits that an on-the-day approach cannot achieve. These potential benefits mainly relate to smoother prices and a potentially reduced mismatch between the actual debt cost outcomes (or cash outflows) for providers of energy network services and the allowed return on debt.[3] In our explanatory statement to the current Guideline, we observed that the majority of stakeholders, including consumer groups, supported moving to a trailing average approach.[4]
>
> We have also recognised that without a revenue-neutral transition, the wealth transfer away from consumers will be a substantial unintended cost to consumers of the regulatory change to a trailing average in current market conditions.[5] As such, our current determinations have included a 10-year transition to the trailing average return on debt.

In view of the broad support for our overall return on debt approach, this discussion paper focusses on two detailed aspects of our framework:

- the choice of third party data provider
- the choice of the appropriate debt series, within which we address:
    - benchmark credit rating
    - benchmark term

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2 AER, *Issues paper Review of the rate of return guidelines*, October 2017, p.19

3 See AER, *Draft decision: AusNet Services gas access arrangement 2018 to 2022, Attachment 3 — Rate of return*, July 2017, p. 342.

4 We list these submissions in AER, *Better Regulation: Explanatory statement rate of return guideline*, December 2017, p. 110.

5 AER, *Draft decision: AusNet Services gas access arrangement 2018 to 2022, Attachment 3 — Rate of return*, July 2017, p.335. This observation is also supported in Partington, G., Satchell, S., *Report to the AER: Issues in relation to the cost of debt*, 9 April 2017, p.27.

- implementation of the benchmark credit rating

4.1 Use of third party data series

Currently we estimate the return on debt by reference to independent third party data series as discussed in Section 3.2.Using third party data series is the same approach we proposed in the current Guideline.[6]

We have previously adopted this approach for reasons including:[7]

- A third party data series can be practically applied in the annual debt update process. This approach allows all stakeholders to estimate the annual return on debt using pre-determined data series, to combine them using a pre-determined formula and to capture this data over set averaging periods. This creates a high degree of predictability and transparency in implementing the approach.
- A third party data series is independent information developed by finance experts with access to financial datasets. These experts develop this primarily for the use of market practitioners and it is independent from any regulatory process.
- Using a third party data series also reduces the scope for debate on debt instrument selection and curve fitting—For instance, independent data service providers have already exercised their judgement on bond selection, curve fitting and adjusting yields. To undertake this process during each annual debt update would be impractical, and potentially impermissible under a binding rate of return instrument.

Importantly, all available third party data series that we are aware of are based on corporate bond data. Some stakeholders have identified that the regulated networks raise debt through a mix of corporate bonds and bank debt. This is consistent with the data provided to us by the networks. However, we are not aware of any independent data series reflecting the cost of bank debt provided to borrowers that are comparable (in terms of risk) to the regulated networks.

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6 AER, *Better Regulation Rate of Return guideline*, December 2013, p21

7 AER, Draft decision— AusNet Services Transmission determination 2017-2022 Attachment 3 Rate of Return, April 2017, p.109–111.

5 Benchmark credit rating

In Section 3, we explained how we estimate the return on debt for each service provider under the current Guideline and that various benchmarks are used in the estimation process. One such benchmark is the corporate credit rating. The current benchmark is BBB+ from Standard and Poor's or the equivalent rating from other reputable rating agencies.

5.1 Updated actual credit rating data

In our final decision for AusNet Services' 2017-22 transmission determination[8] we explained our position and key reasons on using the benchmark credit rating of BBB+. We also included our calculation of the median credit rating of a sample of firms to estimate the industry median. We have updated the data to include the latest information for 2017 shown in the tables below.

Table 4 below shows the historical credit ratings for service providers from 2006 to 2017.

Table 4 Historical credit ratings of service providers

Issuer	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	Median 2006-2017
APT Pipelines Ltd	NR	NR	NR	BBB	BBB	BBB	BBB	BBB	BBB	BBB	BBB	BBB	BBB
ATCO Gas Australian LP*	NR	NR	NR	NR	NR	BBB	BBB	A-	A-	A-	A-	BBB+	A-
DBNGP Trust*	BBB	BBB	BBB	BBB-	BBB-	BBB-	BBB-	BBB-	BBB-	BBB-	BBB-	BBB	BBB-
DUET Group	BBB-	BBB-	BBB-	BBB-	BBB-	BBB-	BBB-	NR	NR	NR	NR	NR	NR
ElectraNet Pty Ltd	BBB+	BBB+	BBB+	BBB	BBB	BBB	BBB	BBB	BBB+	BBB+	BBB+	BBB+	BBB+
Energy Partnership (Gas) Pty Ltd	BBB	BBB	BBB-	BBB-	BBB-	BBB-	BBB-	BBB-	BBB-	BBB-	BBB-	BBB+	BBB-
Australian	BBB-	BBB-	BBB-	BBB	BBB	BBB	BBB	BBB	BBB	BBB	BBB	BBB	BBB-

[8] AER, *AusNet Services Transmission determination 2017-2022 Attachment 3 Rate of Return,* April 2017, p.3-347 - 3-351

Gas Networks Ltd				-	-	-	-		+	+	+	+	
ETSA Utilities	A-	A-	A-	A-	A-	A-	A-	A-	A-	A-	A-	A-	A-
Powercor Australia LLC	A-	A-	A-	A-	A-	A-	A-	BBB+	BBB+	NR	NR	NR	NR
SP AusNet Services	A	A	A-	A-	A-	A-	A-	A-	A-	A-	A-	A-	A-
SGSP (Australia) Assets Pty Ltd	NR	NR	A-	A-	A-	A-	A-	BBB+	BBB+	BBB+	A-	A-	A-
The CitiPower Trust	A-	A-	A-	A-	A-	A-	A-	BBB+	BBB+	NR	NR	NR	NR
United Energy Distribution Pty Ltd	BBB	BBB	BBB	BBB	BBB	BBB	BBB	BBB	BBB	BBB	BBB	A-	BBB
Victoria Power Networks Pty Ltd	NR	NR	NR	NR	NR	NR	NR	NR	NR	BBB+	BBB+	BBB+	BBB+
NSW Electricity Networks Finance Pty Ltd	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	BBB	BBB	BBB
Ausgrid Finance Pty Ltd	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	BBB+	BBB+	BBB+
Network Finance Company Pty Ltd	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	BBB+	BBB+
Industry median (yearly)	BBB/BBB+	BBB/BBB+	BBB+	BBB	BBB	BBB	BBB	BBB/BBB+	BBB+	BBB+	BBB+	BBB+	-

*Not under AER regulation

Source: Bloomberg (S&P), AER analysis

The table above indicates that those network service providers have collectively maintained stable credit ratings over an extended period - spanning the GFC. All debt issuers within the sample have maintained investment grade credit ratings (between BBB– and A–) over the period.

The table below shows the industry median credit rating over historical periods of progressively longer lengths between 2006 to 2017[9].

Table 5 - Industry median credit rating over progressive periods between 2006 to 2017

Time period	Median credit rating	Time period	Median credit rating
2017 (to date)	BBB+	2011–2017	BBB
2016–2017	BBB+	2010–2017	BBB
2015-2017	BBB+	2009-2017	BBB
2014–2017	BBB+	2008–2017	BBB+
2013–2017	BBB/BBB+	2007–2017	BBB/BBB+
2012–2017	BBB	2006–2017	BBB/BBB+

Source: Bloomberg (S&P), AER analysis.

Questions

1. Does the evidence support continuation of a BBB+ credit rating or a change? If it supports a change, what should the benchmark credit rating be?

[9] This is an update on the table previously published with the 2017 data of AER, *Final determination 2017-2022 Attachment 3 Rate of Return,* April 2017, p.3-350

6 Selection of third party yield curve provider

Currently we estimate the return on debt using a simple average of curves published by Bloomberg (the BVAL series) and the RBA. Since our initial choice of data sources,[10] we have become aware of two additional data providers offering Australian dollar denominated yield curves for corporate debt: Thomson Reuters and Standard and Poor's (S&P).

In recent review processes, several service providers have proposed to adopt a Thomson Reuters 10 year yield curve in addition to or in place of the Bloomberg data series:

- Ausnet Services proposed to estimate its return on debt using a simple average of RBA and Thomson Reuters curves. In its submission it submitted that the BVAL curve would not contribute to an estimate that achieved the ARORO.
- CitiPower and Powercor also proposed to rely on the Thomson Reuters curve. It proposed a weighted average of the RBA, BVAL and Thomson Reuters curves, with 50 per cent weight allocated to the RBA curve and 25 per cent allocated to each of the BVAL and Thomson Reuters curves.

