GOLDFIELDS GAS TRANSMISSION PTY LTD

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GGT submission: implementation of debt risk premium estimation

Goldfields Gas Transmission Pty Limited (GGT), operator of the Goldfields Gas Pipeline, appreciates the opportunity to comment on the process and software tools which the Economic Regulation Authority (ERA) is proposing to adopt for debt risk premium (DRP) estimation.

GGT is concerned that to use complex statistical methods for DRP estimation, as the ERA proposes, automatically, without first examining the data to which they are to be applied, and without subsequent examination of the results, is contrary to good practice in applied statistics. However, if good statistical practice is adopted, DRP estimation using either the ERA's current process, or the more sophisticated methods now proposed, cannot be in accordance with the requirements section 30E(2) of the *Statutes Amendment (National Energy laws) (Binding Rate of Return Instrument) Bill 2018*, which is soon to become law.

As we discuss below, there is a simple solution to this problem: rely on the results of yield curve estimation carried out by independent third parties.

GGT's comments are made in the expectation that imminent changes to the National Gas Law, to implement a binding rate of return instrument, will be adopted into the Western Australian National Gas Law.

DRP estimation

The DRP of the ERA's estimate of the rate of return on debt is estimated as a historical trailing average of risk premiums. Unlike the other components of the rate of return, which are to be fixed at the start of the regulatory period, the DRP is to be updated annually.

The process which the ERA is now proposing appears, to GGT, to be much the same as the ERA's current process for DRP estimation.

Data for yield curve estimation are to be sourced from the Bloomberg service using the search criteria currently applied by the ERA.

However, the ERA now proposes to use a number of "packages", including YieldCurve and NMOF, which are available for use in the open source software environment provided by the R Project for Statistical Computing, to estimate the parameters of Nelson-Siegel and Nelson-Siegel-Svensson yield curves. These packages are to be used in place of the Solver routine in Microsoft Excel, which is currently used by the ERA.

Use of the R packages, and the principles and procedures to be followed, are described in the ERA's paper *Appendix 1 DRP process for updating in R* (*Appendix 1*), which was issued for comment on 5 November 2018.

Use of Nelson-Siegel and Nelson-Siegel-Svensson curves

Nelson-Siegel and Nelson-Siegel-Svensson curves are flexible, non-linear functional forms for the yield-maturity relationship. These flexible functional forms allow modelling of the wide variety of yield curve shapes observed in market data. Constraints imposed on the values of the parameters of the curves ensure that the corresponding discount curves are, as should be expected, bounded by zero for very long periods to maturity, and by 1 as the time to maturity approaches zero.

However, the Nelson-Siegel and Nelson-Siegel-Svensson curves have no strong foundations in asset pricing theory.[1]

Furthermore, the curves are prone to estimation difficulties arising from their non-linearity. The numerical methods used in parameter estimation may "find" estimates corresponding to a local minimum of the criterion function for curve fitting, rather than finding the required estimates which globally minimize that function.[2]

These difficulties do not preclude use of the Nelson-Siegel and Nelson-Siegel-Svensson curves, but they strongly caution against their unconsidered application.

Nelson-Siegel-Svensson curve estimation using the NMOF package in R uses a relatively new differential evolution algorithm for finding an optimum. *Appendix 1* notes that this algorithm generally has a lower risk of parameter estimates being "trapped" on a local minimum of the criterion function.[3] Use of the NMOF package should, it seems, reduce the potential for difficulties in estimation of the parameters of the Nelson-Siegel-Svensson curve. However, it will not eliminate those difficulties.

Use of the R packages may be an improvement, but does not justify the conclusion that "once the settings and spreadsheets have been established in Bloomberg, Excel and R, the estimation process is deterministic".[4]

The ERA's current process for estimating the DRP involves the use of complex statistical methods. The process now being proposed requires the use of more sophisticated methods. To apply such methods – either those of the current process, or the more sophisticated methods now proposed – automatically, without first examining the data to which they are to be applied, and without subsequent examination of the results and consideration of whether they are appropriate to the circumstances in which they have been obtained, is contrary to good practice in applied statistics.

That the data should be examined before any statistical technique is chosen is especially important when using the Nelson-Siegel and Nelson-Siegel-Svensson curves, since functional form and parameter values are largely unconstrained by any underlying financial theory, and "unusual

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1 We are aware that Diebold and others have interpreted a dynamic version of the Nelson-Siegel curve as a linear factor model, but note the ERA's aversion to models in this class (which include the Fama-French three factor model for equity returns). See Francis X Diebold and Glenn D Rudebusch (2013), *Yield Curve Modelling and Forecasting*, Princeton: Princeton University Press.

