The Allen Consulting Group

Update of WACC Minor Parameters

For the Purpose of Determining the Maximum Reserve Capacity Price

October 2010

Report to Independent Market Operator

The **Allen Consulting** Group

The Allen Consulting Group Pty Ltd

ACN 007 061 930, ABN 52 007 061 930

Melbourne

Level 9, 60 Collins St

Melbourne VIC 3000

Telephone: (61-3) 8650 6000

Facsimile: (61-3) 9654 6363

Sydney

Level 12, 210 George St

Sydney NSW 2000

Telephone: (61-2) 8272 5100

Facsimile: (61-2) 9247 2455

Canberra

Empire Chambers, Level 2, 1-13 University Ave

Canberra ACT 2600

GPO Box 418, Canberra ACT 2601

Telephone: (61-2) 6204 6500

Facsimile: (61-2) 6230 0149

Online

Email: info@allenconsult.com.au

Website: www.allenconsult.com.au

Contents

Executive summary

Introduction

In September 2010 the IMO requested that the ACG provide further updated recommendations for the values of the minor parameters needed as inputs to the calculation of the WACC for a particular asset (an OCGT).

Main Summary Points

Table ES.1 presents the ACG's latest recommendations for the minor parameters of a WACC for a particular asset.

Table ES.1

WACC MINOR PARAMETER ESTIMATIONS

CAPM Parameter	2010
Nominal risk free rate of return (%)	5.14
Expected inflation (%)	2.90
Real risk free rate of return (%)	2.37
Debt margin (%)	5.19

Source: ACG analysis

Chapter 1

Brief and Report Structure

1.1   The Brief

The Independent Market Operator (IMO) has asked the Allen Consulting Group (ACG) to review the following minor parameters:

- Nominal interest rate,

- Inflation rate,

- Real interest rate, and

- Debt margin.

These parameters constitute part of a formula used to calculate the weighted average cost of capital (WACC), itself used for calculating the cost of building an asset. The asset is an open cycle gas turbine (OCGT) peaking plant. The cost of building this asset is needed for setting the Maximum Reserve Capacity Price used in the Reserve Capacity Auction.

The formula for calculating a WACC contains both debt parameters and equity parameters. 'Minor' parameters are those that relate to the debt rather than the equity part of the WACC formula.

The ACG has previously advised the IMO on the values to be used for the parameters (both major and minor) which are inputs to the WACC. The ACG's last advice to the IMO in relation to the minor parameters was October 2009 (with a follow-up in January 2010). Those 2009 recommendations are presented in Table 1.1 (along with – for comparative purposes - the recommendations of this report).

Table 1.1

WACC MINOR PARAMETER ESTIMATIONS

CAPM Parameter	2009	2010
Nominal risk free rate of return (%)	5.62	5.14
Expected inflation (%)	3.00	2.90
Real risk free rate of return (%)	3.15	2.37
Debt margin (%)	3.22	5.19

Source: ACG analysis

In order to update the minor parameters, certain assumptions need to be made. ACG's previous advice to the IMO contained explanations for the assumptions used in this report, and we do not repeat them here.

Table 1.2 shows the assumptions needed and values previously provided by ACG with respect to an efficient OCGT.

Table 1.2

ASSUMPTIONS

Assumption	Value
Gearing level (%)	*40*
Credit rating	*BBB+*

Source: ACG

In this report we review current market evidence relating to the Australian bond market and provide updated recommendations to the IMO regarding the minor parameters.

1.2   Report Structure

The remainder of this report is structured as follows:

- In chapter 2 we review evidence relating to risk free rate and inflation;

- In chapter 3 we review evidence relating to debt margin.

Chapter 2

Risk free rate and inflation

2.1   Introduction

In this chapter we review current market evidence relating to the Australian government bond market to assess the risk free rate (nominal and real) and inflation. Since inflation forecasts are obtained from data on the nominal and real risk free rate, we consider those two first.

2.2   Risk free rates (nominal and real)

The risk free rate measures the return an investor would expect from an asset with zero beta risk. It is required for estimating the cost of equity capital when using the CAPM, and also forms the base to which a debt risk premium is applied to derive a cost of debt.

The market typically derives values of nominal and real risk free rates from capital market observations on yields on Commonwealth Government securities (CGS) (that is, government bonds). The CGS used for that purpose are government coupon bonds and government inflation indexed bonds.

There are no CGS with precisely 10 years to maturity. Consequently, approximate yields had to be obtained through linear interpolation of existing CGS. The procedure is as follows.

Nominal

To calculate the <u>nominal</u> interest rate, ACG obtained yield data on the two CGS coupon bonds with maturity closest to ten years from now, and straddling a date ten years from now.

These data are available from the website of the Reserve Bank of Australia (RBA).[1]

The coupon bond with the 'lower' maturity (TB122) expires on 15 March 2019, while the coupon bond with the 'higher' maturity (TB126) expires on 15 May 2021.