To date, we have not included the Thomson Reuters curve in our approach to estimate the return on debt. However, as noted in response to the above proposals, we had not yet formed a definitive view about the suitability of the Thomson Reuters curve. In those determinations, we remained satisfied that our current approach (BVAL and RBA) remained fit for purpose.[11] This guideline review allows for the opportunity to evaluate all available options in a sector-wide process.

In considering the appropriate mix of providers we should rely on to estimate the return on debt, we will have had regard to factors including:

- The market expertise and credibility of the data provider
- The technical characteristics of the curves, including bond selection criteria and the curve-fitting methodology
- Time series of curve availability
- Curve outcomes.

This section sets out information about the new curves in line with the above characteristics.

Relevant market experience

[10] ACCC Regulatory Economic Unit, *Return on Debt estimation: a review of the alternative third part data series*, August 2014.

[11] See for example: AER, *Final determination— AusNet Services transmission determination 2017-2022— Attachment 3: Rate of return*, April 2017, pp. 340–341.

Estimation of yield curves to be used in this application is a complex exercise. It relies both on the development of a methodology, then the ongoing application and maintenance of that methodology with a high degree of quality control. The development of such a methodology is, in itself, a highly technical exercise and relies on expert judgement.

For these reasons, we have previously considered the relevant market expertise and credibility of the potential curve providers in making our decision. This may be even more important under a binding rate of return instrument, recognising that we will be relying on the data providers to continue publishing and to maintain quality control over their curves for a long period of time.

In this case, the four curve providers are:

- the RBA
- Bloomberg
- Thomson Reuters
- Standard & Poor's.

Question

2. What are your views on the relevance of market expertise of the above providers with respect to estimating corporate debt yield curves for our purposes?

Technical characteristics of the curves

In choosing third party yield curves, we have previously had regard to detailed analysis of the curves' technical characteristics. In particular, we have had regard to:

- bond selection criteria— these are the rules governing the sample of bonds to which a curve is fitted
- curve-fitting methodology— this is the econometric process by which a curve is fitted to the sample of constituent bonds

The analysis of technical characteristics in the RBA, BVAL and TR debt series have been addressed in prior reports by the ACCC's Regulatory Economics Unit, and by Dr Lally.[12]

To date, we have concluded that both of the RBA and BVAL curves have strengths and weaknesses, and that neither is clearly superior with respect to either the bond selection criteria or curve fitting methodology.

[12] ACCC Regulatory Economics Unit, *Thomson Reuters Credit Curve Methodology – Note for the AER*, April 2017, Lally, *Implementation issues for the cost of debt*, November 2014

For the purposes of comparison, we have incorporated details of the bond selection criteria from the four curves into Table 2.

Table 2 Comparison of bond selection criteria between RBA, BVAL, TR and S&P corporate yield curves

Bond characteristic	RBA series[13]	BVAL series[14]	TR series[15]	S&P series [16]
Size of issue / quality of pricing data	At least A$100 million (or equivalent) - outstanding	Ratings and BVAL prices available at the market close BVAL score of 6 or higher[17]	Only actively priced bonds [18] At least A$150 million outstanding	Only actively priced bonds[19] Bonds' weighting in curve aggregation depends on the liquidity of bonds within the past 10 days.[20]
Residual term to maturity	Over 1 year	At least 3 months	At least 1 month	No restriction
Issuing entity	Non-financial corporations only Incorporated in Australia	Both financial and non-financial corporations Australia is identified as the country of risk	Exclude sovereign and agency debt, bonds issued by non-profit/charitable foundations, supranationals, universities/colleges, bonds guaranteed by sovereign governments. For the 'domestic' curve: Australian-domiciled entity with Australia being the country of risk. For the 'main'/'blended' curve: no restriction on ownership or	Any entity issuing debt in AUD, including non-resident entities.[21]

13 RBA Statistical Table F3 (series FNFYBBB10M)

14 Bloomberg BS157 AUD Corporate BBB BVAL Curve series

15 Thomson Reuters AUD BBB curves BBBAUDBMK ('blended' curve) and BBBAUDDBMK ('domestic' curve).

16 S&P Global, Internal Document, *Construction of the Rating and Sector Yield Curves for Corporate Debt (confidential)*, Dec 2014

17 BVAL score is a Bloomberg measure of the BVAL pricing data quality. It is discussed in more detail in our 2014 report.

18 According to TR this condition means that 'the pricing on the bond should not be stale – if the bond's prices are not updated for 2 or more days then the bond will be excluded… "Actively priced" means that there are bid and ask prices published for those bonds'.

19 Specifically, S&P grades bonds as high, low or no liquidity based on the number of unique price updates have been observed from a given source within the last 10 days. Only coverage with 'high' (at least 6 of the last 10 days) liquidity grade can be used within each data source.

20 Specifically, this is based on the availability of quoted prices for the bonds within the preceding 10 days. This is designed to mitigate level fluctuations arising from intermittently quoted bonds dropping into and out of the sample.

21 S&P indicate the rationale for this decision is that, if a non-resident entity is issuing in AUD then we would assume they primarily use that money to finance local operations.

			country of risk.	
Secured / unsecured	Both secured and unsecured bonds[22] [23]	Senior unsecured bonds only [24]	Senior unsecured and unsecured bonds only.	Senior unsecured bonds only
Credit rating	Broad BBB :[25] S&P bond rating, if available; S&P issuer rating otherwise – for unsecured bonds only	Broad BBB: broad BBB Bloomberg composite bond rating, if available; broad BBB or equivalent from S&P, Moody's and Fitch credit rating agency otherwise	Broad BBB credit rating by S&P, Moody's, Fitch, or DBRS; generally more weight is put on the latest available ratings; to resolve the issue where a bond has split ratings on the same date, the minimum rating for that bond is taken.	Broad BBB credit rating by S&P.
Currency of issue	AUD, USD, Euro	AUD	AUD	AUD
Coupon type	Fixed rate bonds only	Fixed rate bonds only	Plain vanilla fixed rate or zero coupon bonds.	Fixed rate bonds only
Embedded options	Both bullet bonds and bonds with embedded options [26]	Bullet bonds and bonds with make-whole call option Note that bonds with a make-whole call option are included – even when they also have other type of embedded	Bullet bonds and bonds with make-whole call option only	Bullet bonds and bonds with make-whole call option only
Other restrictions	Excludes bonds with some form of duplication and several credit wrapped securities The final list of bonds in the sample is published by the RBA once a month together with the credit spread table some form of duplication and several credit	Prior to the curve fitting, outliers are detected and removed from the bond sample. Once a bond is considered an outlier it remains out of the sample unless it is later re-added following a review by evaluators on a case by case basis	Only includes bonds issued into Australian bond market as a primary market. Excludes private placements. Excludes outliers (z-spread based procedure)	Excludes private placements Excludes outliers (z-spread based procedure)

[22] A secured bond is a bond for which the issuer has set aside assets or collateral to ensure timely interest and principal payments. In the event of default, the creditor(s) of a secured bond has a priority claim to the pledged assets over the unsecured debt creditors.

[23] Unsecured debt is a claim for repayment that ranks behind senior unsecured and ahead of subordinated debt. 'Unsecured' indicates that the obligation is not backed by any collateral.

[24] Senior unsecured debt is a claim for repayment that ranks ahead of other unsecured debt, but behind secured debt. The obligation is not backed by any collateral.

[25] 'Broad BBB' refers to S&P credit ratings in the following range: BBB-, BBB, BBB+.

[26] Bullet bonds are redeemable only at maturities. An embedded option is a component of a financial bond or other security, and usually allows either the bondholder or the issuer the right to take some action against the other party on specified dates at specified prices.

wrapped securities

For the purposes of this discussion paper, we have not repeated full details of the RBA, Bloomberg or Thomson Reuters curve fitting methodologies in this section. These are set out in detail in two previously published reports by the ACCC's Regulatory Economics Unit.[27] Since these reports, we have corresponded with Standard & Poor's about the technical characteristics of its yield curves to allow for comparison with the existing three curves. Standard & Poor's provided to us a detailed proprietary document setting out its approach. Based on that document and on further correspondence, Standard & Poor's has allowed us to publish the details set out in section 11 in order to allow stakeholders to compare the bond selection criteria and curve fitting methodologies.