2 The literature reporting problems with curve estimation is extensive. See, for example, David Bolder and David Streliski (1999), *Yield Curve Modelling at the Bank of Canada*, Bank of Canada Technical Report No. 84; M Gilli, Stefan Grosse, E Schumann (2010), "Calibrating the Nelson–Siegel–Svensson model", COMISEF Working paper Series, WPS-031 30/03/2010; Jan Annaert, Anouk G P Claes, Marc J K De Ceuster, Hairui Zhang (2013), "Estimating the spot rate curve using the Nelson–Siegel model: A ridge regression approach", International Review of Economics and Finance, 27, pages 482–496; Ivailo Arsov, Matthew Brooks and Mitch Kosev (2013), "New Measures of Australian Corporate Credit Spreads", Reserve Bank of Australia Bulletin, December Quarter 2013, pages 15-26, and especially footnote 15.

3 *Appendix 1*, paragraph 88.

4 *Appendix 1*, paragraph 12.

data", which may not be filtered out by the ERA's bond search criteria, have the potential to distort the outcomes of a very flexible curve fitting process.

The potential for unusual data to distort results was clearly evident in the ERA's recent estimation of the DRP for GGT's annual variation of the reference tariff for the Goldfields Gas Pipeline.

Compliance with the National Gas Law

Section 30E(2) of the *Statutes Amendment (National Energy laws) (Binding Rate of Return Instrument) Bill 2018* requires:

If a rate of return instrument states a way to calculate the rate of return on capital or the value of imputation credits, the instrument must –

(a) provide for the same methodology to apply in relation to all covered pipeline service providers in calculating the rate or value; and

(b) provide for the methodology to apply automatically without the exercise of any discretion by the AER.[5]

If good statistical practice is adopted, estimation of the DRP using the ERA's current process, or in the way the ERA now proposes, cannot be automatic, and cannot be undertaken without any discretion on the part of the regulator. If good statistical practice is adopted, DRP estimation using the ERA's current process, or in the way the ERA now proposes, cannot be in accordance with the requirements section 30E(2).

Were the ERA's current process for DRP estimation, or the process the ERA is now proposing, to be applied automatically and without the exercise of discretion, there would be no reason to expect that the DRP, and any rate of return on debt calculated using that DRP, would lead to a rate of return and a reference tariff which:

- should provide the service provider with a reasonable opportunity to recover at least the efficient costs the service provider incurs in providing reference services, and in complying with regulatory obligations (NGL, section 24(2))
- should provide the service provider with effective incentives in order to promote economic efficiency with respect to reference services (including efficient pipeline investment, efficient provision of pipeline services, and efficient pipeline use) (NGL, section 24(3))
- allows for a return commensurate with the regulatory and commercial risks involved in providing the reference service to which that tariff relates (NGL, section 24(5)).

A reference tariff which is inconsistent with these revenue and pricing principles cannot promote efficient investment in, and efficient operation and use of, natural gas services for the long term interest of consumers. It cannot contribute to achievement of the national gas objective.

In its report to the ERA, the Independent Panel concluded that the DRP approach could be implemented under the binding rate of return requirements.[6] However, no reason was given for this conclusion.

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5 The Bill is about to become law in jurisdictions other than Western Australia, and will become law in this State if it is adopted by ministerial order.

6 *Independent Panel Review of Economic Regulation Authority Draft Rate of Return Guidelines (2018)*, 20 October 2018, page 42.

Addressing these concerns

There is a simple solution to GGT's concerns: allow the necessary checking of the data and the results of yield curve estimation to be carried out by independent third parties.

Estimates of the bond yields made using the Reserve Bank Australia's Gaussian kernel curve for Australian non-financial corporations, and using the Bloomberg BVAL curve, seem not to be different from those which might be obtained using the method which the ERA is now proposing.

The ERA Gaussian kernel estimate of yield for DRP estimation for annual variation of the reference tariff of the Goldfields Gas Pipeline was 4.71%. An estimate made from the Reserve Bank's curve was 4.72%.

The estimates of yields for calculation of the DRP for Goldfields Gas Pipeline tariff variation made (by GGT) using the YieldCurve package to estimate the parameters of the Nelson-Siegel and Nelson-Siegel-Svensson curves were 4.65% and 4.63%, respectively. A comparable estimate made from the Bloomberg BVAL curve, without any need for making the choices necessary when sourcing bond data, and without the need to apply complex statistical methods, was 4.63%.

Reputation is an important motivator for the Reserve Bank publishing carefully considered estimates. Commercial gain provides the incentive for the Bloomberg service to ensure that its BVAL curves appropriately estimate bond yields.

The Australian Energy Regulator has, in its Draft Rate of Return Guidelines, indicated an intention to rely on the Reserve Bank yields and credit spreads, and on Bloomberg BVAL curves (as well as on similar curves published by the Thomson Reuters service) for its rate of return on debt estimation.

Although the ERA's approach is different, the ERA could still use third party data sources the same as those used by the Australian Energy Regulator, ensuring compliance with the requirements of the binding rate of return instrument, and without compromising its rate of return on debt estimation.

Use of these third party data sources would still require access to information provided only to subscribers by Bloomberg and others, but the process would be more accessible for both service providers and other parties, including pipeline users and end-users of gas. Verification of the rate of return on debt would not require the learning of a new programming language.

GGT would be pleased to elaborate on any of the issues it has raised in this submission. Please contact me on [redacted]

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