Estimation of the weighted average cost of capital for the Port of Melbourne

Report for Herbert Smith Freehills

11 May 2022

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Executive summary

This report has been prepared at the request of Herbert Smith Freehills (HSF) to provide the Port of Melbourne (PoM) with an independent estimate of the weighted average cost of capital (WACC) consistent with the Pricing Order made under section 49A of the *Port Management Act 1995* (Vic) (PMA).

The rate of return is an input to the accrual building block model (ABBM) that PoM uses to derive its annual revenue requirement. We understand that our WACC estimates from this report will inform PoM's Tariff Compliance Statement (TCS) for 2022/23, which will be submitted to the Victorian Essential Services Commission (ESC).

Importantly, the Pricing Order states that PoM as the Port Licence Holder must apply an accrual building block methodology over the regulatory period that includes:[1]

> … an allowance to recover a return on its capital base, commensurate with that which would be required by a benchmark efficient entity providing services with a similar degree of risk as that which applies to the Port Licence Holder in respect of the provision of the Prescribed Services…

The Pricing Order also requires PoM to apply a pre-tax, nominal rate of return that uses:[2]

> … one or a combination of well accepted approaches that distinguish the cost of equity and debt, and so derive a weighted average cost of capital.

We estimate an 8.99 per cent pre-tax nominal WACC as at 31 March 2022 using methods that we consider well-accepted. This estimate is 76 basis points (bp) higher than the 8.23 per cent estimate from PoM's 2021-22 TCS, which is primarily caused by the 87 bp increase in the risk free rate.[3]

We have derived the individual WACC parameters after reviewing precedent from regulators in Australia and New Zealand, including the ESC. In particular, we have reviewed the ESC's 2021 inquiry into PoM's compliance with the Pricing Order (the Inquiry),[4] as well as the advice from the ESC's consultants, Cambridge Economic Policy Associates (CEPA).[5]

We have also considered the recent judgment of the Supreme Court of Western Australia (WASC) that determines the WACC estimate for Perth Airport as at 30 June 2018.[6]

The approach we adopt is also consistent with PoM's undertaking to the ESC Minister (the Undertaking).[7]

Meaning of 'one or a combination of well accepted approaches'

The Pricing Order sets out principles that must be used when estimating PoM's return on capital. This includes the requirement that the rate of return on capital allowance must be 'commensurate with that which would be required by a benchmark efficient entity providing services with a similar degree of risk as that which applies to the Port Licence Holder in respect of the provision of the Prescribed Services'.

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[1] Victoria Government Gazette, *Port Management Act 1995 (Vic.) Pricing Order*, No. S 201, 24 June 2016, para 4.1.1(a).

[2] Victoria Government Gazette, *Port Management Act 1995 (Vic.) Pricing Order*, No. S 201, 24 June 2016, paras 4.3.1-4.3.2.

[3] Port of Melbourne, *2021 – 2022 Tariff Compliance Statement*, General statement, 31 May 2021, p 8.

[4] ESC, *Inquiry into the Port of Melbourne compliance with the pricing order*, Final report, 31 December 2021.

[5] CEPA, *Port of Melbourne five-year review – WACC*, Final report, 17 December 2021.

[6] *Perth Airport Pty Ltd v Qantas Airways Ltd [No 3]* [2022] WASC 51 [282].

[7] Port of Melbourne, *Undertaking to the Essential Services Commission Minister*, April 2022.

The Pricing Order also states that the rate of return estimate must be determined on a pre-tax, nominal basis that reflects 'one or a combination of well accepted approaches' with separate estimates for the costs of equity and debt.

The ESC's Statement of Regulatory Approach (SoRA) defines well accepted approaches as ones that are broadly recognised for estimating an efficient regulatory return on capital for a benchmark efficient entity, which may be informed by the views and practices of regulators and other regulatory economic professionals.

The Inquiry states that PoM's estimated WACC was approximately 200 bp higher on average than the ESC's benchmark estimates. In reaching this conclusion, the ESC assessed whether an approach is 'well accepted' based on its adoption by Australian regulators. The ESC also stated that the use of a 'well accepted' approach requires maintaining consistency with both the methodology and implementation of the approach.[8]

HSF has instructed us that for the purposes of this report we are to assume that a 'well accepted approach' means an approach which is consistent with the principles and approach that regulators and courts in Australia and New Zealand have adopted in similar regulatory contexts and implemented consistently with those principles and that approach.

We note that there have been several updates to Australian regulatory precedent since the Inquiry, including discussion papers or WACC reviews by five regulators and a judgment issued by the WASC. We refer extensively to this recent precedent in our discussion of WACC parameters, but continue to assign weight to the existing methods that other regulators apply.

Comparator sample

Consistent with clause 4.1.1(a) of the Pricing Order, we construct a comparator sample of companies with similar systematic risks to that of the benchmark efficient port. We use this sample as a source of estimates for industry-specific WACC parameters, in that we:

- derive the benchmark asset beta and gearing based on the comparator sample; and
- cross-check the existing benchmark credit rating against the comparator sample.

In line with clause 25(c) of the Undertaking, we first use Bloomberg's equity screening function (EQS) to identify a wide set of potential comparators, before narrowing the sample by applying filters for market capitalisation and liquidity. Finally, we analyse the remaining companies manually to remove those that do not own and operate container port and channel infrastructure, including by reviewing their Bloomberg descriptions and carrying out desktop research.

We do not apply a country filter when identifying comparators. However, we note that filtering to select only Developed and Advanced Emerging countries does not materially change the asset beta of our comparator sample.

We identify two samples:

- our preferred sample of 24 firms that own and operate container port and channel infrastructure, and whose revenues are primarily derived from container port operations; and
- an alternative sample, which we construct to cross check our preferred sample estimate, of 30 firms that further includes firms who own and operate container port and channel infrastructure, but who also derive substantial revenues from activities unrelated to container port operations.

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[8] ESC, *Inquiry into the Port of Melbourne compliance with the pricing order*, Final report, 31 December 2021, p 38.

We also conduct a sensitivity analysis on our asset beta estimates by removing from the preferred and alternative samples each of the following sets of firms:

- set of firms with China as a country of domicile;
- set of firms with China as a country of risk; and
- set of firms with developing country risk.

Our sensitivity analysis suggests that our asset beta point estimate is robust to the above changes, with a sensitivity range of 0.70 to 0.72 compared to our 0.72 point estimate.

Cost of debt

The Inquiry accepted that PoM's approach for estimating the cost of debt is well-accepted.[9] We have retained most elements of PoM's approach after confirming that each parameter continues to be well-accepted and reflects the cost of debt of the benchmark efficient port.

Specifically, we calculate a benchmark cost of debt of 4.78 per cent as at 31 March 2022, which reflects:

- BBB credit rating;
- 10-year term of debt;
- trailing average debt management strategy with a transition beginning in 2017/18; and
- 10 bp debt raising costs.

These parameters are consistent with clauses 19, 24, and 27 of the Undertaking.

Cost of equity and gearing

We estimate a benchmark risk free rate of 2.57 per cent using the same sources used in PoM's 2020-21 and 2021-22 TCS, which the ESC considered well-accepted.[10]

Our approach for estimating the other cost of equity parameters differs from PoM's earlier approaches, but is nevertheless consistent with clauses 18 and 20 to 22 of the Undertaking. Our approach uses:

- **0.72 asset beta and 0.90 relevered equity beta**: we calculate weekly and 4-weekly betas for our comparator sample and use only the Sharpe-Lintner CAPM (SL-CAPM) without correcting for low beta bias or giving weight to the Black CAPM or the Fama-French model (FFM), with the latter two considered not well-accepted by the ESC;[11]
- **6.63 per cent market risk premium (MRP)**: we assign 85 per cent weight to the 6.62 per cent estimate from historical excess returns (HER) and 15 per cent weight to the 6.68 per cent estimate from forward-looking returns:[12]
  > we assign equal weight to the Brailsford, Handley, and Maheswaran (BHM) and NERA datasets when implementing the HER, instead of placing exclusive reliance on the NERA dataset, which the ESC did not consider to be well-accepted;[13]

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[9] ESC, *Inquiry into the Port of Melbourne compliance with the pricing order*, Final report, 31 December 2021, pp 73-74.