For the purposes of comparison, we have set out brief summaries of the curve-fitting methodologies in Table 3.

Table 3 Comparison of bond selection criteria between RBA, BVAL, Thomson Reuters and S&P corporate yield curves

Provider	Description
BVAL	The Bloomberg curve is fitted to observations by using an adaptive mix of zeroth and first order nonparametric regression and subsequently smoothed by using rational Bezier polynomials. Some further detailed aspects of its estimation approach are proprietary. Our understanding, however, is that the BVAL curve is a par yield curve. A par yield curve is a way of normalising bond yields to represent the term structure of a sample of bonds. It also represents the yield to maturity that would need to be offered to raise funds equal to the face value of the bond at issuance.
RBA	The RBA approach to estimating credit spreads is outlined in their Bulletin article. They have provided the following summary of its econometric method: "[A]ggregate credit spreads of A-rated and BBB-rated Australian NFCs [non–financial corporations] are estimated for a given (target) tenor as the weighted average of the Australian dollar equivalent credit spreads over the swap rate. The method is applied to the cross-section of bonds in the sample that have the desired credit rating. The weights are determined by a Gaussian kernel that assigns a weight to every observation in the cross-section depending on the distance of the observation's residual maturity and the target tenor according to a Gaussian (normal) distribution centred at the target tenor."
Thomson Reuters	Thomson Reuters uses a non-parametric model to derive a term structure – the basis spline model. For each curve, TR reports a par yield, zero yield, the benchmark spread, swap spread and asset swap spread.
S&P	Estimation of the credit curves occurs in 3 broad steps: 1. Curve shapes are generated for all possible credit curves (S&P calls this a term structure scheme). 2. Bonds of the credit rating of interest are discounted to an instantaneous spread (using the term structure scheme), outliers are removed and an average of the remaining bonds is

[27] ACCC Regulatory Economic Unit, *Thomson Reuters Credit Curve Methodology – Note for the AER*, April 2017; ACCC, Regulatory Economic Unit, *Return on debt estimation: a review of the alternative third party data series – Report for the AER,* August 2014

	taken. 3. The average from step two is used along with the term structure schedule to generate the credit curve of interest. Within this process, S&P makes use of a series of computational techniques to improve estimation of credit curves.

Source: AER analysis, Bloomberg, RBA, Thomson Reuters, Standard and Poor's

Questions

3. Having regard to the available evidence, are any of the curves clearly superior to the other curves in terms of their overall fitness for purpose?

The level of adjustment required from the curve's published form to make it fit for purpose

Holding other factors constant, we have previously identified our preference for curves that require fewer adjustments from their published form for use in the benchmark. We have set out these adjustments in detail in past decisions.[28] They include:

- Extrapolation—where the published curve has a maximum published term of less than the target term to maturity, we have extrapolated that term to our benchmark term of 10 years. This requires decisions about the approach to extrapolation, which necessarily include assumptions about the shape of the yield curves at longer maturities.
- Interpolation—we require daily estimates of the return on debt over debt averaging periods. Currently, the RBA curve is only published on one day per month while the BVAL curve, TR curve, and S&P curve are published daily. As a result, we interpolate the RBA month-end data across all business days in the month.[29] This requires assumptions about the linearity of spread movements over the course of the month. We have discussed the potential effects of these assumptions in previous decisions.[30]

Table 4 below, sets out the necessary adjustments to published yield curves.

Table 4 Necessary adjustments to published yield curves

Curve	Necessary adjustments
BVAL	Bloomberg typically publishes a daily 10 year BVAL estimate so the only necessary adjustment is conversion to an effective annual rate, which is a straightforward and small adjustment. Currently, we extrapolate the BVAL curve, where necessary, using the corresponding margin from the RBA

[30] See for example: AER, *Final determination— AusNet Services transmission determination 2017-2022— Attachment 3: Rate of return*, April 2017, pp. 204–209.

	curve. For example, if BVAL only publishes to 7 years, we extrapolate it using the 7 to 10 year margin from the RBA curve. In addition, BVAL estimates require conversion to an effective annual rate, which is a straightforward and small adjustment.
RBA	The RBA only publishes data on one day per month. As a result, we are required to interpolated monthly spreads to Commonwealth Government Securities (CGS) to produce a daily yield series. Also, as a consequence of the RBA's curve-fitting methodology, its published 10 year estimate typically has an 'effective term' of less than 10 years. We extrapolate the RBA curve from its 'published' 10 year term (effective term is closer to 9 years) to an 'actual' 10 year term using linear extrapolation from the published 7 and 10 year estimates. This method is based on advice from Lally, who suggested that linear extrapolation was reasonable where the extrapolation term range was relatively small. In addition, RBA estimates require conversion to an effective annual rate, which is a straightforward and small adjustment.
TR	Thomson Reuters typically publishes a daily 10 year estimate so the only necessary adjustment is conversion to an effective annual rate, which is a straightforward and small adjustment. However, Thomson Reuters does not extrapolate beyond the longest term in its bond sample and the availability of its 10 year estimate may vary. In addition, Thomson Reuters estimates require conversion to an effective annual rate, which is a straightforward and small adjustment.
S&P	Over the period its curve has been offered (since January 2017), S&P typically publishes a daily 10 year estimate so the only necessary adjustment is conversion to an effective annual rate, which is a straightforward and small adjustment.

Source: AER analysis, Bloomberg, RBA, Thomson Reuters, Standard and Poors.

Where only two data series were available, our view was that the benefits of multiple data series outweighed the costs of the adjustments described above. Where additional data series are available, these benefits may be less important at the margin.

Questions

4. How should we consider the impact of adjustments to curves away from their published form when deciding on the curves to use in our benchmark?

Availability of the curve over a longer time series

In assessing the available yield curves and comparing them, the time series over which that curve is available may be relevant. Holding other things constant, a longer time

series allows us to form better-informed conclusions about the performance of the curve over time. This includes factors such as whether it is published consistently, whether the curve has required methodological changes etc. The longer time series may also allow for stronger assessment of the relative outcomes of different curves over a range of market circumstances.

Of the four curves we are currently considering, published estimates at a 10 year AUD broad-BBB curves are available for:

Table 5 Availability of published 10 year AUD broad-BBB estimates

Curve provider	10 year broad BBB available since:	Comments
BVAL	April 2015	When we selected our current approach, the BVAL series was only published to 7 years. We extrapolated the 7 year estimate to 10 years using the corresponding margin in the RBA curve. However, with the exception of 19 business days over a one-month period, BVAL has consistently published a 10 year broad-BBB curve estimate since April 2015.
RBA	January 2005	The RBA curve has been published since 2014, but it has backcast results back to 2005. We note that the 10 year RBA estimate is published to an effective term to maturity that can be greater than or less than 10 years. Under our approach we extrapolate or interpolate using the 7 and 10 year yield points as necessary to result in a target term of 10 years.
TR	July 2015 to April 2016 then October 2016 onwards	Thomson Reuters began publishing curves using its current methodology as early as 2007. However, its 10-year AUD BBB corporate curve has been available over periods from: • May 2015 to May 2016 • October 2016 to March 2017 • April 2017 to date. The intermittent availability of the 10 year estimate appears to be a consequence of Thomson Reuters' curve fitting methodology under which it will not extrapolate past the longest dated bond available in its sample. As such, the availability of a 10 year estimate may continue to vary over time.
S&P	January 2017	The S&P curve is relatively recently published. We will consult with S&P to determine whether this curve can be backcast further to allow for more extensive comparisons.

Source: AER analysis, Bloomberg, RBA, Thomson Reuters, Standard and Poors.

Questions

5. How should we consider the impact of curve availability over time when deciding on the curves to use in our benchmark?

