Estimating a cost of capital for DBCTM

DBCT User Group

November 2015

pwc

Executive summary

DBCTM submitted to the Queensland Competition Authority (QCA) its Draft Access Undertaking (DAU) for the 2016-21 regulatory period on 9 October 2015, in which it proposed a number of changes to the 2010 DAU related to revenue and pricing. DBCTM proposed to apply a post-tax nominal WACC rate of 7.46%.

The purpose of this report is to estimate independently a WACC rate that would provide a return commensurate with the risk to investors in a benchmark efficient coal terminal, having regard to established QCA regulatory precedent and other methodologies.

We have estimated a WACC rate for DBCTM having reviewed the QCA's comprehensive 2014 WACC calculation methodology review, and having considered how it has implemented the findings of that review in recent rate of return decisions for Queensland Rail (October 2015) and Aurizon (September 2014). We have also reviewed the 2015 DAU proposal submitted by DBCTM, and the supporting evidence provided by its advisors, Frontier Economics.

We estimate DBCTM's WACC rate as at 21 August 2015 to be 5.84%, expressed as a nominal, post-tax value (using the QCA's preferred WACC3 specification). This discount rate should be applied to nominal, post-tax, cash flows that have been adjusted for imputation.

Table 1: Post-tax nominal WACC parameters for DBCTM

Parameter	Value
Risk free rate	2.17% (as at 21 August 2015)
Credit rating	BBB
Debt risk premium	2.32%
Interest rate swap costs	0.15%
Debt issuance costs	0.108%
Pre and post-tax cost of debt	*4.75%*
Asset beta	0.43
Gearing	60%
Equity beta	0.81
Equity market risk premium	6.50%
Tax rate	30%
Gamma	0.47
Cost of equity	*7.47%*
Post-tax nominal WACC	**5.84%**

Source: Capital IQ, Bloomberg, PwC analysis

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1   Introduction

1.1   Dalrymple Bay Coal Terminal

Dalrymple Bay Coal Terminal (DBCT), located south of Mackay, Queensland, is the world's third largest coal export terminal. It has a nameplate capacity of 85 million tonnes per annum and handles approximately 20% of the world's metallurgical coal. It is integral to Queensland's coal export industry.

DBCT is owned by the Queensland State Government and is leased to DBCT Management (DBCTM) through a 50 year lease with a further 49 year option. DBCTM expanded the terminal to its current capacity, all of which is contracted, under long-term take-or-pay agreements to coal producers located in the Bowen Basin coalfields.

DBCTM's revenue is regulated by the Queensland Competition Authority (QCA) which sets a regulated annual revenue requirement (ARR) as part of a third-party access framework. The ARR is divided by the annual contracted capacity to calculate the Terminal Infrastructure Charge (TIC), which is the charge paid per tonne by DBCTM's customers ('the User Group') to use the terminal's facilities.

Operational management of the Terminal is undertaken by Dalrymple Bay Coal Terminal Pty Ltd (DBCT Pty Ltd, or the Operator), a company owned by the majority of the User Group, under an Operations and Maintenance Contract (OMC). The operating costs of the terminal therefore do not feature in DBCTM's ARR.

1.1.1   Underlying economics of DBCT

Coal demand

Over the longer term, international demand for coal products shipped through DBCT looks to be relatively secure. The United States Energy Information Administration (EIA) forecast Australian coal exports to increase at a compound annual growth rate of 0.8% over the next 25 years (Figure 1), to a total of approximately 540 million tonnes per annum by 2040. The EIA anticipates Australia will be the largest individual exporter of coal by 2035, and supply over 30% of total international coal exports annually between 2035 and 2040.

Figure 1: Forecast coal exports by country, 2012 to 2040
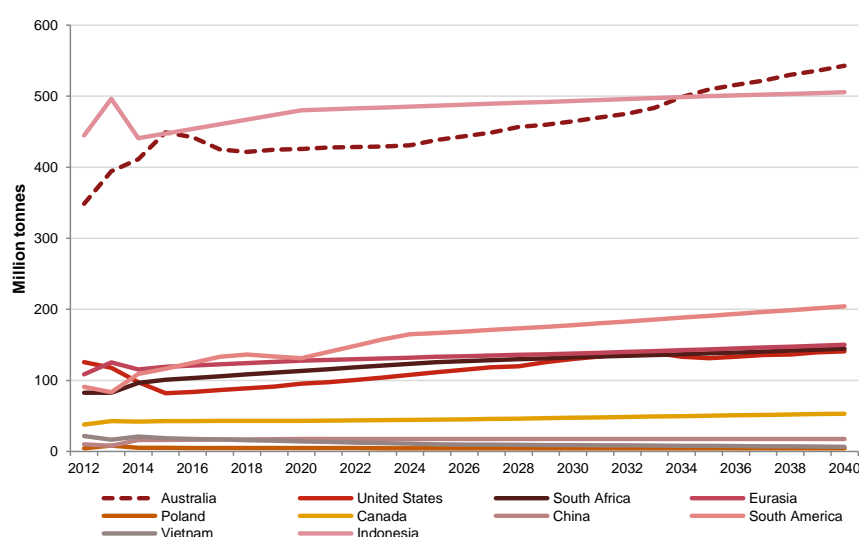
Source: US Energy Information Administration, April 2015

The International Energy Agency (IEA) also has strong outlook for the Australian coal industry, forecasting Australia to be the largest coal exporter in the world for period 2013-2040.[1] In particular, the IEA notes that coal mining in the Surat and Galilee basins will be necessary to meet increased global demand for energy. The Bureau of Resource and Energy Economics (BREE) provides similarly buoyant projections for Australian metallurgical coal exports, anticipating exports to increase at an annual average rate of 1.5% to 195 million tonnes in 2018/19, and export earnings to increase by 3.3% a year to around $28.2 billion (in 2014/15 dollar terms) in 2018/19.[2]

However, while the longer-term outlook is strong, coal companies are currently facing some short-term challenges. Metallurgical coal prices have declined substantially in recent times, reflecting an increase in supply and lower import demand from China. These conditions are not anticipated to improve until 2017, as higher-cost capacity is closed and Chinese import demand begins to increase. In the thermal coal market, excess supply is also contributing to lower prices in the short term. The market is projected to recover from 2017, however, as demand increases and uncompetitive capacity closes, supporting a moderate increase in prices.[3]

Complete take or pay contract cover

Although short term conditions in the coal market are challenging, DBCTM is insulated from this as it bears no volume risk. Capacity at the terminal is covered through take-or-pay contracts with coal customers, which protect DBCTM in the event of technical factors or demand conditions affecting a user's coal shipments.