[10] ESC, *Inquiry into the Port of Melbourne compliance with the pricing order*, Final report, 31 December 2021, pp 49-50. CEPA, *Port of Melbourne five-year review – WACC*, Final report, 17 December 2021, p 23.

[11] ESC, *Inquiry into the Port of Melbourne compliance with the pricing order*, Final report, 31 December 2021, pp 47-48. CEPA, *Port of Melbourne five-year review – WACC*, Final report, 17 December 2021, p 22, 57-60.

[12] The ESC considered that PoM's approach of placing higher weights on the Wright and DDM approaches was not well accepted. See: ESC, *Inquiry into the Port of Melbourne compliance with the pricing order*, Final report, 31 December 2021, p 58.

[13] ESC, *Inquiry into the Port of Melbourne compliance with the pricing order*, Final report, 31 December 2021, pp 56-57. CEPA, *Port of Melbourne five-year review – WACC*, Final report, 17 December 2021, pp 33-35.

> we use the NSW Independent Pricing and Regulatory Tribunal's (IPART's) current MRP estimate and DDM (dividend discount model) estimates from AER, ERA and QCA, where we calculate the mean DDM MRP for each regulator, before taking the median across the four regulators;[14] and

> we do not use the Wright approach in our estimate, which the ESC considered not well-accepted.[15]

In addition, we estimate a benchmark gearing of 0.20, which reflects the average gearing of our comparator sample. This approach is consistent with clause 23 of the Undertaking, and the ESC considered it to be well-accepted.[16]

Using the above parameters, we estimate 8.54 per cent per cent cost of equity for the benchmark efficient port.

Our alternative sample generates a benchmark asset beta of 0.71 and benchmark gearing of 0.21, which is not materially different from the asset beta and gearing derived from our preferred sample. This results in an alternative cost of equity of 8.53 per cent, which is in line with the estimated cost of equity in our preferred sample.

Tax rate and gamma

PoM estimates a gamma of 0.50 for its 2021-22 TCS.[17] The ESC's analysis concluded that PoM's 0.50 gamma estimate is consistent with well accepted approaches for 2019-20 and 2020-21, while the corresponding gamma estimate is 0.45 for 2017-18 and 2018-19.[18]

We have retained PoM's 0.50 gamma estimate for this report, which is calculated as the product of:

• 0.625 utilisation rate; and

• 0.8 distribution rate.

This approach is consistent with clause 22 of the Undertaking.

We adopt a corporate tax rate of 30 per cent, consistent with Australian legislation.[19]

Weighted average cost of capital

Based on the discussion in the previous sections, we estimate a pre-tax nominal WACC estimate of 8.99 per cent using approaches that we consider to be well accepted.

The Inquiry included a comparison of PoM's 2020-21 WACC parameters against the estimates for selected regulated transport infrastructure businesses. We consider this line of reasoning to be flawed because industry specific WACC parameters are not directly comparable across industries with substantially different characteristics and across different time periods, while cost of debt estimates are affected by the date of the transition to the trailing average.

Furthermore, we note that clause 4.3 of the Pricing Order focuses on the use of 'well accepted approaches', instead of a 'well accepted WACC estimate', while clause 4.1.1 stipulates that the estimated rate of return

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[14] The ESC finds that PoM did not correctly implement the DDMs that IPART and ERA use. See: ESC, *Inquiry into the Port of Melbourne compliance with the pricing order*, Final report, 31 December 2021, p 57.

[15] ESC, *Inquiry into the Port of Melbourne compliance with the pricing order*, Final report, 31 December 2021, p 54. CEPA, *Port of Melbourne five-year review – WACC*, Final report, 17 December 2021, p 36.

[16] ESC, *Inquiry into the Port of Melbourne compliance with the pricing order*, Final report, 31 December 2021, pp 72-73. CEPA, *Port of Melbourne five-year review – WACC*, Final report, 17 December 2021, p 75.

[17] Synergies, *Determining a WACC estimate for Port of Melbourne*, May 2021, p 63.

[18] ESC, *Inquiry into the Port of Melbourne compliance with the pricing order*, Final report, 31 December 2021, p 81.

[19] ATO, https://www.ato.gov.au/Rates/Company-tax/, accessed 17 March 2022.

should be 'commensurate with that which would be required by a benchmark efficient entity providing services with a similar degree of risk'.

As such, we consider that this analysis cannot be used to determine whether PoM's overall WACC estimate reflects a commensurate return, since it compares PoM's WACC estimates against other entities that may not provide services with a similar degree of risk. Instead, in this report we have focused our analysis on identifying and applying well accepted approaches for estimating the WACC, which ensures that the overall WACC estimate is commensurate with that required by a benchmark efficient entity providing services with a similar degree of risk of risk.

Table 1 presents our estimates of the individual WACC parameters for PoM's 2022-23 TCS and compares them to the estimates from PoM's 2021-22 TCS. The formula we use to calculate the pre-tax nominal WACC is consistent with clause 17(b) of the Undertaking.

We note that our pre-tax nominal WACC estimate of 8.99 per cent is 76 bp higher than the 8.23 per cent estimate from PoM's 2021-22 TCS. This is primarily caused by the 87 bp increase in the risk free rate from 1.70 per cent to 2.57 per cent. As Table 1 shows, had the risk free rate remained unchanged at 1.70 per cent, our pre-tax nominal WACC estimate for 2022-23 would instead have been 8.26 per cent, which is 3 bp higher than the corresponding 8.23 per cent estimate from PoM's 2021-22 TCS.

Table 1: Weighted average cost of capital estimates

	Parameter	2021-22 TCS	HoustonKemp 2022-23	HoustonKemp 2022-23, risk free rate unchanged	Formula
(a)	Return on debt (including debt raising costs)	4.90%	4.78%	4.69%	Rounded to two decimal places.
(b)	Return on equity	8.24%	8.54%	7.78%	(b1) + (b2) × (b3)
(b1)	- risk free rate	1.70%	2.57%	1.70%	Rounded to two decimal places.
(b2)	- MRP	6.54%	6.63%	6.76%	Rounded to two decimal places.
(b3)	- equity beta	1.0[20]	0.90	0.90	(b3b) ÷ (1 − (c))
(b3b)	- asset beta	0.70	0.72	0.72	Rounded to two decimal places.
(c)	Gearing	30%	20%	20%	Rounded to nearest percentage point.
(d)	Tax rate	30%	30%	30%	
(e)	Gamma	0.50	0.50	0.50	(e1) × (e2)
(e1)	- utilisation rate	0.625	0.625	0.625	
(e2)	- distribution rate	0.8	0.8	0.80	
	Pre-tax nominal WACC	**8.23%**	**8.99%**	**8.26%**	$(c) \times (a) + \dfrac{(1-(c)) \times (b)}{1-(d) \times (1-(e))}$

Source: Synergies, Determining a WACC estimate for Port of Melbourne, May 2021, pp 3-4, 65; HoustonKemp analysis. We round the parameter estimates to two decimal places before inserting them into the formulae shown in the rightmost column without subsequently rounding the intermediate steps, ie, the equity beta, return on equity, and gamma estimates are unrounded.

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[20] ESC, *Inquiry into the Port of Melbourne compliance with the pricing order*, Final report, 31 December 2021, pp 41-44.

1. Introduction

This report has been prepared at the request of Herbert Smith Freehills (HSF) to provide the Port of Melbourne (PoM) with an independent estimate of the weighted average cost of capital (WACC) consistent with clause 4.3 of the Pricing Order made under section 49A of the *Port Management Act 1995* (Vic) (PMA).

The rate of return is an input to the accrual building block model (ABBM) that PoM uses to derive its annual revenue requirement. We understand that our WACC estimates from this report will inform PoM's Tariff Compliance Statement (TCS) for 2022/23, which will be submitted to the Victorian Essential Services Commission (ESC).

Importantly, the Pricing Order states that PoM as the Port Licence Holder must apply an accrual building block methodology over the regulatory period that includes:[21]

> an allowance to recover a return on its capital base, commensurate with that which would be required by a benchmark efficient entity providing services with a similar degree of risk as that which applies to the Port Licence Holder in respect of the provision of the Prescribed Services…

The Pricing Order also requires PoM to apply a pre-tax, nominal rate of return that uses:[22]

> … one or a combination of well accepted approaches that distinguish the cost of equity and debt, and so derive a weighted average cost of capital.