These coupon bonds straddle the ten year date (measured from this month), which is October 2020.

ACG then interpolated this data to obtain 10-year yields, focusing on only the most recent 20 trading days up to 26 October 2010. ACG then calculated the average equivalent annualised yield for this data. The result is given in Box 2.1.

Box 2.1

20-DAY AVERAGE *NOMINAL* **ANNUAL YIELD (UP TO 26 OCTOBER 2010)**

5.14%

Source: ACG Analysis of RBA data

---

[1]   See http://www.rba.gov.au/statistics/tables/index.html#interest_rates, (file F16).

Real

To calculate the <u>real</u> interest rate, ACG obtained yield data on the two CGS inflation indexed bonds with maturity closest to ten years from now, and straddling a date ten years from now.

These data are available from the website of the Reserve Bank of Australia (RBA).[2]

The inflation indexed bond with the 'lower' maturity (TI406) expires on 20 August 2020, while the inflation indexed bond with the 'higher' maturity (TI407) expires on 20 September 2025.

These inflation indexed bonds straddle the ten year date (measured from this month), which is October 2020.

ACG then interpolated this data to obtain 10-year yields, focusing on only the most recent 20 trading days up to 26 October 2010. ACG then calculated the average equivalent annualised yield for this data. The result is given in Box 2.2.

Box 2.2

20-DAY AVERAGE *REAL* ANNUAL YIELD (UP TO 26 OCTOBER 2010)

2.37%

Source: ACG Analysis of RBA data

2.3 Inflation

Inflation imputed from government bonds data

A common way of forecasting inflation is to extract market expectations regarding future inflation from information about yields on long-lived government bonds.

Australian regulators have typically derived values of nominal and real risk-free rates from capital market observations of yields on CGS.

Nominal CGS are used to derive a nominal risk free rate, and real (or inflation indexed) CGS are used to derive a real risk free rate.
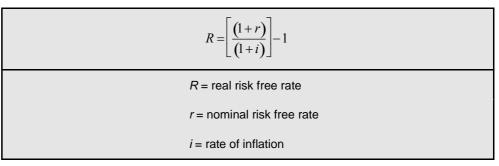
From these two types of risk free rates, a forecast of inflation can be derived by application of the equation presented in Box 2.3, called the Fisher equation:

---

[2] See http://www.rba.gov.au/statistics/tables/index.html#interest_rates, (file F16).

Box 2.3

FISHER EQUATION

$$R = \left[\frac{(1+r)}{(1+i)} \right] - 1$$

R = real risk free rate

r = nominal risk free rate

i = rate of inflation

Source: ACG

The ACG previously highlighted a minor controversy surrounding this way of estimating forecast inflation in our 2007 report to the IMO.
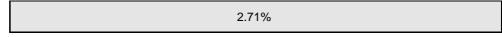
In summary, the controversy concerned the fact that the implied inflation rate derived from the Fisher equation using nominal and real CGS was likely to overstate the market's true expectation of long-term inflation. This was due to a shortage of real (that is, indexed) CGS at that time.

Despite this minor controversy, ACG's view - then and now - is that this approach still provides relatively valuable insights on inflation forecasts, but should be cross-checked with other evidence on the inflation rate.

Application of the Fisher equation to the 20-day average real and nominal risk free rates presented in Box 2.1 and Box 2.2 gives the following forecast inflation rate.

Box 2.4

INFLATION RATE

2.71%

Source: ACG

This forecast inflation rate is well within the RBA's inflation target band of 2 and 3 percent per annum.

Other inflation measures

On the other hand, RBA's survey of inflationary expectations contained in the August Statement on Monetary policy indicated a year-end underlying inflation rate of 2.75 per cent.[3] This is within the RBA's target inflation band, the first time underlying inflation has fallen within the target band since September 2007.

The CPI inflation rate, based on the latest Bureau of Statistics survey, is 3.1%, which is slightly above the target band.[4]

---

[3]   Reserve Bank of Australia (August 2010), *Statement on Monetary Policy*, at pages 2-3.

[4]   From RBA website accessed 27 October 2010.

Recommendation

Most of the available evidence on inflation appears to now lie below our previous recommendation of the inflation rate (three per cent). This suggests that a minor downward revision would not be inappropriate. Recommending shaving off 10 or 15 basis points from our previous recommendation of 300 bp would certainly be an arguable position.

On the other hand, looking forward, market and RBA expectations for the near-term are that inflationary pressures are upwards, due to the economy being at near full-employment, and given the high value of the Australian dollar vis-a-vis the US dollar. The market expects the RBA to raise interest rates on multiple occasions over the next six months. Even if it does not, domestic banks are raising their interest rates to reflect the rise in the cost of wholesale debt (a fact mirrored in the rise in our estimated debt margin in Box 3.1 in Chapter 3 below). None of these inflationary pressures is expected to diminish over the next half-year at least.