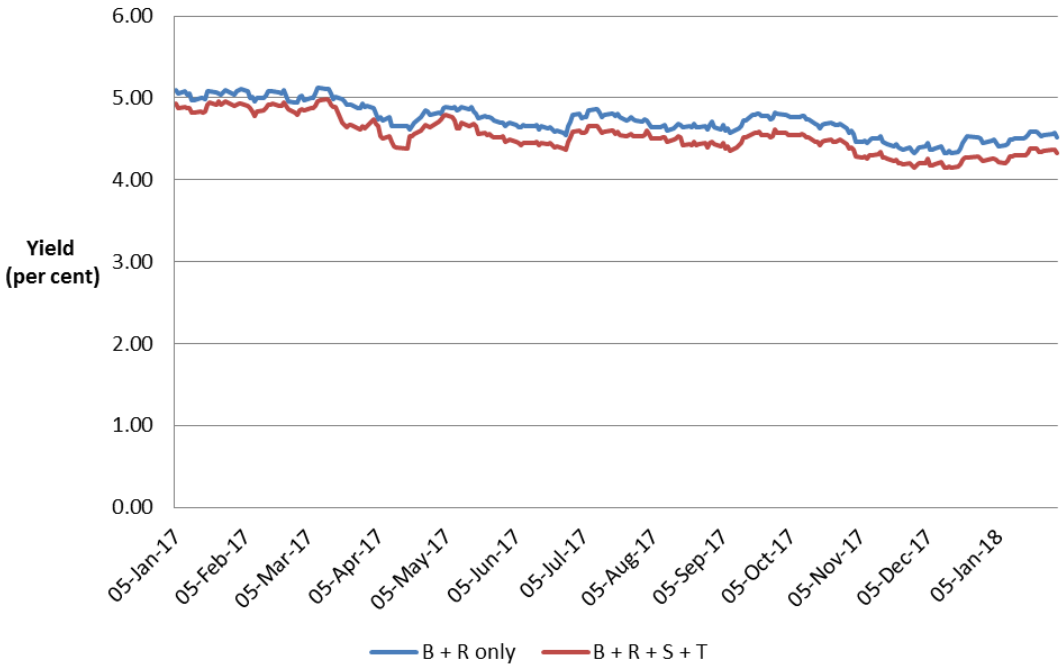
Curve outcomes

In the past, we have given comparatively little weight to curve outcomes in determining the appropriate approach to implementing the return on debt.[31] This is because the 'true' 10 year, BBB+ return on debt is not directly available and must be estimated from market data. For this reason, we have given greater weight to the technical characteristics of the curves in determining whether they are likely to result in a good fit to our benchmark. Further, the relative outcomes of a set of curves are not guaranteed to be consistent over time. Illustrating this variation, the difference in 10 year yield between the BVAL and RBA broad-BBB series has varied over 2013-2017 between:[32]

- The RBA curve exceeding the BVAL curve by 97 basis points
- The BVAL curve exceeding the RBA curve by 40 basis points.

Figure 1 illustrates the impact of adopting a simple average of all four curves on estimated yields for the period starting January 2017.

Figure 1 Impact of including the additional curves



However, we observe that:

- The credit spreads on the S&P curve has been materially and consistently lower than our current approach over the time series within which the S&P curve has been available.

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31 For example: AER, Draft decision—Ausgrid distribution determination: Attachment 3—Rate of return, November 2014, p. 146.

32 For clarity, these are the 10 year estimates using the AER approach. This, for example, the RBA published 10 year estimate being extrapolated from its published effective term which is commonly less than 10 years to an effective term of 10 years.

- The credit spread on the Thomson Reuters curve has been, on average, approximately 17 basis points higher than our current approach over the time series within which the Thomson Reuters curve has been available.

Questions

6. How should we have regard to curve outcomes over time when deciding on the curves to use in our benchmark?

Options

Our current approach has been stable over a number of years and submissions to our issues paper have not signalled support to remove either of the BVAL or RBA curves from our approach. In addition, under a binding instrument there may be advantages in having an expanded curve mix to mitigate any shocks to outcomes in the event that a provider ceases publishing. We are seeking views on potential curve mix options including:

- BVAL and RBA
- BVAL, RBA and Thomson Reuters
- BVAL, RBA and S&P
- BVAL, RBA, Thomson Reuters and S&P.

7 Actual cost of debt data—The Chairmont report

As flagged in our issues paper,[33] we requested actual debt information from the networks to serve as a 'sense check' on our current approach. This information may assist us in determining whether our benchmarks remain appropriate. In particular, we requested details of all return on debt instruments and financial instruments issued between 1 January 2013 and 31 December 2017 by privately owned networks that we regulate. We also requested all debt instruments and financial instruments in the issuer's portfolio outstanding as at 1 January 2013. The purpose of this historical information was to provide a common base. We engaged Chairmont to assist us in developing our request and developing an aggregated series for further analysis.

The full report has been published on our website. Chairmont has also provided us with all underlying modelling on which we have undertaken further analysis. Importantly, we recognise that the specific details of these individual debt instruments are commercially sensitive and all networks have claimed confidentiality over this material. We accept these confidentiality claims and, as such, will not disclose any information which could identify specific details of individual debt instruments.

Key output and methodology

Chairmont has created a simple 12-month rolling average of the credit spreads of all new debt instruments raised by a total of 11 privately owned networks between January 2013 and December 2017. As described by Chairmont[34]:

> The key output of this comparative analysis is the creation of the Energy Infrastructure Credit Spread Index (EICSI). Its key characteristics are that it is:
>
> - based on the spread which companies pay on their debt above a market benchmark rate, interpreted as the swap rate or the floating Bank Bill Swap Rate (BBSW) (credit spread). This spread can be loosely considered as the credit spread or Debt Risk Premium (DRP);
> - an unadjusted index, except interest rates are all re-calibrated to quarterly. EICSI does not apply weights for differences such as term to maturity or credit rating; and
> - measured as a 12-month rolling average, meaning that the first index value calculated is January 2014, using the data from the prior 12 months.

So:

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33 AER, *Issues paper Review of the rate of return guidelines*, October 2017, p22

34 Chairmont Consulting, *Aggregation of return on debt data*, April 2018, p3

- For floating rate debt, the credit spread is the margin above the floating 3-month BBSW rate[35]
- For fixed rate debt, the credit spread is the margin between the fixed rate yield on the date of issuance less the Australian Dollar swap rate on the date of issuance for the matching term to maturity.

Chairmont has used the credit spreads for its analysis because:[36]

> When examining the debt raising pattern of service providers, it is important to keep in mind the decision process that corporates undertake to instigate new debt. It is the credit spread in AUD which is the key variable driving debt raising decisions. Therefore, the greatest value of the data provided by the networks is their company-specific credit spreads.
>
> Swap base rates are the same (within a small margin) for all companies in the market at any point in time. The total fixed rate can then be managed by use of interest rate swaps, which is the predominant process revealed by the network survey data.

Along with the information on debt instruments, we have collected information from the networks on all financial instruments (such as fixed-floating interest rate or currency swaps) issued over the same time period. Chairmont's analysis includes only the credit spreads on the primary debt instruments.

Due to the confidential nature of the information included in the responses, we are unable to publish full models for consultation with stakeholders.

Exclusions from the EICSI sample

The debt included in the EICSI series does not include all debt instruments provided in the networks' responses. In particular:

- It does not include bonds with features that would be expected to change the spreads on the bond relative to ordinary vanilla debt,[37] such as subordinated debt or callable debt. This avoids the assumptions necessary to remove option value from that debt to enable direct comparison against our current approach. However, it also means that the sample does not reflect some of the issued debt instruments.
- Some bank debt, such as revolving debt facilities or working capital facilities, are relatively more complex than vanilla bonds. For example, a revolving debt facility may be available over (for example) 2 years, but repayment of any drawings of that debt may need to be paid back over a shorter period. This complicates interpretation of factors such as the term to maturity. Where there is sufficient information to draw conclusions about the relevant term to maturity on these

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35 Where spreads are listed in responses relative to the bank bill swap rate 'bid' rate BBSY, Chairmont has adjusted to make these comparable with spreads to the bank bill 'mid' rate ('BBSW').

36 Chairmont Consulting, *Aggregation of return on debt data*, April 2018, p.4

37 Chairmont Consulting, *Aggregation of Return on Debt Data,* April 2018*,* p.6

facilities, Chairmont has sought to include these instruments in the sample with minimal assumptions.

This results in approximately 15 per cent of total debt instruments being excluded from the EICSI sample.

As discussed in section 6, providers of independent third party yield curves all also adopt selection criteria to exclude possible comparators in determining the constituent bonds within their samples. The particular exclusion criteria vary between providers and depend on the providers' expert judgement and underlying data sources. In principle, Chairmont's process of determining 'like for like' comparators appears to be consistent with this process.