Where actual throughput volumes do not meet the total capacity of the terminal, the rate per tonne charged to customers is increased. Take or pay contracts therefore reduce the risk that DBCTM's revenues will fall short of expectations.

For most existing users, the terminal also is the only economic means of accessing export markets. Although coal supply chains are physically connected, there are a range of contractual, economic and physical restrictions meaning that to continue to produce, coal mines must export through DBCT.

1.2   2015 Access Undertaking

The 2015 Draft Access Undertaking (DAU) sets out the terms and conditions for negotiating access to the terminal for the 2016-21 regulatory period. DBCTM submitted to the QCA its DAU for the 2016-21 regulatory period on 9 October 2015, in which it proposes a number of changes to the 2010 DAU related to revenue and pricing.

In particular, DBCTM proposed a WACC rate of 7.46%. DBCTM indicated that it does not accept the methodology and assumptions preferred by the QCA following its 2014 WACC calculation methodology review. DBCTM's proposed WACC is estimated based on its own preferred estimation of a number of parameters. DBCTM considers that its rate provides it with a return that compensates investors for the risks commensurate with investment in a stand-alone coal export terminal.

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[1] International Energy Agency, World Energy Outlook 2015 available at:
http://www.worldenergyoutlook.org/weo2015/#d.en.148701

[2] BREE (2014)

[3] Department of Industry, Innovation and Science (2015) *Resources and Energy Quarterly*. Accessed online at:
http://www.industry.gov.au/Office-of-the-Chief-Economist/Publications/Documents/req/Resource-and-Energy-Quarterly-September-2015.pdf

1.2.1 Purpose of this report

The purpose of this report is to estimate independently a WACC rate that would provide a return commensurate with the risk to investors in a benchmark efficient coal terminal.

We detail our estimated values for the following WACC elements:

- Cost of equity
- Cost of debt
- Gearing.

Our analysis does not include:

- a detailed assessment into the merits of particular approaches to estimating a regulatory cost of debt and equity, or
- an assessment of the appropriateness of the QCA's form of WACC.

2 Estimated WACC

2.1 Our approach

We have estimated a WACC rate for DBCTM having reviewed the QCA's comprehensive 2014 WACC calculation methodology review, and having considered how it has implemented the findings of that review in recent rate of return decisions for Queensland Rail (October 2015) and Aurizon (September 2014). We have also reviewed the 2015 DAU proposal submitted by DBCTM, and the supporting evidence provided by its advisors Frontier Economics (Frontier).

The parameters used to estimate the WACC consists of two groups. The first group represents parameters specific to coal terminals, and must be consider the specific nature and risks of these businesses. These parameters include the asset/equity beta, credit rating and gearing. The second group represents parameters that are applicable to the market as a whole, and therefore are independent to the type of industry that is being assessed. These include the risk-free rate, value of imputation credits (gamma), debt margin, and equity market risk premium.

Where the approach taken by DBCTM is consistent with the stated position of the QCA, we have adopted DBCTM's proposed parameter values. Where DBCTM has not adopted the QCA's approach, and relied on technical or theoretical arguments to support a contrary position, we have highlighted how DBCTM's proposal is inconsistent with established regulatory precedent or with previous decisions of the QCA, and have adopted the QCA's stated position.

Where we do not agree with the market based parameters proposed by DBCTM, we have identified our concerns with the approach taken by DBCTM, presented additional evidence and provided our own recommended parameter values.

The QCA applies the Officer WACC3 version of the weighted average cost of capital. This version recognises the value of imputation, and is applied to cash flows defined in nominal post-tax terms which account for the tax deductibility of interest payments and the value of dividend imputation credits.

Detailed equations for these assumptions are shown in Appendix A

2.2 Coal terminal specific parameters

Australian economic regulators typically estimate industry specific parameters by reference to data from benchmark companies. For DBCTM, we apply parameter values reflecting those of a benchmark coal terminal or broadly comparable asset, estimated initially through primary data analysis. The estimated values are then compared with regulatory precedents and estimates from industries of a similar nature.

The industry specific parameters are:

- gearing – the proportion of debt capital as a ratio to total debt and equity capital used to finance the terminal's assets

- credit rating – the credit rating that is expected to be issued to a benchmark terminal by a reputable credit rating agency, geared at the benchmark level, and

- asset beta - the amount of systematic risk of the benchmark market (in this case, bulk ports), assuming no debt capital, measured as the variance in the returns of that market relative to variance in returns of the market as a whole.

2.2.1 Comparator firms

While ideally comparators would consist only of Australian businesses operating in the Australian market, no Australian ports or coal terminals are listed on the ASX. Accordingly, we expanded our scope to include Australian and international firms from similar capital intensive industries that operate in an environment similar to Australia. Our sample includes 43 firms across the energy, ports, water, infrastructure, airport and toll road sectors in Australia and internationally. A summary of each comparator firm is presented in Table 2.

We drew comparator firms from Capital IQ, searching for businesses listed on international stock exchanges in the road and rail, transportation infrastructure, airport services, highways and railtracks, marine and port services or utilities industry classifications. From the initial list of comparators returned, we removed businesses not directly relevant to DBCTM (for example, we removed Cash Converters which was listed as being Road and Rail). We then removed comparators whose equity betas were only weakly related to the market overall (with an R^2 less than 0.1 in the regression of share price on the market overall).