We estimate an 8.99 per cent pre-tax nominal WACC as at 31 March 2022 using methods that we consider well-accepted. This estimate is 76 basis points (bp) higher than the 8.23 per cent estimate from PoM's 2021-22 TCS, which is primarily caused by the 87 bp increase in the risk free rate.[23]

We have derived the individual WACC parameters after reviewing precedent from regulators in Australia and New Zealand, including the ESC. In particular, we have reviewed the ESC's 2021 inquiry into PoM's compliance with the Pricing Order (the Inquiry),[24] as well as the advice from the ESC's consultants, Cambridge Economic Policy Associates (CEPA).[25]

We have also considered the recent judgment of the WASC that determines the WACC estimate for Perth Airport as at 30 June 2018.[26]

The approach we adopt is also consistent with PoM's undertaking to the ESC Minister (the Undertaking).[27]

1.1 Instructions

We attach a copy of our detailed instructions as Annexure A. In summary, we have been asked to prepare an independent expert report addressing the following matters:

1. an estimate for PoM's weighted average cost of capital, which must:

    – use one or a combination of well accepted approaches that distinguish the cost of equity and debt, and so derive a weighted average cost of capital; and

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[21] Victoria Government Gazette, *Port Management Act 1995 (Vic.) Pricing Order*, No. S 201, 24 June 2016, para 4.1.1(a).

[22] Victoria Government Gazette, *Port Management Act 1995 (Vic.) Pricing Order*, No. S 201, 24 June 2016, paras 4.3.1-4.3.2.

[23] Port of Melbourne, *2021 – 2022 Tariff Compliance Statement*, General statement, 31 May 2021, p 8.

[24] ESC, *Inquiry into the Port of Melbourne compliance with the pricing order*, Final report, 31 December 2021.

[25] CEPA, *Port of Melbourne five-year review – WACC*, Final report, 17 December 2021.

[26] *Perth Airport Pty Ltd v Qantas Airways Ltd [No 3]* [2022] WASC 51 para 282.

[27] Port of Melbourne, *Undertaking to the Essential Services Commission Minister*, April 2022.

    –   be determined on a pre tax, nominal basis;

2.   estimates for the following parameters and WACC components:

    –   risk free rate;

    –   beta;

    –   gearing;

    –   market risk premium (MRP);

    –   gamma; and

    –   cost of debt.

For the purposes of your report, you are to make the assumption that a 'well accepted approach' means an approach which is consistent with the principles and approach that regulators and courts in Australia and New Zealand have adopted in similar regulatory contexts and implemented consistently with those principles and that approach.

1.2 Experience and qualifications

In this section, we provide a summary of our experience and qualifications.

<u>Brendan Quach</u>

Brendan has worked as a consulting economist, specialising in network economics and finance in Australia, New Zealand and Asia Pacific region. Over a period exceeding 19 years, Brendan has advised clients on the application of regulatory principles to airports, ports, telecommunications electricity transmission and distribution networks, water networks and gas pipelines. He has provided advice on application of the building block approach, incentive mechanisms, operating and capital allowances, financing, pricing and asset valuation to businesses, a regulators and governments.

Brendan is a specialist in the cost of capital for use in regulatory price reviews and contract arbitrations. He has authored reports on all aspects of the cost of capital including equity estimation techniques, the impact of tax imputation credits, and estimating benchmark debt costs.

Brendan holds a Bachelor of Economics and a Bachelor of Laws, both from the Australian National University.

<u>Johnathan Wongsosaputro</u>

Johnathan is an economist with seven years' experience working on a wide range of regulatory projects, with a particular focus on cost of capital issues. Johnathan has advised clients in several jurisdictions, including Australia, New Zealand, Fiji, and Singapore. These clients span a wide range of sectors, including energy, telecommunications, radio broadcasting, and intellectual property.

Prior to joining HoustonKemp, Johnathan was a Senior Economist with the Competition Economists Group. Johnathan graduated from the University of Sydney with first class honours in econometrics and a Bachelor of Laws. He also holds a Graduate Diploma in Legal Practice from the University of Adelaide and a Graduate Certificate in Data Engineering from the Australian National University.

Acknowledgement

In preparing this report we have been provided with a copy of:

- Form 44A to the Supreme Court (General Civil Procedure) Rules 2015, the Expert Witness Code of Conduct (Code of Conduct); and

- Victorian Civil & Administrative Tribunal Practice Note – PNVCAT2, Expert Evidence (Practice Note).

We acknowledge that:

- we have read and understood the Code of Conduct and the Practice Note, and agree to be bound by them; and
- our opinions set out here are based wholly or substantially upon our specialised knowledge.

We have been assisted in the preparation of this report by our colleagues Adrian Kemp, Elaine Luc and Zoe Odgers. Notwithstanding this assistance, the opinions in this report are our own, and we take full responsibility for them.

1.3   Structure of the report

We have structured this report as follows:

- section 2 discusses PoM's regulatory framework and the meaning of 'one or a combination of well accepted approaches';
- section 3 sets out our approach for identifying an appropriate comparator sample for the purpose of estimating industry-specific WACC parameters;
- section 4 sets out our approach for estimating the benchmark cost of debt parameters;
- section 5 sets out our approach for estimating the benchmark gearing and the cost of equity parameters;
- section 6 sets out our estimates of the benchmark corporate tax rate and gamma;
- section 7 calculates the benchmark weighted average cost of capital; and
- in section 8, we provide our declaration in accordance with the requirements of the Code of Conduct and the Practice Note.

Also attached to this report are the following appendices:

- appendix A1 sets out the list of firms in our comparator samples;
- appendix A2 sets out our calculations of industry-specific parameters based on the comparator samples;
- appendix A3 sets out our approach for deriving DDM MRP estimates; and
- appendix A4 sets out our approach for estimating MRP based on historical excess returns.

A copy of our detailed instructions from HSF is attached as Annexure A

2. Meaning of 'one or a combination of well accepted approaches'

The Pricing Order sets out principles that must be used when estimating PoM's return on capital. This includes the requirement that the rate of return on capital allowance must be 'commensurate with that which would be required by a benchmark efficient entity providing services with a similar degree of risk as that which applies to the Port Licence Holder in respect of the provision of the Prescribed Services'.

The Pricing Order also states that the rate of return estimate must be determined on a pre-tax, nominal basis that reflects 'one or a combination of well accepted approaches' with separate estimates for the costs of equity and debt.

The ESC's Statement of Regulatory Approach (SoRA) defines well accepted approaches as ones that are broadly recognised for estimating an efficient regulatory return on capital for a benchmark efficient entity, which may be informed by the views and practices of regulators and other regulatory economic professionals.

The Inquiry states that PoM's estimated WACC was approximately 200 bp higher on average than the ESC's benchmark estimates. In reaching this conclusion, the ESC assessed whether an approach is 'well accepted' based on its adoption by Australian regulators. The ESC also stated that the use of a 'well accepted' approach requires maintaining consistency with both the methodology and implementation of the approach.[28]

HSF has instructed us that for the purposes of this report we are to assume that a 'well accepted approach' means an approach which is consistent with the principles and approach that regulators and courts in Australia and New Zealand have adopted in similar regulatory contexts and implemented consistently with those principles and that approach.

We note that there have been several updates to Australian regulatory precedent since the Inquiry, including discussion papers or WACC reviews by five regulators and a judgment issued by the WASC. We refer extensively to this recent precedent in our discussion of WACC parameters, but continue to assign weight to the existing methods that other regulators apply.

2.1   Port of Melbourne's regulatory framework

PoM operates under a regulatory framework set out in the PMA and Pricing Order made pursuant to section 49 of the PMA and implemented by the ESC.

The Pricing Order sets out the regulatory framework for setting the maximum allowable tariffs of PoM's prescribed services, which include:[29]

- wharfage fees;
- channel fees;
- hire fees; and
- other fees, ie, tanker inspection, other gangway hire, and wharf inspection.

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[28] ESC, *Inquiry into the Port of Melbourne compliance with the pricing order*, Final report, 31 December 2021, p 38.

[29] Port of Melbourne, *Reference Tariff Schedule: effective 1 July 2021*, 2021.