Chairmont's conclusions

Commenting on the key features of the EICSI, Chairmont concludes that:[38]

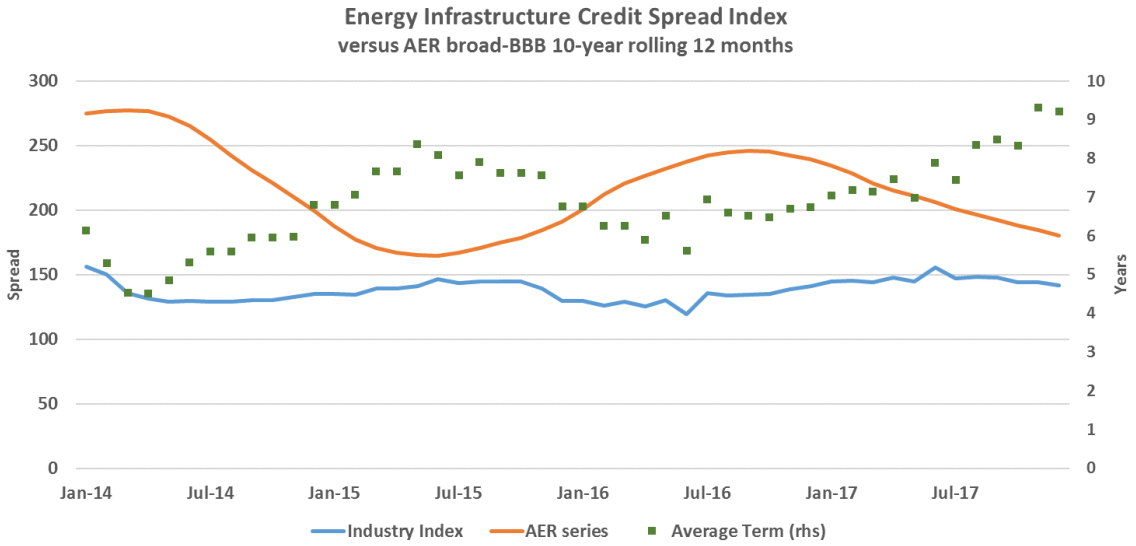
- it has been considerably less volatile than market credit spread indices such as those from the Reserve Bank of Australia (RBA) and Bloomberg, which the AER uses to calculate their cost of debt allowance. EICSI's range was 33 basis points (bp) while AER's 10-year BBB bond margin range was113bp;
- the stability can be largely explained by variations in the term to maturity of debt raised by the industry. When spreads are high providers raised shorter term debt and vice versa. Additionally, the average credit rating of debt issued by the industry has varied, typically further depressing volatility of the margin; and
- the index has been constantly lower than market credit spreads for 10-year BBB debt measured by the AER. The difference has varied significantly from 136bp to 19bp.

Key findings of the Chairmont report

The key output of the comparative analysis between the EICSI against the broad BBB corporate credit spreads under our approach, is shown in the Figure 2 below.

[38] Chairmont Consulting, *Aggregation of return on debt data*, April 2018, p3

Figure 2 The current AER approach compared against EICSI[39]



Source: Chairmont, AER data.

This chart compares:

- 'Industry index'−the average credit spreads on all debt issued within the last 12 months in the EICSI sample;
- 'Average term'—the average term at issuance for all debt making up the industry index at any point in time (rolling 12 month average). In contrast, the AER approach always has an average term of 10 years.
- 'AER series'−the average credit spreads for the past 12 months of daily credit spreads estimates calculated as:
    - A daily yield− the average of 10 year broad-BBB estimates using the BVAL and RBA third party yield curves; less
    - The Australian Dollar swap rate with a 10 year term to maturity.

In the following sections we discuss possible drivers of the features we see in the Chairmont analysis and raise possible changes to our estimation approach for the return on debt for comment.

[39] Note: The 'spread' axis in this chart refers to the credit spread in basis points.

8 Benchmark term

In its report, Chairmont indicates that the term to maturity of issued debt is a primary driver of the differences between the AER approach and EICSI.[40] We observe that:

- The difference between the AER approach and EICSI moves over time, but move inversely with the average term in the rolling 12 month sample of debt. That is, during 12-month periods where service providers issued longer term debt, the difference between the AER approach and EICSI is at its smallest.
- This is consistent with the expectation that there would typically be a higher credit spreads on longer term debt.

We have identified a series of other factors which should be taken into account in reaching a view as to whether the 10-year assumed term to debt remains appropriate. Specifically:

- The weighted average term at issuance
- The interaction between benchmark term and the transition to a trailing average.
- Temporary or ongoing patterns of term issuance
- Differences in term profile between networks
- Spread comparison at matched terms.

Weighted average term at issuance

The EICSI is unweighted by the size of debt issuance. This mitigates the extent to which results of the comparison are dominated by large one-off debt raising events. However, it also means that smaller debt issuances carry equal weight to larger debt issuances. For this reason, it may be useful to have regard to both the EICSI term profile and the weighted average term at issuance over the sample in reaching a view about whether a 10 year term to maturity remains appropriate.

We have calculated the weighted average term at issuance (by size of issuance) using both the EICSI sample and we have compared this against the unweighted average as represented in Chairmont's analysis. The results of this comparison are set out in Table 6, below.

Table 6 Size-weighted average terms to maturity

Time period	Weighted by size of issuance	Unweighted by size of issuance
Jan 2013-December 2017	7.4 years	7.5 years

Source: AER analysis.

[40] Chairmont Consulting, *Aggregation of return on debt data*, April 2018, p9

In developing the current rate of return guideline, we determined the weighted average term at issuance of debt issued by a representative sample of networks was 8.7 years. In reaching our decision to adopt a 10 year benchmark term to maturity, we also had regard to:[41]

- Patterns in the term of issuance changing over time in response to changing market conditions
- A conclusion that conceptually, service providers or their parent companies have an incentive to issue longer term debt to match the long economic lives of the underlying assets in order to minimise refinancing risk.
- Using the data provided in determining the 2009 statement of regulatory intent, the same representative sample of businesses in the 2013 estimate had an average term at issuance of 9.1 years.[42]

The interaction between benchmark term and the transition to a trailing average

To a greater extent than other aspects of our return on debt approach, the benchmark term is closely linked with the form of the trailing average and the transition to the trailing average. Because the 10-year trailing average return on debt and the transition into it span multiple regulatory periods, and because we expect networks may enter into hedging arrangements based to some extent on the benchmark term assumptions, a change to the benchmark term may have more significant practical implications for regulated networks than some aspects of our approach.

For example, in its submission, APGA noted that:

> In respect to the benchmark term of ten years, not only is it reflective of the long run horizon required of regulation and the actual debt issuing practices of regulated firms, but businesses are partway through a transition process in respect of debt, which would require a considerable unwinding of hedging and other contracts.

This issue may not impact service providers equally. This is because some service providers may have followed the benchmark debt raising approach more closely than others in practice.

Temporary or ongoing patterns of term issuance

The time period covered by the EICSI captures the entire period since we began implementing the 2013 rate of return guideline. In particular, it captures all determinations during which we commenced the 10-year transition to the trailing average return on debt. In previous determinations, we have set out our expectations

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41 AER, *Rate of return guideline: Final explanatory statement,* December 2013, pp. 134–138.

42 AER, *Rate of return guideline: Final explanatory statement*, December 2013, pp. 138.

for how regulated networks might respond to the transition period. In particular, we identified that:[43]

> On the first year of a trailing average, a business would either:
>
> - Raise an equal-weighted portfolio of 1, 2, 3 ... 9, 10 year debt. Each year 10 per cent of this would expire and the business would replace this with 10 year debt.
> - Raise 10 year debt. Each year it would refinance 10 per cent of this and replace this with more 10 year debt.
>
> We have calculated the return on debt allowance assuming the latter option. Since we expect this would be the higher cost option given interest rates on longer-term debt securities are often higher than those on shorter-term debt securities, our debt allowance should be conservative in the service providers' favour.

One possible use of the data provided by networks is that we may be able to evaluate the patterns of issuance over time to form a view on how these networks have responded to the trailing average return on debt approach. However:

- Due to the timing of the relevant determinations, many of the networks within our sample would only have one or two years under the current approach. This may be too limited a time series on which to base conclusions about longer term practices in response to the trailing average return on debt approach.
- Networks in our sample appealed our aspects of our determinations to the Australian Competition Tribunal, specifically including the approach to estimate the return on debt. The process of resolving these appeals and finalising the relevant determinations has taken several years, and is yet to be finalised in some cases. It is therefore unclear when, if at all, the networks or their parent companies would adopt new debt raising strategies in response to the new approach.
- The EICSI sample also includes newly privatised networks for which privatisation processes took place during the period where we might expect the transition to the trailing average to be underway. Debt raising practices during the initial acquisition of an asset may not reflect 'business as usual' debt raising practices.