Table 2: Comparator asset betas, gearing and credit ratings

Company	Equity beta^	Asset beta+	Market cap. (AUDm)	Credit rating*	Gearing#
Regulated energy businesses					
UIL Holdings Corporation	0.66	0.43	3,674.36	BBB	47.0%
Eversource Energy	0.55	0.39	22,057.65	A	42.3%
MGE Energy Inc.	0.65	0.55	1,853.58	AA-	21.6%
Pinnacle West Capital Corporation	0.56	0.41	9,553.11	A-	37.7%
SSE plc	0.67	0.53	31,405.30	A-	29.5%
Ausnet Services	0.65	0.35	5,009.69	A	61.4%
Ports and logistics					
Hutchison Port Holdings Trust	0.68	0.54	4,878.2	BBB+	27.7%
Brookfield Infrastructure Partners L.P.	0.77	0.52	6,498.7	BBB+	43.5%
EUROKAI GmbH & Co. KGaA	1.01	0.89	451.8	n/a	15.4%
Hamburger Hafen und Logistik AG	0.92	0.82	1,304.2	n/a	13.6%
Ocean Wilsons Holdings Ltd.	0.86	0.84	450.4	n/a	3.6%
The Port of Tauranga Limited	0.73	0.67	2,117.8	n/a	11.7%
Westshore Terminals Investment Corporation	0.89	0.84	1,447.1	n/a	8.8%
DP World Limited	0.74	0.63	17,811.8	n/a	21.6%
Infrastructure					
Asciano Limited	0.88	0.63	8,438.9	BBB	36.7%
Aurizon Holdings Limited	0.73	0.64	10,900.2	BBB+	16.1%
Macquarie Atlas Roads Group	1.10	0.69	1,790.5	n/a	45.6%
APA Group	0.89	0.55	9,505.0	n/a	48.7%
Toll roads					
Macquarie Atlas Roads Group	1.10	0.69	1,790.5	n/a	45.6%
Anhui Expressway Co. Ltd.	1.04	0.87	3,670.1	n/a	20.6%
Atlantia SpA	0.82	0.50	29,900.1	n/a	50.3%
Brookfield Infrastructure Partners L.P.	0.77	0.52	8,854.8	BBB+	43.5%
Empresas ICA, S.A.B. de C.V.	1.08	0.48	314.4	B	66.7%

Estimated WACC

Company	Equity beta[^]	Asset beta[+]	Market cap. (AUDm)	Credit rating[*]	Gearing[#]
Ferrovial, S.A.	0.64	0.42	23,278.3	BBB	46.3%
Shenzhen Expressway Co., Ltd.	0.98	0.63	2,979.6	BBB	44.7%
Airports					
Sydney Airport Limited	0.61	0.40	12,975.5	n/a	46.6%
Auckland International Airport Limited	0.86	0.71	5,660.0	A-	24.2%
Aéroports de Paris Société Anonyme	0.65	0.51	15,476.1	A-	29.0%
Airport Facilities Co., Ltd.	0.92	0.69	361.4	n/a	32.3%
Airports of Thailand Public Company Limited	0.86	0.76	14,483.3	n/a	16.5%
Beijing Capital International Airport Company Limited	0.68	0.46	6,486.0	n/a	43.5%
Københavns Lufthavne A/S	0.62	0.54	6,081.0	n/a	17.5%
Hainan Meilan International Airport Company Limited	0.95	0.92	625.5	n/a	5.2%
Grupo Aeroportuario del Sureste, SAB de CV	0.62	0.62	5,799.6	n/a	0.7%
Grupo Aeroportuario del Centro Norte, S.A.B. de C.V.	0.66	0.62	2,657.0	AA+	8.0%
Flughafen Zuerich AG	0.50	0.41	6,645.2	A+	26.5%
Water					
Middlesex Water Co.	0.77	0.57	463.7	A	34.7%
Artesian Resources Corp.	0.60	0.42	250.4	n/a	41.3%
California Water Service Group	0.75	0.55	1,494.9	A+	35.5%
Aqua America Inc.	0.63	0.49	5,997.4	n/a	31.2%
SJW Corp.	0.85	0.59	864.0	n/a	40.1%
Connecticut Water Service Inc.	0.71	0.53	520.3	A	34.6%
Manila Water Company, Inc.	0.63	0.53	2,242.1	n/a	22.3%
The York Water Company	0.64	0.52	378.6	A-	25.9%

* Credit rating by Standard and Poors
^ Five year average raw equity beta estimated using monthly observations
# Five year average net debt divided by the sum of net debt and market capitalisation, using monthly observations
+ Unlevered using the Conine formula
Source: Capital IQ, Bloomberg, PwC analysis

Table 3 summarises the weighted average asset and equity beta, credit rating and gearing level by industry.

Table 3: Weighted average betas, credit rating and gearing by industry

Industry	Equity beta	Asset beta	Credit rating	Gearing
Regulated energy businesses	0.62	0.45	A-	37.3%
Ports and logistics	0.76	0.62	BBB+	24.8%
Infrastructure	0.84	0.61	BBB+	33.6%
Toll roads	0.78	0.50	BBB	46.3%
Airports	0.69	0.56	A	26.3%
Water	0.67	0.52	A	31.0%
Total sample	**0.72**	**0.53**	**A-**	**34.5%**

Source: Capital IQ, Bloomberg, PwC analysis

Within each category, there are no substantial differences between the observed equity betas and gearing levels, and delevered asset betas of Australian and international comparator businesses.

2.2.2 Credit rating

DBCTM proposes to lower the credit rating applied in the 2015 DAU, from BBB+ to BBB. It cites Standard and Poor's rating downgrade of DBCT Finance Pty Ltd from BBB+ to BBB and Moody's revised rating outlook from stable to negative as evidence that the credit rating of a benchmark firm would have fallen since 2010.

Both ratings organisations noted the weakening coal market and the weakened credit quality of DBCTM's customers, and considered DBCTM's counterparty risk to have increased.

We agree with DBCTM that rating agencies' assessments of the credit rating applied to DBCT Finance Pty Ltd is direct and relevant evidence of how they would assess the efficient benchmark terminal. We would anticipate that the credit rating applied to a benchmark coal terminal would be linked directly to the overall credit quality of its customer base.

A BBB rating is a lower rating than those of Hutchinson Port Holding Trust and Brookfield Infrastructure Partners (the two port related businesses in our sample for which a credit rating was available), and of Aurizon and Queensland Rail (all rated BBB+). However, we note the sample of port-related businesses for which credit ratings were available is limited, and that a BBB rating is broadly consistent with the overall ratings of the comparator firms identified in our total sample.

Overall, we consider that DBCTM's proposed credit rating of BBB is reasonable.

2.2.3 Asset beta

Analysis of comparator industries

As expected, regulated energy and water businesses within our sample demonstrate the lowest observed systematic risk relative to the market overall, with weighted average equity betas of 0.65 and 0.67, respectively. Overall, toll roads and airports demonstrate a moderate level of systematic risk, though there are significant variations between individual businesses in this group. Infrastructure and Ports and logistics industries demonstrate the highest systematic risk, though the individual equity betas of firms in these groups are more closely centred around the average (but with more variation than energy or water businesses).

Importantly, we note that the port and logistics firms we were able to identify are not necessarily close comparators to DBCT. Given the lack of close comparators to DBCTM in the market, we have been required to include non-regulated general container ports and associated transport and logistics companies. Although these businesses provide some insight into the riskiness of businesses broadly related to DBCTM, they do not share the same specific characteristics as DBCTM, and which govern its overall risk profile. As described above, DBCTM is completely insulated from volume risk, given the take-or-pay contracts it has in place with its users. Existing exporters largely are constrained by commercial and economic factors from shipping through other more northerly or southerly coal terminals. And the users of DBCT also own the business which operates the terminal, and therefore have a financial incentive to utilise the terminal rather than seek out alternative export options.