These maximum allowable tariffs are derived from PoM's ABBM, which calculates aggregate required revenues as the sum of five components:[30]

- return on capital;

- return of capital;

- recovery of previously unrecovered depreciation;

- forecast operating expenses; and

- indexation allowance (negative).

Clauses 4 and 8 of the Pricing Order set out the principles that must be used when estimating PoM's return on capital, namely that:

- the return on capital allowance must be 'commensurate with that which would be required by a benchmark efficient entity providing services with a similar degree of risk as that which applies to the Port Licence Holder in respect of the provision of the Prescribed Services';

- the rate of return estimate must be derived from 'one or a combination of well accepted approaches that distinguish the cost of equity and debt, and so derive a weighted average cost of capital' that must be determined on a pre-tax, nominal basis; and

- forecasts and estimates must be derived reasonably and must 'represent the best forecast or estimate possible in the circumstances'.

2.2   ESC's interpretation of a 'well accepted' approach

The ESC discusses its interpretation of a 'well accepted' approach in:

- its SoRA; and

- the Inquiry.

2.2.1   Statement of Regulatory Approach

The ESC published the SoRA in April 2020 that provides guidance on how PoM may demonstrate compliance with the Pricing Order.[31]

The SoRA also sets out the following three-step process for assessing whether PoM has complied with the Pricing Order and the objectives of the regulatory regime:[32]

- assess whether the approach or approaches used by the port to determine the allowed rate of return are 'well accepted';

- assess whether the return on capital outcomes determined by the port, when calculating the aggregate revenue requirement, are commensurate with the return required by a benchmark efficient entity with a similar degree of risk as that which applies to the port in respect of providing prescribed services; and

- assess whether the port's approach is consistent with the Pricing Order and the objectives of the regulatory regime.

The SoRA defines well accepted approaches as ones that are broadly recognised for estimating an efficient regulatory return on capital for a benchmark efficient entity:[33]

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[30] See: Port of Melbourne, *2021-22 Tariff Compliance Statement | General statement*, 31 May 2021, p 8.

[31] ESC, *Statement of Regulatory Approach – version 2.0*, Port of Melbourne pricing order, 28 April 2020.

[32] ESC, *Statement of Regulatory Approach – version 2.0*, Port of Melbourne pricing order, 28 April 2020, pp 22-23.

[33] ESC, *Statement of Regulatory Approach – version 2.0*, Port of Melbourne pricing order, 28 April 2020, p 21.

We consider that the requirement to use 'one or a combination of well accepted approaches' is likely to be satisfied where that approach is, or approaches are, broadly or generally recognised as being used, or appropriate for use, to estimate a return on capital in the context of an economic regulatory regime which has objects such as efficiency and principles such as that a regulated service provider should be provided with a return commensurate with a benchmark efficient entity providing services with a similar degree of risk.

The SoRA also states that the views and practices of regulators and other professionals involved in economic regulation may be informative in assessing whether an approach is well accepted:[34]

In looking at whether an approach is generally recognised as being used, or appropriate for use, in the terms set out above, the views and practices of practitioners in the area of economic regulation may be informative. This would include the views of regulators and other professionals engaged in the practice of economic regulation in regimes similar to that applying to the port. These other professionals might include academics, economists and finance practitioners.

2.2.2   ESC inquiry into PoM's compliance with the Pricing Order

PoM adopted pre-tax WACC estimates of 8.23 per cent and 8.93 per cent in its 2021-2022 and 2020-2021 TCS respectively.[35]

However, in the Inquiry, the ESC stated that:[36]

1. 'there has been non-compliance with the Pricing Order', which is driven by PoM's estimated WACC being approximately 200 basis points higher on average compared to the ESC's benchmark estimates;

2. PoM's annual revenue requirement is overstated by $304.0 million compared to the high WACC scenario, and by $656.1 million compared to the low WACC scenario, over the years 2016/17 to 2020/21; and

3. 'the non-compliance was non-compliance in a significant and sustained manner'.

In reaching this conclusion, the ESC stated:[37]

A 'well accepted' approach will be 'used' where the application of the approach is faithful to its methodology and the determination of any relevant inputs to that methodology (that is, the implementation of the methodology). That is, the 'use' of a 'well accepted' approach requires adherence to the methodology and principles underpinning the approach, appropriately allowing for any differences that arise from the particular regulated services under consideration (in the case of the Port's, prescribed services).

The ESC also assessed whether an approach is 'well accepted' based on its adoption by Australian regulators. For example, the ESC:

•   rejected the use of the Wright method for estimating the MRP, while recognising that two regulators gave weight to the method from 2016-17 to 2018-19;[38] and

•   rejected the use of market valuation studies for implementing the utilisation approach when estimating gamma, even though one regulator, the NSW Independent Pricing and Regulatory Tribunal (IPART) uses it.[39]

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[34] ESC, *Statement of Regulatory Approach – version 2.0*, Port of Melbourne pricing order, 28 April 2020, p 21.

[35] Port of Melbourne, *2021 – 2022 Tariff Compliance Statement*, General statement, 31 May 2021, p 41. Port of Melbourne, *2020 – 2021 Tariff Compliance Statement | General statement*, 31 May 2020, p 7.

[36] ESC, *Inquiry into the Port of Melbourne compliance with the pricing order*, Draft report, 26 October 2021, pp 3-6, 21.

[37] ESC, *Inquiry into the Port of Melbourne compliance with the pricing order*, Final report, 31 December 2021, p 38.

[38] ESC, *Inquiry into the Port of Melbourne compliance with the pricing order*, Final report, 31 December 2021, pp 54, 56.

[39] ESC, *Inquiry into the Port of Melbourne compliance with the pricing order*, Final report, 31 December 2021, p 81.

Similarly, CEPA considered that:

- an approach must have wide acceptance in order to be 'well accepted';[40]

- Australian precedent is more useful for assessing whether an approach is well accepted, although CEPA also reviewed the approaches used by international regulators where relevant;[41] and

- an approach adopted by an Australian regulator may not be well accepted if it is 'markedly different' from all other Australian regulatory approaches.[42]

Table 2.1 sets out CEPA's assessment of PoM's approach for estimating each WACC parameter, which we reproduce from table 2.3 of CEPA's report.

Table 2.1: CEPA's assessment of PoM's WACC approach

	PoM's approach	CEPA's review
Cost of equity approach	In the most recent 2020-21 TCS, PoM places 100% weight on the Sharpe-Linter Capital Asset Pricing Model (SL-CAPM). However, in the preceding TCS, some weight has been placed on the Black CAPM and Fama French Model (FFM).	Only the SL-CAPM is a well accepted methodology. The reliance placed on SL-CAPM by PoM in the 2020-21 TCS is well accepted by regulators. The reliance placed on the Black CAPM and the FFM in earlier years is not well accepted. Parts of PoM's implementation relating to individual SL-CAPM parameters are not well accepted, as noted below.
Risk-free rate	PoM has consistently applied a 20-day average of 10-year Commonwealth Government bond yields.	PoM's methodology and implementation is well accepted.
Market risk premium (MRP)	Over the five-year review period, PoM has placed varying degrees of weight on three approaches to estimating the MRP: historical excess returns (HER); the Wright method; and dividend discount models (DDMs).	PoM's methodologies (HER, Wright and DDMs) are well accepted. However, PoM has combined and implemented these methodologies in a way that is not well accepted, leading to MRP estimates outside the range of well accepted approaches across the entire review period.
Beta	PoM has varied the comparator sample that it uses to estimate the asset beta over time. In all periods, PoM has used comparators who are not port operators. This includes railway comparators (all years) and airports (2017-18 and 2018-19 TCS). PoM has adopted a variety of approaches to filtering the comparator sample, including minimum market capitalisation filters.	PoM's methodology for constructing a comparator sample (i.e. seeking to identify comparators with similar systematic risk exposure to the Port) is well accepted. Parts of PoM's implementation are not well accepted, including reliance on non-industry specific comparators, lack of an appropriate country filter and emphasis on monthly rather than weekly returns for estimation.
Gearing	Across the review period, PoM has used (i) the midpoint of gearing ratios for investment grade comparators and (ii) gearing ratios for Australian port privatisations.	PoM's methodology of examining credit ratings of comparators is well accepted. Parts of PoM's implementation are not well accepted, including its selection of comparators, referring only to investment grade comparators, and placing emphasis Australian port acquisitions.
Notional credit rating	PoM has adopted a notional BBB credit rating in all years, based on its asset beta comparator sample.	PoM's methodology for examining credit ratings of comparators is well accepted. Using an investment grade (BBB) credit rating is well accepted.
Debt risk premium	PoM uses Bloomberg/RBA data to construct a cost of debt for a BBB rated entity, using a 10-year term to maturity. PoM has implemented a 10-year transition to a 10-year trailing average.	PoM's methodology and implementation are well accepted.
Debt raising costs	PoM has proposed debt raising costs based on evidence gathered by PwC for Australian corporates.	PoM's methodology and implementation are well accepted.
Gamma	PoM places one-third weight on a zero value for gamma. In the 2020/21 TCS, the remaining two-thirds weight was placed on the equity ownership approach. In all previous TCS, the remaining weight was divided between two versions of the utilisation approach: equity ownership and market valuation studies.	PoM's application of the utilisation approach based on equity ownership is well accepted. However, the utilisation approach based on market valuation studies is not well accepted. PoM's use of a zero gamma value is also not well accepted.