In addition, we recognise that debt issuance from regulated networks or their parent companies will reflect other drivers beyond simply the approach we adopt to estimating the return on debt[44]. As identified in previous reports by Chairmont, there are a range of different strategies service providers could adopt to match depending on its appetite for risk.[45]

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[43] AER, Final decision—*Jemena distribution determination 2016 to 2020—Attachment 3: Rate of return*, May 2016 p. 3-302

[44] Commonwealth Bank of Australia, *Debt Market Update Outlook for 2018*, 15th edition, p.11, p.22 & p28

[45] Chairmont Consulting, *Financial practices under regulation: past and transitional,* October 2015*,* pp. 75-84

Differences in term profile between networks

We have also estimated the weighted average (by size of issuance)[46] term at issuance issued for each different issuer of debt in our sample to test whether terms are common across the sector, or distinct between networks. We have found that

- Some issuers in the EICSI sample issued debt at an average term to maturity of at or around 10 years, including some with average terms exceeding 10 years
- Other issuers in the EICSI sample issued debt at an average term to maturity of at or around 5 years.

Amongst other factors, the choice of term at issuance reflects a trade-off between:

- The term premium– longer term debt typically requires a higher rate (yield or credit spread) to reflect the higher risk of the debt issuer defaulting over a longer term to maturity.
- Refinancing risk– holding other things constant, issuing longer term debt means that issuers are less frequently required to refinance their debt. In turn, this means lower risk arising from what could be unfavourable market circumstances at the time of raising debt.

To the extent that service providers have issued debt at different average terms, this could reflect different appetites for refinancing risk across the sector. The nature of a benchmark term allows for the possibility that different networks might adopt strategies facing more or less risk and either benefit from or face the consequences of that risk. For this reason, neither the lower nor higher-risk approach necessarily reflects the most efficient approach.

We are aware that individual networks may also raise their debt subject to individual or corporate group treasury strategy or formal policies. During 2015, we sought information on the debt-raising strategies of a number of privately owned networks. The responses to this information request formed the basis to a previous Chairmont report. In particular, it indicated that networks may have regard to factors including:[47]

- Constraints on the proportion of debt maturing in any given year;
- Structuring the terms to maturity of debt issuance having regard to 'prevailing capital market conditions and conventions at the time of issue' or 'pricing and available tenors'

In having regard to differences in term profile between networks, we will also have regard to the impact that parent ownership might have on the financing strategies adopted by networks, and on the consistency of those sample constituents with other aspects of the rate of return.

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[46] Specifically, we have weighted the term of each debt instrument in the average using the face value of the debt at issuance divided by the total face value at issuance across the sample.

[47] Chairmont, *Financing practice under regulation: Past and transitional*, October 2015, pp. 66−93.

Nonetheless, the model of incentive regulation also requires that we identify and reflect in our benchmarks where regulated networks performing efficiently adopt practices that diverge from our benchmarks. This is important in order to share the benefits of efficiency gains with consumers of natural gas and electricity. As such, we seek stakeholder views on how best to incorporate a variety of debt raising strategies within the benchmark approach.

Interaction with the form of the trailing average

The form of the trailing average return on debt and the transition from an 'on-the-day' debt approach to that trailing average depend on the benchmark term to maturity. Under our current approach:

- We have initially adopted a 10 year transition path in which:
    - the first year is estimated as over a single averaging period with a 10 year term to maturity
    - In subsequent years of the 10-year transition period, the portfolio estimate is updated to include 10 per cent of a further tranche of 10 year debt. The weighting of the first year estimate (initially weighted at 100 per cent) is reduced by 10 per cent per year each year.
- Once the 10 year transition is complete, the return on debt in any year will reflect annual estimates over the current year and preceding 9 years, weighted at 10 per cent per year.

If we were to adopt a different benchmark term to maturity or change it during the transition period, it would be necessary to undertake a further transition between approaches or make adjustments to the trailing average calculation methods in order to achieve the NPV=0 principle which underpins estimation of the allowed rate of return objective. The implementation of this change would require a further complex transition from midway through the ongoing transition based on the 10 year term.

Questions

7. In your view, does this evidence support a change to the current benchmark term of debt being 10 years? In answering this question, please address:
    (a) The impact of a change on term to the trailing average approach, including whether this change would have long term or transient impacts
    (b) The implications of such a change for regulatory certainty given the multiple-period commitment that may be implicit in the transition to the trailing average
    (c) The appropriate way to establish a benchmark if there is evidence of multiple distinct term issuing practices amongst networks?
    (d) The longer term data on benchmark term to maturity as estimated in previous rate of return review processes.

9 Implementation of the benchmark credit rating

In this section, we discuss the implementation of the broad-credit rating band we adopt for estimation. While our benchmark credit rating has been BBB+, curve providers typically offer Australian Dollar debt curves as broad-BBB (BBB-,BBB,BBB+) or broad-A (A-,A,A+). We are not aware of a curve that directly estimates AUD corporate BBB+ debt. As a result, we have to make a choice about which broad credit rating band or combination of bands best gives effect to our target credit rating, which has been BBB+.

We have previously recognised that this approach is conservative because, to the extent that credit ratings are a proxy for the risk associated with debt, curves that include lower credit ratings than the benchmark are more likely to overestimate than underestimate the required return on debt for a BBB+ benchmark.[48]

9.1 Spread comparison at matched terms

The term to maturity of debt issuance may be a material driver of the differences between the AER approach and EICSI. However, other factors may also be contributing to these differences.

To assess the possible impacts of these other factors, we have undertaken a comparison of credit spreads for debt instruments within the EICSI against the AER approach at a matching term on the commencement date of the debt instrument.

Specifically, we have compared the spreads on issued debt against an average credit spread estimated using the BVAL and RBA broad-BBB curves at matched-terms.[49] For example, if a debt instrument was issued with 5 years' term of maturity on 1 Jan 2013, we have compared its credit spread against a simple average of the BVAL and RBA broad-BBB curve estimates also issued at a 5 year term on 1 January 2013.[50] Where there is a difference between these two credit spreads, this implies a difference caused by factors other than term.

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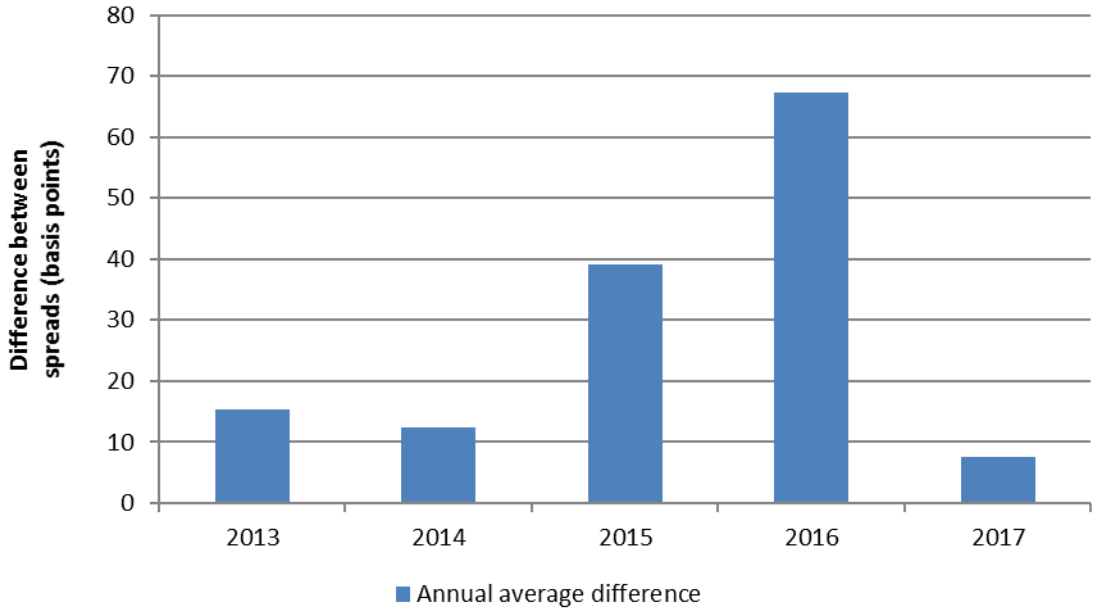
48 For example: AER, *Final determination— AusNet Services transmission determination 2017-2022—Attachment 3: Rate of return*, April 2017, p. 340

49 In some cases, there is no corresponding BVAL or RBA estimate because the term of issued debt is longer term than the longest published term at issuance by either of the curve providers. We have not calculated a 'difference estimate' in these cases because they would require strong assumptions to extrapolate the curves. This excludes approximately 10 per cent of the sample. However, we have undertaken a sensitivity check using a conservative assumption (spreads held constant from longest published term) and it does not appear to materially change the result.