As such, we do not believe these results alone provide the best indication of DBCTM's systematic risk profile. However, we do believe they are instructive in determining the overall risk level of DBCTM relative to the market as a whole.

Independent analysis

In its 2010 independent expert report for Prime Infrastructure, prepared to assess the proposed merger of Prime Infrastructure with Brookfield Infrastructure Partners, Grant Samuel sought to estimate an appropriate equity beta for DBCTM. Similar to our assessment above, Grant Samuel did not consider general commercial ports to be appropriate comparators for DBCT. Grant Samuel estimated DBCT to have a geared equity beta in the range of 0.70 to 0.80, [4] placing particular weight on the regulatory framework in which DBCTM operates. Grant Samuel noted that:

> *'while this appears low, none of the other listed ports are regulated and in Grant Samuel's view, the regulated nature of the asset (and the certainty of its cash flows) warrants a lower beta.'*[5]

Incenta Economic Consulting (Incenta), for the QCA, translated this range to an equivalent asset beta of 0.35, applying the Conine formula and a debt beta assumption of 0.12.[6]

However, since 2010 the international coal market has softened considerably, and DBCTM's credit rating has recently been downgraded by Standard and Poor's and Moody's. Having regard to this, we consider that there is some evidence to suggest the systematic risk of assets held by DBCTM may have increased moderately since 2010.

Previous regulatory decisions

In 2013, Incenta estimated an asset beta for Aurizon as part of the 2014 Draft Access Undertaking. It estimated Aurizon's asset beta as the mid-point of a range bounded at the lower end by Grant Samuel's estimated asset beta of 0.35 for DBCT, and bounded at the upper end by its calculated asset beta of 0.49 for toll-road businesses. The mid-point of the range was 0.42. [7]

The QCA considered this to be a justifiable value. Importantly, it did not consider that 0.35 was an inappropriate asset beta for DBCTM, or that it did not reflect the systematic risk profile of the business. In its draft decision it preferred to maintain the asset beta of 0.45 from the prior regulatory period, but noted that future considerations of the asset beta for Aurizon could lead to further reductions. [8]

The QCA applied the same asset beta to Queensland Rail in its 2015 Draft Access Undertaking draft decision.[9] It noted that Queensland Rail's West Moreton network and Aurizon share similar characteristics, in particular that they both have:

- operations in the Queensland coal chain

- cost-based regulation that is applied to coal traffic operations

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[4] Grant Samuel (2010), *Proposal from Brookfield Infrastructure Partners L.P., Independent Expert report addressed to the board of directors of Prime Infrastructure Holdings Limited*. Accessed online at http://www.primeinfrastructure.com/primeinfrastructure/media/436989/pih%20scheme%20booklet.pdf

[5] Ibid.

[6] Incenta Economic Consulting (2013) *Review of Regulatory Capital Structure and Asset / Equity Beta for Aurizon Network – Report to the Queensland Competition Authority*. Accessed online at http://www.qca.org.au/getattachment/7bdcc7f6-e569-4688-9d6e-15fc941a4660/Incenta-Economic-Consulting-Review-of-Regulatory-C.aspx

[7] Ibid.

[8] Queensland Competition Authority (2014) *Draft decision – Aurizon Network 2014 Draft Access Undertaking – Maximum Allowable Revenue*. Accessed online at http://www.qca.org.au/getattachment/9e1f80ed-7c00-446d-8043-bf6a3c1d8f22/QCA-Draft-decision.aspx

[9] Queensland Competition Authority (2015) *Draft Decision – Queensland Rail's 2015 Draft Access Undertaking*. Accessed online at http://www.qca.org.au/getattachment/dfcf0cda-40c6-4a8e-b945-930a97a4f135/QCA-QR-2015-DAU-Draft-Decision.aspx

- revenue protection from take-or-pay contract provisions

- cost pass-through provisions within access agreements, and

- similar institutional arrangements, being located in the same state and regulated by the same regulator.

The QCA noted the differences in product composition between the two businesses, but did not consider Queensland Rail's coal operations to be materially more risky than those of Aurizon. We consider that the risk characteristics of Aurizon are more similar to DBCTM than they are to Queensland Rail, as DBCTM operates entirely within the same coal supply chain, and is completely protected through take-or-contract provisions.

Recommended asset beta

As noted above, there are no close comparators to DBCTM available from whom to estimate an appropriate asset beta. As such, we propose to adopt the methodology Incenta applied to estimate an asset beta for Aurizon, as we consider them to have very similar systematic risk profiles. This methodology was considered to be justifiable by the QCA, which applied very similar values to that estimated by Incenta to Aurizon and Queensland Rail in recent draft decisions.

The asset beta estimated by Grant Samuel in 2010 forms the lower bound of the range. The upper bound is estimated with reference to a sample of comparator toll-road businesses. The weighted average asset beta of toll-road businesses in our sample is 0.50, giving a mid-point estimate of 0.43.

2.2.4   Gearing

DBCTM proposes to roll forward the benchmark gearing level of 60% which has been applied since 2006. Although DBCTM notes that this level of gearing may not remain sustainable into the future if the industry outlook does not improve, it does not propose to revise this assumption for the 2016-21 regulatory period.

There is strong regulatory precedent for gearing levels of at least 50% across multiple industries, including rail and ports. The QCA applied a gearing of 55% for Aurizon in its 2014 draft decision,[10] and for Queensland Rail in its 2015 draft decision[11]. It approved a 60% gearing level for DBCTM in its 2004 draft decision[12] which was maintained in the 2010 DAU.

As such, we consider DBCTM's proposed gearing level of 60% to be reasonable.

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[10] Queensland Competition Authority (2014) *Draft decision – Aurizon Network 2014 Draft Access Undertaking – Maximum Allowable Revenue*. Accessed online at http://www.qca.org.au/getattachment/9e1f80ed-7c00-446d-8043-bf6a3c1d8f22/QCA-Draft-decision.aspx

[11] Queensland Competition Authority (2015) *Draft Decision – Queensland Rail's 2015 Draft Access Undertaking*. Accessed online at http://www.qca.org.au/getattachment/dfcf0cda-40c6-4a8e-b945-930a97a4f135/QCA-QR-2015-DAU-Draft-Decision.aspx

[12] Queensland Competition Authority (2004) *Draft Decision – Dalrymple Bay Coal Terminal Draft Access Undertaking*. Accessed online at http://www.qca.org.au/getattachment/dd6f9368-3c28-44e5-9350-7549981b461e/2004-Draft-Decision-re-DBCT-Draft-Access-Undertaki.aspx

2.2.5 Equity beta

DBCTM submission

DBCTM engaged Frontier to provide its view of an appropriate equity beta, who concluded that the equity beta for DBCTM should be at least 1. Frontier's arguments attempt to demonstrate that the overall risk profile of DBCTM has increased relative to other coal terminals since 2010, but they do not demonstrate that DBCTM's level of systematic risk is equal to or greater than that of the market overall.