Source: CEPA, Port of Melbourne five-year review – WACC, Final report, 17 December 2021, p 11 [Table 2.3].

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[40] CEPA, *Port of Melbourne five-year review – WACC*, Final report, 17 December 2021, p 6.

[41] CEPA, *Port of Melbourne five-year review – WACC*, Final report, 17 December 2021, pp 6-7, 10.

[42] CEPA, *Port of Melbourne five-year review – WACC*, Final report, 17 December 2021, p 41.

2.3 Adopting 'well accepted' approaches

We note the following when adopting a 'well accepted' approach:

- there are different levels of regulatory precedent when estimating market wide parameters versus industry specific parameters; and

- it is important to maintain internal consistency when estimating different WACC parameters.

2.3.1 Market wide parameters versus industry specific parameters

Market wide parameters can be applied to all regulated firms across different industries. As such, when estimating market wide parameters, there is a wide range of relevant regulatory precedent available.

However, PoM's economic characteristics as the owner and operator of container port infrastructure and its regulatory framework under the PMA and Pricing Order are unique among regulated firms in Australia and New Zealand. Consistent with this, the SoRA recognises some of the problems associated with estimating industry-specific parameters for PoM, given its unique characteristics:[43]

> We note that no firms in Australia supply services having all of these characteristics. As a result, we recognise that the port may need to use comparator firms that supply services which do not have all of these characteristics. We would expect any comparators used to estimate weighted average cost of capital parameters would have risk characteristics as close as possible as those faced by the port. We would expect the port to provide reasoning for its use of comparators and how their risk characteristics have been interpreted and adjusted to calculate its statistical estimates of equity beta (and gearing).

A verbatim application of the approaches that Australian regulators use to estimate industry specific parameters may thus result in a WACC estimate that is inconsistent with clause 4.1.1 of the Pricing Order, ie, the estimated rate of return will not be commensurate with that which would be required by a benchmark efficient entity providing services with a similar degree of risk.

For these parameters (gearing, credit rating, term of debt, asset beta and equity beta), we identify a 'well accepted' approach as one that is consistent with the general principles that regulators and courts in Australia and New Zealand adopt when estimating them.

We consider it well accepted among regulators and courts in Australia and New Zealand that the benchmark estimates for industry specific parameters should be set with reference to two methods, namely:

- referring to regulatory precedent, whereby there is a preference for maintaining the existing benchmark; and/or

- referring to estimates derived from a suitable sample of comparator firms.

One example of the first method is the longstanding adoption of a ten-year debt term by most Australian regulators. In particular, one of the Australian Energy Regulator's (AER's) reasons for maintaining the ten-year debt term is that it has adopted the same debt term across multiple regulatory periods and values the regulatory certainty associated with it.[44]

An example of the second method is that Australian regulators often update their asset beta estimates at the beginning of each regulatory period after considering a range of evidence, including updated estimates from a sample of comparators.

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[43] ESC, *Statement of Regulatory Approach – version 2.0*, Port of Melbourne pricing order, 28 April 2020, p 22.

[44] AER, *Rate of return – Term of the rate of return & Rate of return and cashflows in a low interest rate environment*, Final working paper, September 2021, p 62.

2.3.2 Importance of maintaining internal consistency among different WACC parameters

We consider it important to maintain internal consistency among WACC parameters estimates. This is important because interrelationships often exist between WACC parameters, such that various WACC parameter estimates tend to be correlated. These correlations often will not be correctly accounted for if different WACC parameters are estimated in an internally inconsistent manner.

In particular, assessing each WACC parameter separately increases the risk of introducing internal inconsistencies across WACC parameters. Such inconsistencies may arise because of:

- inappropriately estimating different parameters over different time periods, such as pairing a short term prevailing parameter estimate with a long term historical estimate for another parameter; and

- inappropriately comparing individual WACC parameters with regulatory precedent without adjusting for other related parameters.

One example of the first dot point is that several Australian regulators pair a prevailing risk free rate with a historical MRP that is calculated over several decades. This approach does not maintain internal consistency between time periods, which the WASC cites as a reason for accepting IPART's WACC approach.[45]

Furthermore, the WASC accepts that one benefit of IPART's approach is its preservation of internal consistency across time periods and its regard to both short and long term estimates.[46] We agree with the WASC, and as such consider IPART's approach to be our preferred approach.

Nevertheless, for the purpose of applying a well accepted approach to estimate the WACC for the benchmark efficient port, we proceed largely along the approach adopted by the ESC and CEPA, where we separately assess the estimation approaches for each parameter.

2.4 Regulatory developments since the ESC's Inquiry

There have been a number of updates to Australian regulatory precedent since the Inquiry:[47]

- the AER has published a series of working papers that set out its positions on various issues relevant to its forthcoming 2022 rate of return instrument (RoRI), including its omnibus final working paper;

- the Western Australian Economic Regulation Authority (ERA) has released a discussion paper for its 2022 gas RoRI;

- the Queensland Competition Authority (QCA) has published its rate of return review setting out its approach for determining the WACC for future regulatory determinations;

- the ACT Independent Competition and Regulatory Commission (ICRC) has published its final report reviewing its method for setting the WACC in the next water and sewerage services price investigation;

- the Office of the Tasmanian Economic Regulator (OTTER) has published its draft report that investigates TasWater's prices and services; and

- the WASC issued a judgment that estimates the WACC for Perth Airport, where the Court:

  > accepted IPART's approach for estimating market wide WACC parameters while adopting the AER's gamma estimate; and

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[45] *Perth Airport Pty Ltd v Qantas Airways Ltd [No 3]* [2022] WASC 51 [322], [327].

[46] *Perth Airport Pty Ltd v Qantas Airways Ltd [No 3]* [2022] WASC 51 [266], [286].

[47] AER, *Overall rate of return, equity and debt omnibus*, Final working paper, December 2021. ERA, *2022 gas rate of return instrument review*, Discussion paper, December 2021. QCA, *Rate of return review*, Final report, November 2021, pp 37-38. ICRC, *Review of methodologies for the weighted average cost of capital*, Final report, April 2021, p 1. OTTER, *Investigation into TasWater's prices and services for the period 1 July 2022 to 30 June 2026*, Draft report, February 2022. *Perth Airport Pty Ltd v Qantas Airways Ltd [No 3]* [2022] WASC 51 [187], [190]-[191], [266]-[267], [327]-[330], [335]. New Zealand Commerce Commission, *Input methodologies review decisions*, Topic paper 4: Cost of capital issues, 20 December 2016.

> relied substantially on the NZCC's approach for deriving a comparator sample that is then used to estimate industry specific WACC parameters.

Our discussion of the WACC parameters in subsequent sections refers extensively to the above precedent. We do not repeat the precedent that the ESC and CEPA have summarised as part of the Inquiry.

However, our assessment of 'well accepted' approaches continues to assign weight to the existing methods that these regulators apply when estimating the WACC. Specifically, our assessment of 'well accepted' approaches also considers:[48]

- IPART's 2018 WACC review;

- the Essential Services Commission of South Australia's (ESCOSA's) 2020 regulatory determination for SA Water;[49] and

- the Australian Competition and Consumer Commission's (ACCC's) 2019 decision on Australian Postal Corporation's price notification.