50 We have interpolated the third party yield curves between their published terms using linear extrapolation. For the RBA curve, the shortest published term to maturity is 3 years. We have used the rate of change of the spread to swap between the 3 and 5 year terms to interpolate estimates at 1 and 2 year terms to maturity. Bloomberg typically publishes its BVAL estimates at a greater number of term points, resulting in less need for interpolation.

Our preliminary analysis suggests that debt within the EICSI is raised at, on average, approximately 30 basis points less than equivalent debt estimated using the an average of the BVAL and RBA broad-BBB curves. However, as set out in Figure 3, there is time-variation in these spread differences.

Figure 3 Comparison of spreads on debt instruments against the AER approach (Bloomberg and RBA) BBB estimate at matching term to maturity



Source: AER analysis, Bloomberg, RBA.

Our analysis to date suggests that this time variation may be driven by a range of factors. In particular, there has been more variation in the published third party yield curves than in the spreads on issued debt.[51]

9.2 Implementation of the benchmark credit rating

In section 5, we discuss the benchmark credit rating appropriate for the regulated network service providers.

To implement this benchmark credit rating, we would ideally select a third party yield curve based on bonds of a credit rating matching our benchmark. However, both providers that we currently rely on (Bloomberg and RBA) and the two additional providers whose curves we are now also considering (Thomson Reuters and S&P) publish curves based on broad credit-rating bands. This means that, rather than including only BBB+ rated bonds, the curves we have relied on to date are 'broad-BBB' curves and include BBB-, BBB and BBB+ rated debt.

[51] On this point, we observe that the RBA curve has been substantially more volatile than the BVAL curve.

We have also received expert advice in the past indicating that credit ratings are an informative but not perfect proxy for the risk of debt.[52] This is because:

- credit ratings are primarily an indicator of the risk of default, whereas required returns on debt also depend on other factors including the likely loss given default[53]
- credit ratings depend on the use of evaluative judgement by the credit rating agencies
- issuers from different industries within the same credit rating band respond differently.

When considering how best to implement the benchmark credit rating, there are alternatives to the use of the broad-BBB curve alone. One possible alternative is combined use of both broad-BBB and broad-A (including A-,A and A+ rated debt). This could be in the form of either a simple or weighted average.

By comparing the outcomes of alternative approaches against actual return on debt information such as the EICSI, we may be able to better inform a view on the best broad-rating curves to implement our benchmark.

To illustrate the possible impacts of a change to our implementation of the benchmark credit rating, Figure 5, below, illustrates the outcomes if we had adopted a weighted (2/3 broad-BBB, 1/3 broad-A) average of broad-BBB and broad-A curve estimates over 2013–17. This follows the same 'matched-term differences' approach underlying Figure 3. This weighting system should, on average, more closely match an average credit rating of BBB+ compared to the use of a broad-BBB curve alone.

The average difference across all issuances over the five year sample, captured in this chart, is approximately 12 basis points. This follows the same 'matched-term differences' approach underlying Figure 3. That is, service providers issued debt at spreads to swap 12 basis point below this approach to implementing the benchmark credit rating.

Figure 4, below, shows that, by using an average of broad-A and broad-BBB yield curves rather than BBB-only, the industry index and AER series converge where the average term in the industry index comes closer to 10 years. Where the average term is shorter than 10 years, there remains a difference between the industry index and AER series. However, due to the effects of the use of broad-A and broad-BBB curves, this difference is narrower than it would be using our current approach.

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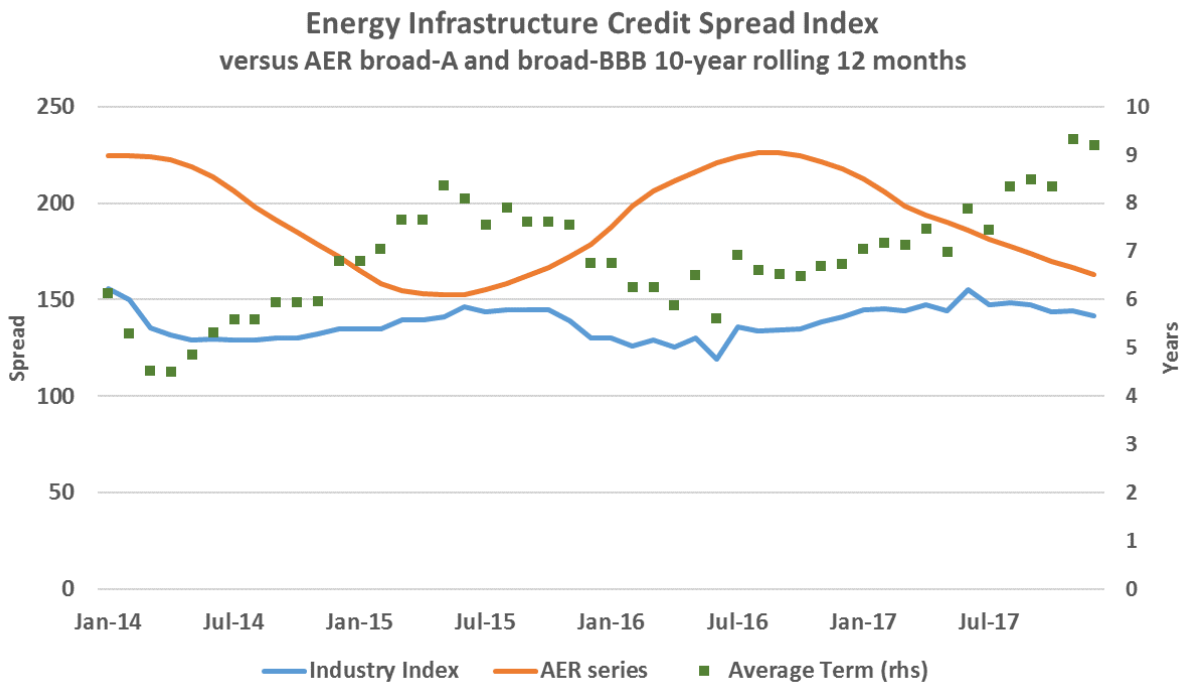
[52] See for example: ACCC Regulatory Economic Unit, *Thomson Reuters Credit Curve Methodology – Note for the AER*, April 2017, p. 8-11;

[53] ACCC, Regulatory Economic Unit, *Return on debt estimation: a review of the alternative third party data series – Report for the AER*, August 2014, p. 23

Figure 4 Impact of using a 2/3:1/3 average of broad-A and broad-BBB yield curves— total impact[54]

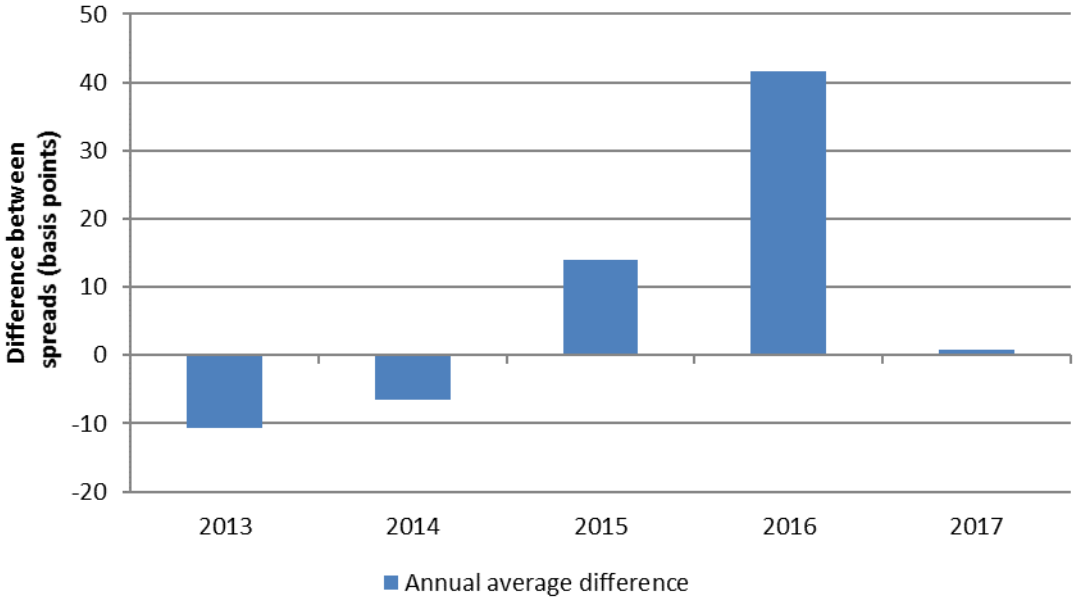


Source: AER analysis, Chairmont spreadsheet.