For example, Frontier noted that approximately three quarters of total annual volume at DBCT are due to expire within the forthcoming regulatory period. This may be a riskier position than if no contracts were due to expire, though it does not necessarily suggest DBCTM is as risky as the broader market. Even in the extremely unlikely case that none of these contracts were extended, DBCTM would still have the ability to recover its annual revenue requirement from the remaining 25%. A large proportion of contracts coming to the end of their agreed terms does not of itself support the position that DBCTM is as risky as the market overall.

Similarly, Frontier also states that DBCTM faces more risk than other coal terminals which agree 10 year contract terms with users, and require them to extend their contracts every 12 months or pay higher prices. That DBCTM has 5 year contract terms currently, without the ability to increase prices if customers do not extend, may indicate that it could be more risky than other coal terminals but does not suggest it faces more systematic risk than the market overall.

Frontier's claim that competition to DBCTM has increased since 2010 relies on there being genuine alternatives available to current users of DBCT. Frontier believes that the Abbot Point coal terminal and Wiggins Island Coal Export Terminal (WICET) now represent real export options for some coal mines in the Bowen Basin which currently export coal from DBCT. We do not agree. We consider that the limited availability of rail and port access, and the additional operating costs that would be incurred at these ports, conspire such that it would be uneconomical for current users of DBCT to switch to a different port.

The port and rail capacity for each supply chain are closely linked, and there is currently limited capacity available on rail networks to either Abbot Point or WICET. While this may become available in the future, DBCT users would need to consider the difference in both below- and above-rail costs they would incur if they were to switch. Given the much greater distances involved for some customers, the additional haulage costs would almost certainly be prohibitive.

The opportunity for customers to move to either Abbot Point or WICET would be dependent on excess capacity arising from the default or non-renewal of customers. Given that WICET customers are contracted under 10-year take-or-pay arrangements, non-renewal of customers at WICET within DBCTM's next two regulatory periods is unlikely.

If a user of DBCT were able to secure both rail and port access to export its coal from an alternative terminal, it would then need to consider the relative terminal infrastructure charge (TIC) between DBCT and another location. Our understanding is that the TIC levied on existing DBCT users compares very favourably to either Abbot Point or WICET.

In addition, DBCT Pty Ltd, the operator of the coal terminal at DBCT is completely owned by the majority of existing users at DBCT. The additional operating costs which would be paid by DBCTM customers at either Abbot Point or WICET mean that neither is likely to be an attractive option.

Frontier also provided the equity betas of a number of international port businesses as evidence that DBCTM's equity beta should be at least 1. As noted above, we do not consider there to be sufficient close comparators to DBCTM in the market from which to estimate an appropriate equity beta. Unregulated general cargo ports may not be insulated to the same degree as DBCTM through revenue cap mechanisms and take-or-pay contracts, and so are unlikely to face the same risk profile. As such, we have included comparators from a range of industries, including electricity, gas and water businesses which share these characteristics.

Frontier limited its comparator group to port businesses. It set out a number of conceptual factors which the QCA's advisor, Professor Lally, considered to be related to the systematic

risk of a firm, and concluded from these that DBCTM is likely to be in an entirely different risk class to electricity and gas distribution and transmission firms. Aurizon presented a similar argument in its 2014 DAU submission, when it noted differences between it and regulated electricity network businesses, relating to the nature of the service provided and the underlying customer base.

However, the QCA's advisors, Incenta, considered that regulated energy and water businesses represent the closest comparators to the Aurizon Network business, as these businesses:

- are subject to cost-based regulation with periodic reviews

- have their revenue risk buffered by the regulatory framework

- have relatively low operational cost risk

- are generally subject to low stranding risk (over the life of their current assets). [13]

The QCA agreed, noting that the comparator firms Incenta identified were appropriate. We consider that the factors identified above apply equally to DBCTM. Given the similarities between the environments in which Aurizon and DBCTM operate, we believe that energy and water businesses are relevant comparators for DBCTM also, and should be included in an appropriate sample of comparator businesses.

Comparison of DBCTM risk relative to market

To illustrate how DBCTM's financial performance is unaffected by coal market conditions, Figure 2 compares DBCTM' s quarterly revenue to changes in the metallurgical coal price and the quarterly volume of tonnes shipped at the terminal over the period March 2012 to June 2015. Over this period, the coal price declined significantly over the period, and the volume of tonnes shipped per quarter varied considerably. However, through the take-or-pay contract framework it has in place with users, and the revenue cap mechanism structure of regulation, DBCTM's quarterly revenue remained stable.

We note that this comparison of revenue to market conditions is not equivalent to an assessment of the variance in *earnings* relative to the market overall, as indicated by a business' equity beta. However, we consider that the earnings profile of DBCTM would closely match its revenue profile, given its relatively fixed cost base and outsourced operations functions. This analysis demonstrates that DBCTM's risk profile is not strongly correlated with overall coal market conditions, at least within plausible market performance ranges, nor is DBCTM adversely affected by short-term fluctuations in the performance of its customers.