We have not identified a recent and comprehensive WACC decision by the Utilities Commission (NT), although we note that the Utilities Commission adopts the AER's nominal WACC in a 2019 decision.[50]

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[48] IPART, *Review of our WACC method*, Final Report, February 2018. ESCOSA, *SA Water regulatory determination 2020*, Final determination: statement of reasons, June 2020. ACCC, *Decision on Australian Postal Corporation 2019 price notification*, December 2019.

[49] The ESC and CEPA referred to ESCOSA's draft decision for SA Water. ESCOSA has since published its final decision, where the rate of return methodology is mostly unchanged, except that the final decision: considers that annual updates are precluded by the Pricing Order; and increases the equity beta from 0.65 to 0.67 after reviewing Australian regulatory precedent and as a recognition of the higher forecast risks associated with removing annual updates. See: ESCOSA, *SA Water regulatory determination 2020*, Final determination: statement of reasons, June 2020, pp 208-209, 221-223.

[50] Utilities Commission of the Northern Territory, *2019 system control charges review*, Final decision, 30 April 2019, p 13.

3. Comparator sample

Consistent with clause 4.1.1(a) of the Pricing Order, we construct a comparator sample of companies with similar systematic risks to that of the benchmark efficient port. We use this sample as a source of estimates for industry specific WACC parameters, in that we:

- derive the benchmark asset beta and gearing based on the comparator sample; and

- cross-check the existing benchmark credit rating against the comparator sample.

In line with clause 25(c) of the Undertaking, we first use Bloomberg's equity screening function (EQS) to identify a wide set of potential comparators, before narrowing the sample by applying filters for market capitalisation and liquidity. Finally, we analyse the remaining companies manually to remove those that do not own and operate container port and channel infrastructure, including by reviewing their Bloomberg descriptions and carrying out desktop research.

We do not apply a country filter when identifying comparators. However, we note that filtering to select only Developed and Advanced Emerging countries does not materially change the asset beta of our comparator sample.

We identify two samples:

- our preferred sample of 24 firms that own and operate container port and channel infrastructure, and whose revenues are primarily derived from container port operations; and

- an alternative sample of 30 firms that further includes firms who own and operate container port and channel infrastructure, but who also derive substantial revenues from activities unrelated to container port operations.

We also conduct a sensitivity analysis on our asset beta estimates by removing from the preferred and alternative samples each of the following sets of firms:

- set of firms with China as a country of domicile;

- set of firms with China as a country of risk; and

- set of firms with developing country risk.

Our sensitivity analysis suggests that our asset beta point estimate is robust to the above changes, with a sensitivity range of 0.70 to 0.72 compared to our 0.72 point estimate.

3.1 Approach for identifying potential comparators

In line with clause 25(c) of the Undertaking, we identify potential comparators by running Bloomberg's EQS for active companies that:[51]

- the Bloomberg Industry Classification Systems (BICS) classifies as 'Port & Harbour Operations'; and

- the Global Industry Classification Standard (GICS) classifies as 'Marine Ports & Services'.

This generates an initial sample of 186 unique tickers.

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[51] We restrict our EQS search to only show the primary security of a company.

3.1.1   Filters for narrowing the comparator sample

We use two filters for narrowing the comparator sample:

- a market capitalisation filter that omits comparators with a market capitalisation that is smaller than USD 100 million as at 31 March 2022; and

- a liquidity filter that omits comparators:[52]

  > with an average bid-ask spread that exceeds 1 per cent over the averaging period; or

  > that were not traded on more than 20 per cent of available trading days.

CEPA observed that Australian regulatory precedent shows mixed support for an explicit market capitalisation threshold, but notes that an implicit threshold may exist.[53] CEPA adopted the same USD 100 million market capitalisation filter, while Synergies and Incenta applied a USD 200 million minimum threshold.[54]

CEPA also found mixed support for a liquidity filter, but ultimately concludes that the approach to be used should reflect the method that generates the best estimate of the beta of a benchmark efficient operator.[55] CEPA used the same liquidity filter that we use, while Incenta's liquidity filter excluded firms with a free float less than USD 100 million.[56]

We note that after the ESC's final report was published, the WASC's judgment for Perth Airport has since accepted that it is appropriate to exclude illiquid and delisted firms from the comparator sample,[57] where illiquid firms were identified as having bid-ask spreads that exceed 1 per cent on average.

We do not apply a country filter when identifying comparators. While CEPA observed that Australian regulators often imposed limits on the countries from which comparator firms can be drawn, CEPA also found that there was no unified framework for doing so,[58] although the ESC concluded that the practice of filtering the sample for FTSE Developed and Advanced Emerging countries was well accepted.[59]

In addition, the WASC's judgment for Perth Airport rejects the view that the comparator sample should be restricted to companies with similar country risks. Instead, the WASC accepts a sample based on the NZCC's comparator sample that does not apply a country filter.[60]

We note that filtering to select only Developed and Advanced Emerging countries does not materially change the asset beta of our comparator sample.

Having considered the regulatory precedent, we consider it well-accepted to apply filters for market capitalisation and liquidity without applying a country filter. These filters reduce the number of potential comparators to 48 for a five-year sample and 42 for a ten-year sample.

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[52] The liquidity filter will omit different companies for different averaging periods. For example, a company with an average bid-ask spread that exceeds 1 per cent from 2012 to 2017 but less than 1 per cent from 2012 to 2022 will be omitted when estimating gearing and asset beta for the former period but will not be omitted from the latter period.

[53] CEPA, *Port of Melbourne five-year review – WACC*, Final report, 17 December 2021, p 51.

[54] CEPA, *Port of Melbourne five-year review – WACC*, Final report, 17 December 2021, pp 46-47, 55.

[55] CEPA, *Port of Melbourne five-year review – WACC*, Final report, 17 December 2021, p 51.

[56] CEPA, *Port of Melbourne five-year review – WACC*, Final report, 17 December 2021, pp 46-47, 55.

[57] *Perth Airport Pty Ltd v Qantas Airways Ltd [No 3]* [2022] WASC 51 [266].

[58] CEPA, *Port of Melbourne five-year review – WACC*, Final report, 17 December 2021, p 48.

[59] ESC, *Inquiry into the Port of Melbourne compliance with the pricing order*, Final report, 31 December 2021, pp 64-65.

[60] The WASC removes six illiquid and delisted airports from the NZCC's sample, as well as omitting one additional company that is not an appropriate comparator. See: *Perth Airport Pty Ltd v Qantas Airways Ltd [No 3]* [2022] WASC 51 [265]-[267]. New Zealand Commerce Commission, *Input methodologies review decisions*, Topic paper 4: Cost of capital issues, 20 December 2016, pp 119-120 [458]-[467].

We note that the ESC considered that filters for market cap and liquidity can be used to derive a better beta estimate, but PoM has not applied such filters consistently over the review period.[61] We agree with the ESC that the filters should be applied consistently over the review period instead of being changed in each year.

3.1.2 Manually identifying appropriate comparators

We manually identify appropriate comparators by:

- reviewing Bloomberg descriptions of each company;
- assessing the breakdown of each company's revenues by segment; and
- carrying out desktop research such as reviewing company websites, annual reports, and investor presentations.

Our objective in carrying out the above steps is to identify firms that are comparable to the benchmark efficient port, in that they own and operate container port and channel infrastructure. We do not include infrastructure firms from other industries, which we consider to be less comparable to the benchmark efficient port, and whose inclusion will not result in the best estimate of the beta of the benchmark efficient operator.

This approach is consistent with:

- the guidance from the SoRA that requires comparator firms to be sufficiently comparable to the benchmark efficient port, and that any differences must be accounted for and explained appropriately;[62]
- the ESC's conclusion in the Inquiry that the practice of including out-of-sector comparators cannot be justified on the basis of increasing the sample size;[63]
- CEPA's observation that there is more limited regulatory support for including comparators outside the sector of the firm being regulated.[64]

Our final preferred sample contains 22 firms for our five-year estimates and 18 firms for our ten-year estimates, all of which derive their revenues primarily from container port operations.[65] We also identify an alternative larger sample that further includes firms that derive substantial revenues from activities unrelated to container port operations, consisting of 28 firms for our five-year estimates and 23 firms for our ten-year estimates.[66] This alternative sample is used to cross check the estimated beta derived from our preferred sample.