Given this conflicting picture, a recommendation of 'no change' would also be arguable.

For the purpose of this current review, and taking all evidence into account, the ACG recommends for this current review the least incremental downward revision of 10 basis points, to a new interest rate of 2.9%.

Chapter 3

Debt margin

3.1   Introduction

In this chapter we review current market evidence relating to the Australian government bond market to assess the appropriate debt margin required to finance the OCGT power plant's operation under the benchmark gearing and credit rating assumptions described in Table 1.2. That table shows our previously advised benchmark gearing level of 40 percent and benchmark credit rating of BBB+. We examine evidence on current debt margins to assess the likely cost of debt for an OCGT power plant with these financial characteristics.

3.2   Capital structure and the debt margin

A firm's capital structure refers to the relative levels of debt and equity used to finance its assets. The proportion of debt to total asset value is referred to as a business's level of "gearing".

The capital structure assumed for the purposes of estimating the WACC affects the value of the WACC through the relative weightings given to the costs of debt and equity, the value of the equity beta (which is levered to reflect the assumed capital structure) and the value of the debt margin over the risk free rate (which is affected by assumptions of the credit rating of the business, of which gearing is an important determinant).

It is common regulatory practice to make a benchmark assumption for the financial structure of a regulated business or activity, rather than base estimation of the cost of capital on the actual financial structure of the individual business. This approach is taken to avoid regulatory decisions distorting the incentives of regulated businesses to adopt efficient financing structures.

The cost of debt in the WACC is normally estimated as the risk free rate plus a debt risk premium (debt premium). The debt premium reflects the margin above the risk free rate that would be required by lenders providing debt funding. Regulators typically establish a value of the debt premium from capital market data on yields on corporate bonds consistent with benchmark assumptions for the capital structure and credit rating of the regulated business or activity.

3.3   Data limitations

In our memo to the IMO in December 2008, the ACG advised that it is not possible to calculate the debt risk premium in exact accordance with the requirements of the *Market Procedure*.

There have always been significant data limitations for estimating the debt margin for BBB+ corporate bonds, but currently those limitations have become stringent.

The Spectrum database ceased showing fair yield values for <u>any</u> corporate bonds on 10 August 2010. This means that earlier advice to the IMO by the ACG comparing the utility of estimation utilising either the Spectrum or Bloomberg databases (or both) is now redundant.[5]

Only the Bloomberg database is now available for estimation.

Further, while only Bloomberg data can be used, all AAA bonds (for seven year, eight year, nine year and ten year terms) were discontinued after 22 June 2010. Previous advice by the ACG to the IMO on methods extrapolation methods incorporating AAA bonds is now redundant.

A further problem is that there are no BBB+ bonds in the Bloomberg database. Or, to put is more accurately, Bloomberg does not distinguish BBB bonds from BBB+ or BBB- bonds. Nonetheless, one does not go far wrong by assuming that the Bloomberg BBB yield is representative of a BBB+ yield, since most of the bonds used to estimate it are BBB+ rated.

But a further problem exists in that none of the BBB bonds exist with a maturity of ten years or greater. Indeed, the only two BBB bond maturities are five years and seven years. In Bloomberg, this data is still up to date.

Although this is a problem, it is one to which the ACG has previously alerted the IMO in earlier advice. It is technically a problem from the IMOs point of view since the *Market Procedure* requires estimation via interpolation for a ten year term. The technique of interpolating a ten year term requires use of values both less than and greater than ten years. As there are no BBB bonds with a maturity greater than ten years, interpolation is not possible.

In fact, the only way to estimate the 10 year fair value yield for a BBB bond (which can be taken as representative of a BBB+ bond) is via (linear) extrapolation.

3.4   Method for estimating the debt margin

The only method available to us, given the even greater data limitations now compared to the last time ACG advised the IMO, is to use data on five- and seven-year BBB bonds from the Bloomberg database and to extrapolate a ten-year value from them.

Method: extrapolate from available BBB yields

$$\text{Estimated 10Y BBB+ yield} = \text{7Y BBB BBG FV yield}$$
$$+ \frac{3}{2} \times (\text{7Y - 5Y BBB + BBG FV yield})$$

Table 3.1 shows the estimated debt risk premium obtained via this method. The reference risk free rate is the nominal value shown in Box 2.1. The 20-day average yield was taken up to 26 October 2010.

---

[5] See for example our memo to the IMO in January 2010.

Table 3.1

DEBT RISK PREMIUM ESTIMATE (PER CENT)

Description	Rates
20 day average yield (%)	10.33
Risk free rate (nominal) (%)	5.14
Debt Risk Premium (%)	5.19

Source: ACG analysis

Therefore, the debt risk premium applicable as at 26 October 2010 is as shown in Box 3.1.

Box 3.1

RECOMMENDED DEBT MARGIN (UP TO 26 OCTOBER 2010)

5.19%

Source: ACG