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[13] Incenta Economic Consulting (2013) *Review of Regulatory Capital Structure and Asset / Equity Beta for Aurizon Network – Report to the Queensland Competition Authority.* Accessed online at http://www.qca.org.au/getattachment/7bdcc7f6-e569-4688-9d6e-15fc941a4660/Incenta-Economic-Consulting-Review-of-Regulatory-C.aspx

Figure 2: Changes in estimated DBCTM quarterly revenue, DBCT export volumes and the metallurgical coal price
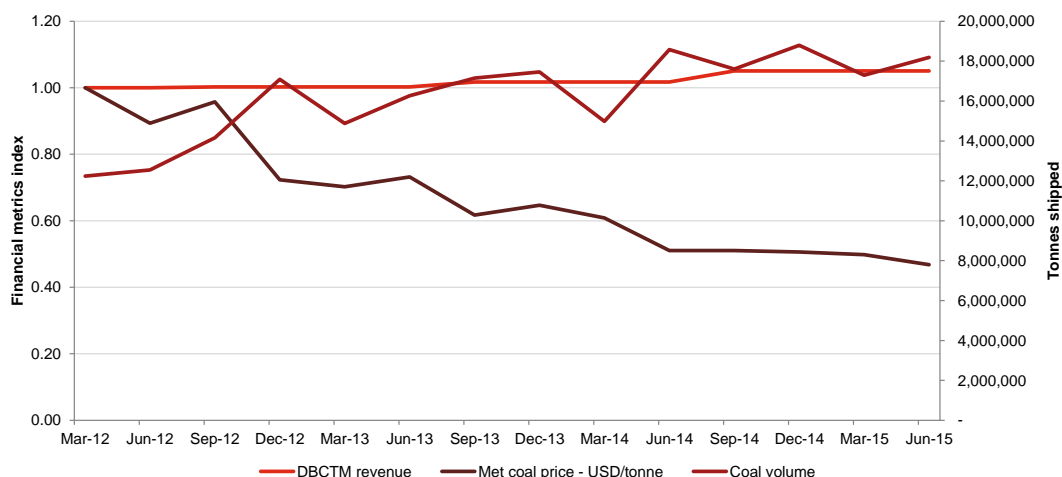
Source: DBCTM, QCA, Bloomberg

Evidence from recent port transactions

Mauboussin and Callahan presented a simplified model of price-earnings multiples, demonstrating how they can be used to value assets.[14]

The authors note that the steady state value of a firm is the worth of the business assuming that it maintains its normalised level of earnings into perpetuity. In these conditions, the steady state earnings multiple is equal to the reciprocal of the cost of equity. Assuming a cost of equity of 10%, the market would expect a company to create shareholder value if its stock trades at above 10 times current earnings (1/cost of equity).

Certainly, there are a range of practical complications which need to be considered. Transactions or investments might be financed in such a way as to deliver a more tax effective outcome for investors, or existing assets might include options such as future expansion potential, which factor into the value ascribed by the market.

Notwithstanding, we can use this framework to assess market expectations in recent port transactions nationwide.

Table 4 presents the sales price multiples of earnings before interest tax and depreciation and amortisation (EBITDA) of four recent port transactions. We note that it would be more appropriate to apply the multiple of net profit after tax, though data for this is not publicly available.

Three of these ports play a role in the coal export industry. The Port of Newcastle is the world's largest coal port, exporting 160 million tonnes in 2014.[15] The Port of Kembla was established to facilitate the export of coal from the Illawarra region, and in 2012/13 exported

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[14] Mauboussin M., Callahan D., (2014) *What does a price-earnings multiple mean? An analytical bridge between P/Es and Solid Economics.* Accessed online at: https://doc.research-and-analytics.csfb.com/docView?language=ENG&format=PDF&source_id=em&document_id=805915460&serialid=b3Wu0sLSCMh00cBXg5ql%2fa4nh5XcibIeQg7OZgs4w68%3d

[15] Port of Newcastle (2014) 2014 Annual Trade Report. Accessed online at http://www.portofnewcastle.com.au/Resources/Documents/PON-Annual-Trade-Report-2014-FINAL.pdf

13.5 million tonnes of coal.[16] The Port of Brisbane exported 8.6 million tonnes in 2012/13 from mines in the West Moreton and Surat Basins,[17] albeit coal is a minor commodity trade through the Port of Brisbane.

We include also the recently transacted Port of Darwin, to identify a non-coal benchmark in this sample.

Table 4: Port transaction multiples

Port	Date	Multiple
Port of Brisbane	November 2010	17[18]
Port of Botany/Kembla	April 2013	25[19] [20]
Port of Newcastle	April 2014	27[21]
Port of Darwin	October 2015	25[22]

If coal export terminals had become significantly more risky recently, we would expect sale price multiples to have decreased over time. However, sale price multiples for these ports increased significantly between the original sale of the Port of Brisbane in 2010 to the more recent transactions of the Port of Newcastle and the Port of Darwin. Indeed, the November 2013 sale of a 27% stake in the Port of Brisbane was transacted for a multiple of 27 times EBITDA.[23] Multiples of between 25-27 are observed consistently in transactions over the past period, suggesting that the market is not factoring in any material "port" or "coal" risk premium in these privatisations.

Recommended equity beta

Frontier, in suggesting that the equity beta for DBCTM should be at least 1, seeks to demonstrate that the risk profile of DBCTM has increased since 2010, relative to other coal terminals. However, they do not demonstrate that DBCTM faces a level of systematic risk equivalent to the market overall. We have identified a number of issues with the arguments put forward by Frontier; most notably that it is unrealistic to consider that competition to DBCTM has increased in any meaningful way, or that the volume of contracts approaching their end date suggests DBCTM is equally risky as the market overall.

Much of Frontier's argument relies on the fact that DBCTM's equity beta is currently 1. We note that Frontier has questioned the relevance of Grant Samuel's 2010 estimated equity beta 0.35 as it is five years old, but relies on an equally-dated previous QCA decision to support an alternative view.

Market expectations for businesses similar to DBCTM can be observed through recent port transaction sale prices. The very high sales prices observed suggest the market considers these businesses likely to generate significant value into the future – which could in part

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[16] http://www.portsaustralia.com.au/aus-ports-industry/trade-statistics/?id=9&period=13

[17] Ibid.

[18] http://www.theaustralian.com.au/business/companies/gip-set-to-leave-brisbane-docks/story-fn91v9q3-1226695158005

[19] http://www.smh.com.au/business/megafunds-spark-a-ports-boom-20140306-34a7y.html

[20] Reflects the total sales price for both ports.

[21] http://www.smh.com.au/business/port-of-newcastle-leased-to-hastings-in-175-billion-deal-20140430-37hbu.html

[22] http://www.smh.com.au/business/chinas-landbridge-wins-port-of-darwin-for-506m-20151013-gk7r90.html

[23] http://www.smh.com.au/business/megafunds-spark-a-ports-boom-20140306-34a7y.html

reflect an investor's perspective that these assets actually are less risky than the market overall.

We consider that DBCTM's overall risk profile is similar to Aurizon and Queensland Rail. We propose, therefore, to estimate DBCTM's equity beta using our recommended asset beta and gearing values, rather than adopt DBCTM's proposed value of 1. Using the mid-point of this range reflects Frontier's argument that the DBCTM's level of risk has increased since 2010. However, this is relative to Grant Samuel's estimated equity beta of 0.7-0.8 converted by Incenta to an asset beta of 0.35, rather than the current equity beta of 1.