We also conduct a sensitivity analysis on our asset beta estimates by removing from the preferred and alternative samples each of the following sets of firms:

- set of firms with China as a country of domicile;
- set of firms with China as a country of risk; and
- set of firms with developing country risk.

Our sensitivity analysis suggests that our asset beta point estimate is robust to the above changes, with a sensitivity range of 0.70 to 0.72 compared to our 0.72 point estimate.

Appendix A1 lists the comparator firms for both samples, as well as setting out our reasoning for including or excluding each potential comparator as part of our manual assessment.

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[61] ESC, *Inquiry into the Port of Melbourne compliance with the pricing order*, Final report, 31 December 2021, pp 65-66.

[62] ESC, *Statement of Regulatory Approach – version 2.0*, Port of Melbourne pricing order, 28 April 2020, p 21.

[63] ESC, *Inquiry into the Port of Melbourne compliance with the pricing order*, Final report, 31 December 2021, p 65.

[64] CEPA, *Port of Melbourne five-year review – WACC*, Final report, 17 December 2021, p 50.

[65] The five-year and ten-year samples contain 22 and 18 firms respectively. There are 24 unique firms across both samples.

[66] The five-year and ten-year alternative samples contain 28 and 23 firms respectively. There are 30 unique firms across both samples.

3.2 Comparison against approaches previously adopted by PoM and CEPA

Table 3.1 summarises the differences between our preferred approach for identifying comparator firms compared to the approaches used by CEPA, Synergies, and Incenta. Our alternative sample makes one change to our sample selection process by including firms that derive substantial revenues from activities unrelated to container port operations.

Table 3.1: Comparison of CEPA and PoM approaches for estimating equity beta

	CEPA	Synergies	Incenta	HoustonKemp preferred
Sample selection				
Comparators in other industries	Only companies providing port services	Include	Only companies undertaking core function of a port owner or port owner-operator	Only companies undertaking core function of a port owner or port owner-operator; alternative sample containing companies providing port services
Minimum market capitalisation	US$100m (applied in two out of four samples)	US$200m	US$200m	US$100m
Country filter	Developed or advanced emerging	Developed only	No filter	No filter
Liquidity filter	<20% trading days with no trading and <1% average bid-ask spread (applied in two out of four samples)	None	At least US$100m free float	<20% trading days with no trading and <1% average bid-ask spread (applied in two out of four samples)
Sample size	7 to 29	13	18	24 to 30
Estimation				
Frequency	Weekly, weekly with all weekdays and monthly	Weekly and monthly	Monthly	Weekly with all weekdays and 4-weekly with all weekdays
Debt measure for gearing	Net debt	Net debt	Long term debt	Net debt
De-levering formula	Brealey-Myers	Brealey-Myers	Harris-Pringle	Brealey-Myers

Source: CEPA, Incenta, Synergies, HoustonKemp analysis.

4. Cost of debt

The Inquiry accepted that PoM's approach for estimating the cost of debt is well-accepted.[67] We have retained most elements of PoM's approach after confirming that each parameter continues to be well-accepted and reflects the cost of debt of the benchmark efficient port.

Specifically, we calculate a benchmark cost of debt of 4.78 per cent as at 31 March 2022, which reflects:

- BBB credit rating;
- 10-year term of debt;
- trailing average debt management strategy with a transition beginning in 2017/18; and
- 10 bp debt raising costs.

These parameters are consistent with clauses 19, 24, and 27 of the Undertaking.

4.1 Credit rating

Consistent with clause 24 of the Undertaking, we assess the appropriate credit rating for the benchmark efficient port by referring to:

- regulatory precedent; and
- the median credit rating of the comparator sample.

We consider that retaining a BBB credit rating is a well-accepted approach for setting the credit rating of the benchmark efficient port.

4.1.1 Regulatory precedent that applies to PoM

PoM's 2020-21 TCS proposes a BBB credit rating, which the ESC accepted as part of its finding that PoM's cost of debt approach is well-accepted.[68] The 2021-22 TCS retains the same benchmark credit rating.[69]

CEPA noted that some Australian regulators have shifted away from the common practice of calculating the cost of debt based on data from a broad BBB corporate bond category, but agrees that:[70]

- a BBB credit rating is well accepted;
- there is insufficient evidence to assess whether a higher gearing is consistent with the assumed credit rating; and
- shifting to a higher credit rating will have a low impact on the overall WACC estimate.

There has been no major shift in credit ratings adopted by Australian regulators since the ESC's final report. In particular:

- the AER's preliminary position in its December 2021 omnibus final working paper is to not use actual energy network debt data to adjust the benchmark credit rating;[71]

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[67] ESC, *Inquiry into the Port of Melbourne compliance with the pricing order*, Final report, 31 December 2021, pp 73-74.

[68] ESC, *Inquiry into the Port of Melbourne compliance with the pricing order*, Final report, 31 December 2021, pp 73-74.

[69] Synergies, *Determining a WACC estimate for Port of Melbourne*, May 2021, p 3.

[70] CEPA, *Port of Melbourne five-year review – WACC*, Final report, 17 December 2021, pp 76-77.

[71] AER, *Overall rate of return, equity and debt omnibus*, Final working paper, December 2021, pp 70-71.

- the ERA's discussion paper for its 2022 gas RoRI maintains the BBB+ benchmark rating from its 2018 Gas Guidelines;[72] and

- the QCA's rate of return review in November 2021 states its view that the current regulatory credit rating provides an appropriate starting point that requires persuasive evidence to justify shifting away from it;[73]

- the ICRC's WACC review final report retains a BBB credit rating for water businesses in order to maintain stability in estimating the cost of debt;[74]

- OTTER's draft report on its investigation for TasWater raises the benchmark credit rating from BBB to BBB+;[75] and

- the WASC's judgment for Perth Airport adopts a BBB+ credit rating that is one notch below the A-median credit rating for the Court's preferred comparator sample.[76]

We therefore consider that regulatory precedent supports maintaining the same BBB credit rating that PoM proposed in its 2021-22 TCS, and which the ESC and CEPA both accepted.

We note that our assessment of regulatory precedent reflects the QCA's view that persuasive evidence is required to justify deviating from the benchmark credit rating that currently applies. This contrasts with CEPA's approach that reviewed the credit ratings applied by other Australian regulators, including one AA-rating that the ACCC applies to Australia Post in 2019.[77]

In principle, we consider that caution should be used when drawing comparisons between regulatory credit ratings applied to businesses in industries with substantially different characteristics. Little to no weight should be assigned to the AA- rating applied to Australia Post, whose risk profile is likely to differ considerably from that of the benchmark efficient port.

4.1.2   Median credit rating for the comparator sample

We have obtained credit ratings from the three main rating agencies for each of the comparator firms in our preferred comparator sample, where available. Only four firms in the comparator sample possess credit ratings, with a median between BBB/BBB+ and A-.

Table 4.1 shows the ratings and sources for the four comparator firms that possess credit ratings. We note that the two ratings for China Merchants Port Holdings Co Ltd (144 HK Equity) are:

- BBB rating by S&P, effective 30 October 2017; and

- BBB+ rating by Moody's, effective 29 May 2020.

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[72] ERA, *2022 gas rate of return instrument review*, Discussion paper, December 2021, pp 37-39. ERA, *Final Gas Rate of Return Guidelines Explanatory Statement*, 18 December 2018, p 114.

[73] QCA, *Rate of return review*, Final report, November 2021, pp 37-38.

[74] ICRC, *Review of methodologies for the weighted average cost of capital*, Final report, April 2021, pp 30-31.

[75] OTTER, *Investigation into TasWater's prices and services for the period 1 July 2022 to 30 June 2026*, Draft report, February 2022, pp 67-68.

[76] *Perth Airport Pty Ltd v Qantas Airways Ltd [No 3]* [2022] WASC 51 [287]-[291], [314], [335], [339].

[77] CEPA, *Port of Melbourne five-year review – WACC*, Final report, 17 December 2021, p 77. ACCC, *Decision on Australian Postal Corporation 2019 price notification*, December 2019, p 38.