Figure 5, below, illustrates the differences between issued credit spreads once we have controlled for the effects of term. Where there is an average difference between credit spreads in the chart, this is likely to be driven by factors other than term. So, it does not imply that in 2013, for example, networks raised debt at higher spreads than our benchmark approach using a 10 year benchmark term. We note that there was a substantially higher number of individual debt issuances in 2016 and 2017. For this reason, the differences for those years in the below chart have been more influential in calculating an overall average difference across the five year sample.

[54] Note: The 'spread' axis in this chart refers to the credit spread in basis points.

Figure 5 Comparison of spreads on debt instruments against a 2/3:1/3 weighted average of BVAL and RBA broad-BBB and broad-A estimate at matching terms to maturity



Source: AER analysis, Bloomberg, RBA

Questions

8. How should we implement the benchmark credit rating? In particular, what do you consider is the appropriate broad-curve rating to use?

10 Summary—List of questions

1. Does the evidence support continuation of a BBB+ credit rating or a change? If it supports a change, what should the benchmark credit rating be?
2. What are your views on the relevance of market expertise of the above providers with respect to estimating corporate debt yield curves for our purposes?
3. Having regard to the available evidence, are any of the curves clearly superior to the other curves in terms of their overall fitness for purpose?
4. How should we consider the impact of adjustments to curves away from their published form when deciding on the curves to use in our benchmark?
5. How should we consider the impact of curve availability over time when deciding on the curves to use in our benchmark?
6. How should we have regard to curve outcomes over time when deciding on the curves to use in our benchmark?
7. In your view, does this evidence support a change to the benchmark term of debt? In answering this question, please address:
   (a) The impact of a change on term to the trailing average approach, including whether this change would have long term or transient impacts
   (b) The implications of such a change for regulatory certainty given the multiple-period commitment that may be implicit in the transition to the trailing average
   (c) The appropriate way to establish a benchmark if there is evidence of multiple distinct term issuing practices amongst networks?
   (d) The longer term data on benchmark term to maturity as estimated in previous rate of return review processes.
8. How should we implement the benchmark credit rating? In particular, what do you consider is the appropriate broad-curve rating to use?

11 Appendices

This section sets out a few further technical details relating to the available third party yield curves. In particular, it includes:

- detailed information on the S&P yield curve
- details of changes to the BVAL and RBA curves since their initial implementation

Detailed information on S&P curve

The process of estimating a credit curve for a set of financial instruments can, in general, be split into two stages: (1) selection and preliminary 'standardisation' of the data inputs, and (2) econometric estimation. Standard and Poor's. This appendix sets out:

- The bond selection criteria
- The curve fitting methodology: including techniques to improve the estimation of credit curves.

We prepared these summaries based on discussions with S&P staff, and on S&P's proprietary technical documents. This information is not publicly available. To allow stakeholders to consult on the suitability of the curve, S&P reviewed our summaries (below) for accuracy and granted permission for the AER to publish them.

Input data and sample selection criteria

S&P produces a wide range of sector and issuer credit curves. All of S&P's ratings and sector curves are based on a set of criteria that are standard across all curves. The following set of criteria applies to bonds used in construction of the BBB Australian Dollar (AUD) credit curves:

- **Currency:** AUD denominated bonds
- **Sector**: Financial and Non-Financial
- **Bond Type**: fixed rate or zero coupon bullet bonds;
- **Seniority**: Only senior unsecured issues
- **Debt type**: exclude commercial paper, certificates of deposits & covered bonds
- **Guarantee**: exclude bonds that are guaranteed by the sovereign government
- **Private placements**: exclude private placements
- **Amount outstanding**: no restrictions
- **Credit rating**: Bonds issued by the corporates that have a credit rating from S&P
- **Market of issue**: No restriction on ownership or country of risk.
- **Remaining time to maturity**: no restriction

- **Minimum number of bonds**: for a curve to be constructed, there must be at least one bond in the group. As the number of bonds reduce below 12, the curve is estimated giving greater weight to a generated curve based on simplifying assumptions.
- **Price sources**: Only actively priced bonds
- **Outliers**: exclude outliers using a Z-spread based procedure.

Curve-fitting methodology

S&P provided a document detailing the curve construction. Estimation of the credit curves occurs in 3 broad steps:

1. Curve shapes are generated for all possible credit curves (S&P calls this a term structure scheme).

2. Bonds of the credit rating of interest are discounted to an instantaneous spread (using the term structure scheme), outliers are removed and an average of the remaining bonds is taken.

3. The average from step two is used along with the term structure schedule to generate the credit curve of interest.

Within this process, S&P makes use of a series of computational techniques to improve estimation of credit curves.

Techniques used to improve estimation of credit curves

First step

S&P first converts yields to z-spreads. This allows the use of older data (up to 10 days rather than one day) to be used in the estimation of the term structure scheme. S&P uses this approach on the basis that the spread shape changes at a slower rate than the underlying base rate. Such a method has the greatest impact when bonds of interest are not traded every day. The method is designed to allow for a more realistic assumption of the shape of credit curves when discounting bonds that are not zero-coupon bonds (coupons are not discounted at a single internal rate of return).

S&P also imposes a no-arbitrage condition because a system of curves should assign a higher yield to a debt with a higher probability of default. This means that a curve reflecting a lower credit rating will, at all points along the curve, produce higher yield estimates.

S&P calculates ‘anchor curves’ for each of the three distinct credit qualities: high quality investment grade, investment grade and high yield on the basis that each of these categories typically has distinct credit curve shapes. These anchor curves are then used to calculate credit curves at every possible level by using affine combinations of the credit curves. Once these are calculated the term structure scheme is complete.

Second step

S&P discounts each bond to its instantaneous spread using the term structure scheme. The instantaneous spread is, in effect, the spread where the term to maturity approaches zero. This strips away the bonds' reference to a specific maturity and should prevent overfitting if bonds are clustered at particular maturities.

The bonds are then weighted by liquidity quality and outliers are removed (using a trimmed weighted-mean). The liquidity quality provides higher weight to bonds traded frequently over the past ten days. If bonds have not traded on (or there is no pricing data for) for more than five days in the past ten, a zero weighting is applied. This weights the curve estimation to the most liquid bonds in a particular credit classification.

Once weighting is completed, the top 25 per cent of the yields and bottom 25 per cent of the yields are removed before the weighted average is taken. This prevents overfitting to bonds that have unobserved (or unaccounted for) characteristics that effect the bond yields. This also improves the robustness of the estimator to the inclusion of new bonds.

Third step

S&P uses the trimmed weighted-mean in combination with the term structure scheme to generate the credit curve of interest. This allows the estimated curve to incorporate the information from both bonds rated at the credit of interest and those rated at other credit ratings that contain useful information.

According to S&P, compared to a naïve flat curve estimation the curve explains 85 per cent of residuals in S&P's US market testing. S&P does not provide an estimate of the residuals in the Australian market.

Estimation of credit curves for specific industries

S&P also provide industry specific credit curves. The estimation method is dependent on the number of bonds in a particular sample.

One of three methods is applied depending on data availability:

- If 12 bonds or more are available (that have good liquidity), steps two and three are completed as in the general credit curve estimation above. The sample used though is that of the industry in question at that credit curve.
- If there are insufficient bonds for the above estimation (but still at least one bond), then a combination of the curves is used. First the available bonds are used to calculate a curve using steps two and three from above. This creates the first curve. To create the second curve, a simplifying assumption is used. That is that the sector specific spread is that same across all credit ratings. This level is estimated and then added to the general credit rating for the credit of interest. A weighted average of these two curves is then used to create the final curve. The weighting applied depends on the quality and number of bonds for the desired industry at that credit rating.

- If there are no bonds at the specific credit rating for that industry, but some bonds have been issued by that industry at a different rating, then a different method is used. An assumption is made that the sector specific spread is that same across all credit ratings. This level is estimated and then added to the general credit rating for the credit of interest.

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