Using the Conine formula, and combining our asset beta and gearing values with the QCA prescribed debt beta (0.12) and gamma parameter values (0.47), we estimate the equity beta for DBCTM to be 0.81.

2.3 Market parameters

The market parameters comprise:

- Risk-free rate – the return an investor would expect from an asset with near to no market risk. This is usually derived from using a proxy with very low risk, such as long term Commonwealth Government Securities (CGS)

- Debt margin– the additional yield in excess of the risk free rate that debt investors require for a business at the benchmark credit rating

- Equity market risk premium – a measure of how much compensation in excess of the risk free rate investors require in order to accept average market risk

- Factor for imputation credits (Gamma) – a factor, when applied to DBCTM's tax liability, estimates the amount of imputation credits investors receive for tax paid by the Port.

2.3.1 Risk-free rate

The current QCA approach is to base the risk free rate on the yield of CGS with a term to maturity equal to the length of the regulatory period ('term matching'), averaged over a 20 day period.

DBCTM does not believe this to be appropriate, however, and considers instead that it should be estimated as the yield on CGS with ten years to maturity. DBCTM considers that this would align with the horizon of investors, and that it would be consistent with wider commercial practice and the approach adopted by most other Australian regulators. DBCTM proposes a risk-free rate of 2.80%, the yield on ten year CGS averaged over the 20 days to August 21.

The QCA considered the risk-free rate at length in its 2014 WACC review. A number of submissions considered that the term of the risk-free rate should be equal to ten years, as this approximates more closely the life of the regulated assets or the investment horizon of investors. However, the QCA's advisor, Professor Lally, noted that because long term interest rates exceed short term interest rates on average, use of a longer term risk-free rate in calculating the WACC will lead to higher regulatory cash flows than if a shorter term rate is used. The 'NPV = 0' rule would be violated as a result.

Given the attention paid to this parameter by both the QCA, regulated businesses and their stakeholders in the recent WACC review, if the QCA were to depart from its current position in its decision for DBCTM, we would anticipate that it would provide substantial supporting evidence and explanation. We note that the risk-free rate was 'term matched' in both the 2015 Queensland Rail and the 2014 Aurizon draft decisions.

Adopting the QCA's existing approach, we have measured the risk-free rate as the yield on 5 year CGS averaged over the 20 days to 21 August, equal to 2.17%.

2.3.2   Debt margin

DBCTM's proposed debt margin is comprised of a debt risk premium and debt issuance costs.

DBCTM calculated its debt risk premium in accordance with the econometric approach adopted by the QCA, assuming a BBB credit rating, based on the 20 days to 21 August. DBCTM's proposed debt risk premium is equal to 2.32%.

DBCTM included debt issuance costs of 0.108% in its debt margin, in accordance with the QCA's standard approach.

The QCA also provides an allowance for interest rate swap costs where the efficient term of debt is different to the length of the regulatory period. Interest rates swaps are used to convert the risk-free component of the debt risk premium from the efficient term of debt to the length of the regulatory period.

However, because DBCTM considers that a ten year term to maturity should be used to estimate the risk free rate, it does not proposes to include an allowance for interest rate swap costs. It does note, though, that if the QCA determines that it will apply its term matching approach, an interest rate swap allowance will need to be provided.

For the purposes of this assessment, and noting that interest rate swap costs will need to be re-estimated as part of the QCA's final decision, we have incorporated indicative interest rate swap costs of 0.15% into our estimated cost of debt. This is broadly consistent with the swap cost allowances included in the QCA's 2014 draft decision for Aurizon (0.113%, which was considered to be at the lower end of a reasonable range).[24]

Our total estimated debt margin for DBCTM as at 21 August, including the debt risk premium, debt issuance costs and indicative interest rate swap costs, is 2.58%.

2.3.3   Equity market risk premium

The equity market risk premium (EMRP) is a variable that is not directly observable from current market data, and is not easily quantifiable. Theoretically, it should reflect forward-looking market expectations but, as these are difficult to measure, reliance is often placed on historical data. Historical analysis of the market risk premium suggests a long-term range between 4.0% - 8.0%, although more recent studies have narrowed the generally accepted range to between 5.0% - 7.0%.

Previously, the QCA estimated the EMRP by taking an equally weighted average of four estimation approaches - the Ibbotson and Siegel historical averaging methods, Cornell method and survey evidence - rounded to the nearest whole number.

- Ibbotson historical averaging – historical averaging of the return above the risk-free rate of a well-diversified portfolio. Estimated by the QCA to be 6.5%.

- Siegel historical averaging – adjusting the Ibbotson method for the effects of unanticipated inflation. Estimated by the QCA to be 5.5%.

- Cornell method – a forward looking advanced application of the dividend growth model. Estimated by the QCA to be 6.9%.

- Survey evidence – survey of investor expectations to determine the premium they require over the risk-free rate. Estimated by the QCA to be 6.2%.

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[24] Queensland Competition Authority (2014) *Draft decision – Aurizon Network 2014 Draft Access Undertaking – Maximum Allowable Revenue.* Accessed online at http://www.qca.org.au/getattachment/9e1f80ed-7c00-446d-8043-bf6a3c1d8f22/QCA-Draft-decision.aspx

In its review, the QCA decided to incorporate additional information, including volatility measures, corporate debt premiums and liquidity premiums on government bonds, into its EMRP estimate. It decided also to remove the requirement to round the estimate to the nearest whole number. The effect of these changes was to increase the equity market risk premium from 6.0% to a range of 5.0% - 7.5%, with a point estimate of 6.5%. [25]

The QCA also considered the Wright estimation method. The underlying assumption of this approach is that the cost of equity is more stable than the EMRP over time, and that when the risk-free rate decreases, the market risk premium increases (and vice versa) to maintain a relatively stable cost of equity.[26] However, based on its own analysis and that of Professor Lally, the QCA considered the EMRP to be relatively more stable than the return on equity in Australia. As a result, the QCA had limited regard to the Wright method in its estimate of the EMRP. [27]

DBCTM's proposed EMRP is 8%, greater than the QCA's adopted point estimate of 6.5%, and outside its range of 5.0% - 7.5%.

DBCTM's proposed value is based on Frontier's own weighted average of four estimation methodologies, one of which is the Wright method, which, at 8.8% is substantially higher than the other estimates generated by the QCA in its review. Frontier also considered that the QCA has altered its approach to estimating the EMRP using the Cornell method in two ways; that it makes a downward adjustment to long-term growth forecasts, and that it assumes investors have two different required returns – one for cash flows over the next ten years and one for all subsequent cash flows. By removing these adjustments, Frontier estimates the EMRP using the dividend growth model to be 8.6%, considerably higher than the QCA's estimate of 6.9%.

Table 5 presents recent regulatory decisions relating to the EMRP. The QCA applied a value of 6.5% in its decisions for Aurizon and Queensland Rail, the same value applied by the Australian Economic Regulator (AER) in April 2015 to electricity transmission businesses nationwide. The decision by the Economic Regulation Authority (ERA) to apply a 7.3% EMRP to West Australian railway network business is an outlier amongst regulatory decisions, but is still considerably lower than the 8.0% proposed by DBCTM.

Table 5: Recent regulatory decisions - EMRP

	QCA 2015	AER 2015	ERA 2015
EMRP	6.5%	6.5%	7.3%

Source: QCA, AER, ERA

The QCA notes that its estimate of the EMRP will be reassessed periodically, so potentially there is scope for the QCA to apply a different value to the 6.5% it determined in its WACC review, and applied in its Queensland Rail and Aurizon draft decisions. However, given the recency of these decisions, we consider them to provide the best indicator of the approach the QCA will take for DBCTM. If the QCA were to adopt a different value based on DBCTM's submission, we anticipate that it would provide a detailed response to Frontier's use of the Wright method and its adjustments to the dividend growth model.

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[25] Queensland Competition Authority (2014) *Final decision - Cost of capital: market parameters.* Accessed online at http://www.qca.org.au/getattachment/820a4f29-2878-4641-b445-dcf8af7f75ed/QCA-Final-Decision-Cost-of-Capital-Market-Paramete.aspx

[26] Ibid.

[27] Ibid.

We have applied an EMRP of 6.5%, consistent with the draft decisions of the QCA for Aurizon and Queensland Rail.

2.3.4 Gamma

The Australian tax system allows companies to provide shareholders with credits which reflect the taxes paid on profits that are distributed as dividends. Shareholders then use the imputation, or 'franking', credits to reduce their own personal tax liabilities. The value of distributed imputation credits to the extent they are utilisable by a firm's investors is known as 'gamma'. The higher the value of gamma, the greater the is tax benefit to the firm's investors and the lower is the allowed tax component in the firm's allowed revenues.

Gamma is a function of the pay-out ratio (the amount of credits generated by the benchmark efficient business that are distributed to investors) and the utilisation rate (the ability of investors to utilise the credits to offset personal income taxes).

Historically, the QCA has favoured a gamma estimate of 0.50, based on a distribution rate of 0.8 and a utilisation rate of 0.625. In its 2014 WACC review, it updated its estimate of the distribution rate to 0.84, based on an analysis of the distribution rates of the twenty largest list companies by market capitalisation. It also updated its estimate of the utilisation rate to 0.56, based on equity ownership of Australian listed companies. [28] Combined, these values generate a gamma value of 0.47 (0.84 multiplied by 0.56).

DBCTM disagreed with the conceptual approach taken by the QCA to estimate both the distribution rate and the utilisation rate. DBCTM considers that Professor Lally estimated the distribution rate incorrectly, measuring it as the ratio of distributed credits to created credits rather than as the ratio of distributed credits to corporate tax paid.

DBCTM considers that the utilisation rate should reflect the market value of franking credits in the hands of investors, rather than the proportion of credits redeemed by investors. DBCTM provides evidence supporting its position that the market value of franking credits is materially less than the redemption proportion.

Regulators across the country have applied a gamma parameter of approximately 0.4 in recent decisions (Table 6). The AER and ERA both applied a parameter of 0.4 in recent decisions, consistent with the 0.47 applied by the QCA. The DBCTM proposed value of 0.25 is again inconsistent with recent regulatory precedent.

Table 6: Recent regulatory decisions - Gamma

	QCA 2015	AER 2015	ERA 2015
Gamma	0.47	0.4	0.4

Source: QCA, AER, ERA

Given the impact of a revised gamma parameter for regulated businesses, both in the WACC rate and in the cash flows to which the WACC is applied, we would anticipate the QCA will address the critique presented by DBCTM of its calculation method.

In the interim, we have applied a gamma value of 0.47, consistent with the draft decisions of the QCA for Aurizon and Queensland Rail.

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[28] Queensland Competition Authority (2014) *Final decision - Cost of capital: market parameters*. Accessed online at http://www.qca.org.au/getattachment/820a4f29-2878-4641-b445-dcf8af7f75ed/QCA-Final-Decision-Cost-of-Capital-Market-Paramete.aspx

3 *Conclusion*

We estimate DBCTM's WACC to be 5.84%, expressed as a nominal, post-tax value. This discount rate should be applied to nominal, post-tax, cash flows that have been adjusted for imputation.

Table 7: Post-tax nominal WACC parameters for DBCTM

Parameter	Value
Risk free rate	2.17% (as at 21 August 2015)
Credit rating	BBB
Debt risk premium	2.32%
Interest rate swap costs	0.15%
Debt issuance costs	0.108%
Pre and post-tax cost of debt	*4.75%*
Asset beta	0.43
Gearing	60%
Equity beta	0.81
Equity market risk premium	6.50%
Tax rate	30%
Gamma	0.47
Cost of equity	*7.47%*
Post-tax nominal WACC	**5.84%**

Source: Capital IQ, Bloomberg, PwC analysis

Appendix A Detailed WACC equation

We have assumed that a post-tax nominal vanilla WACC is estimated by the following formula.

$WACC = K_e \times E/(D+E) + K_d \times D/(D+E)$, where:

- K_e is the return on equity capital

- K_d is the return on debt capital

- D is the amount of debt

- E is the amount of equity

The return on equity capital is estimated by using the Capital Asset Pricing Model (CAPM) shown below.

$K_e = Rf + (\beta_e \times EMRP)$, where:

- Rf is the risk free rate

- EMRP is the equity market risk premium

- β_e is the equity beta, calculated as:

$$\beta_e = \beta_a \times \left[1 + (1 - t_c \times (1 - \gamma)) \times \frac{\dfrac{D}{V}}{1 - \dfrac{D}{V}} \right] - \beta_d \times (1 - t_c \times (1 - \gamma)) \times \frac{\dfrac{D}{V}}{1 - \dfrac{D}{V}}$$

Where:

- β_a is the asset beta

- t_c is the tax rate

- γ is the value of dividend imputation credits

- β_d is the debt beta

The return on debt capital is estimated by observing market data as shown below.

$K_d = Rf + Dm$, where:

- Rf is the risk-free rate

- Dm is the debt risk premium