Table 4.1: Comparator credit ratings

Ticker	Name	Credit ratings^	Rating sources	Government ownership
144 HK Equity	China Merchants Port Holdings Co Ltd	BBB/BBB+	S&P local currency issuer credit rating; Moody's long term rating	25.63% held by state-owned legal persons
600018 CH Equity	Shanghai International Port Group Co Ltd	A+	S&P local currency issuer credit rating; Moody's long term rating	31.36% held by Shanghai Municipal State-owned Assets Supervision and Administration Commission
ADSEZ IN Equity	Adani Ports & Special Economic Zone Ltd	BBB-	S&P local currency issuer credit rating; Moody's long term rating; Fitch senior unsecured rating	-
POT NZ Equity	Port of Tauranga Ltd	A-	S&P local currency issuer credit rating	54.14% held by Quayside Securities Limited, which is owned by Bay of Plenty Regional Council
Median		BBB/BBB+ to A-		

Source: Bloomberg; HoustonKemp analysis. ^We convert Moody's credit ratings to S&P format, such as converting Baa1 to BBB+ and Baa3 to BBB-.

Sources for government ownership: China Merchants Port Holdings Company Limited, *Quarterly report of the substantial shareholder | China Merchants Port Group Co Ltd for the nine months ended 30 September 2021*, Voluntary announcement, 29 October 2021, pp 5-6. Shanghai International Port Group Co Ltd, https://en.portshanghai.com.cn/MajorShareholders/index.jhtml#channel791, accessed 21 March 2022. Port of Tauranga, https://www.port-tauranga.co.nz/investors/share-information/, accessed 21 March 2022

Table 4.1 further shows that three of the four comparators with credit ratings have substantial government ownership, which is likely to positively bias the credit ratings of these companies.

Overall, we consider that the median credit rating from the comparator sample may not be sufficiently informative of the benchmark credit rating for the benchmark efficient port, given the small number of comparators with credit ratings and the substantial levels of government ownership among those comparators.

Consistent with our conclusion from section 4.1.1, we consider it appropriate to maintain the same BBB credit rating that PoM proposed in its 2021-22 TCS, and which the ESC and CEPA both accepted.

4.2   Term of debt

We refer to regulatory precedent when assessing the appropriate term of debt for the benchmark efficient port. Consistent with clause 27(a) of the Undertaking, we consider that setting a 10-year term of debt based on regulatory precedent is a well-accepted approach.

PoM's WACC estimate for its 2021-22 TCS adopts a 10-year term of debt, which Synergies concludes is the longest available tenor with appropriate liquidity in an Australian context.[78] The ESC found that a 10-year term is 'uncontentious within the context of Australian regulatory practice' and thus accepts the proposed term of debt.[79] CEPA agreed that a 10-year term was well accepted.[80]

There has been no major shift in the 10-year term of debt adopted by Australian regulators since the ESC's final report. In particular:

- the ERA's discussion paper for its 2022 gas RoRI maintains the 10-year benchmark debt term from its 2018 Gas Guidelines;[81]

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[78] Synergies, *Determining a WACC estimate for Port of Melbourne*, May 2021, p 57.

[79] ESC, *Inquiry into the Port of Melbourne compliance with the pricing order*, Final report, 31 December 2021, p 74.

[80] CEPA, *Port of Melbourne five-year review – WACC*, Final report, 17 December 2021, p 77.

[81] ERA, *2022 gas rate of return instrument review*, Discussion paper, December 2021, p 34. ERA, *Final Gas Rate of Return Guidelines Explanatory Statement*, 18 December 2018, p 140.

- the QCA's rate of return review in November 2021 retains the 10-year benchmark debt term;[82]

- the ICRC's WACC review final report retains the 10-year benchmark debt term;[83]

- OTTER's draft report on its investigation for TasWater retains the 10-year benchmark debt term;[84] and

- the WASC's judgment for Perth Airport adopts IPART's ten-year term of debt, which the Court considers broadly consistent with Australian regulatory precedent.[85]

We note that the AER considered departing from its assumed 10-year debt term in favour of using energy network debt data to inform the benchmark debt term.[86] Under this approach, the AER would use actual debt portfolio data from the energy networks to generate an Energy Infrastructure Credit Spread Index (EICSI), which they would then use to determine the benchmark debt term.

However, the AER has since reconsidered that approach due to practical limitations. Instead, the AER will consider the benchmark debt term further as part of its future consultations for the 2022 RoRI.[87]

We therefore consider it a well-accepted approach to maintain the same 10-year debt term that PoM proposed in its 2021-22 TCS, and which the ESC and CEPA both accepted.

4.3   Debt management strategy

PoM's 2021-22 TCS adopts a trailing average of the cost of debt with a transition beginning in 2017/18.[88] The ESC found that the trailing average approach has been used in several Australian regulatory decisions, and is therefore compliant with the Pricing Order.[89]

CEPA considered that both the on-the-day and trailing average approaches are well-accepted by Australian regulators. CEPA also found regulatory support for the use of a transition period.[90]

We agree with the ESC and CEPA that PoM's adoption of a trailing average cost of debt is well accepted, although we note that some Australian regulators do not apply a transition when shifting from an on-the-day approach to a trailing average, including IPART, ERA, QCA and OTTER.[91] The WASC's judgment for Perth Airport also adopts IPART's method for estimating the debt risk premium without a transition.[92]

As such, we consider it well accepted to continue calculating the benchmark return on debt as a 10-year trailing average with a transition. This is also consistent with clause 27 of the Undertaking.

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[82] QCA, *Rate of return review*, Final report, November 2021, p 33.

[83] ICRC, *Review of methodologies for the weighted average cost of capital*, Final report, April 2021, pp 27-29.

[84] OTTER, *Investigation into TasWater's prices and services for the period 1 July 2022 to 30 June 2026*, Draft report, February 2022, p 70.

[85] *Perth Airport Pty Ltd v Qantas Airways Ltd [No 3]* [2022] WASC 51 [333].

[86] AER, *Energy network debt data*, Final working paper, November 2020, p 36.

[87] AER, *Overall rate of return, equity and debt omnibus*, Final working paper, December 2021, pp 70-71.

[88] Port of Melbourne, *2021 – 2022 Tariff Compliance Statement*, General statement, 31 May 2021, p 38.

[89] ESC, *Inquiry into the Port of Melbourne compliance with the pricing order*, Final report, 31 December 2021, p 74.

[90] CEPA, *Port of Melbourne five-year review – WACC*, Final report, 17 December 2021, p 78.

[91] The ERA does not apply a transition when implementing the hybrid trailing average where the cost of debt consists of an on-the-day swap rate and a 10-year trailing average spread to swap. The QCA considers that transition arrangements are not normally required, but may consider them in limited circumstances. See: IPART, *Review of our WACC method*, Final Report, February 2018, p 5. ERA, *2022 gas rate of return instrument review*, Discussion paper, December 2021, p 33-35. ERA, *Final Gas Rate of Return Guidelines Explanatory Statement*, 18 December 2018, p 90. QCA, *Rate of return review*, Final report, November 2021, pp 47-50. OTTER, *Investigation into TasWater's prices and services for the period 1 July 2022 to 30 June 2026*, Draft report, February 2022, p 70.

[92] *Perth Airport Pty Ltd v Qantas Airways Ltd [No 3]* [2022] WASC 51 [335].

In addition, we also consider it well accepted for the prevailing cost of debt in each year to be locked in for the purpose of calculating the trailing average cost of debt in future years. That is, prevailing cost of debt estimates from earlier years will not be updated retrospectively in response to data changes.

This approach reflects the AER's methodology in its 2018 RoRI, which states that historical yield estimates will not be revised after it has been finalised for a regulatory year.[93]

4.4   Debt raising costs

PoM assumes debt raising costs of 10 bp in its 2021-22 TCS. This estimate is derived from a PwC report in 2013, which estimates debt financing costs for Australian businesses.[94]

The ESC found that PoM's approach for estimating debt raising costs has been used in several Australian regulatory decisions.[95] CEPA similarly found that Australian regulatory precedent was in line with 10 bp debt raising costs.[96]

Aside from the AER, there has been no material shift in Australian regulators' estimates of the benchmark debt raising costs since the ESC's final report. In particular:

- the ERA's discussion paper for its 2022 gas RoRI sets out its working view that maintains a 10 bp allowance for debt raising costs and 11.4 bp allowance for debt hedging costs, while the ERA's consultant Chairmont finds that the debt raising cost allowance should be increased to 15.5 bp;[97] and

- the QCA's rate of return review in November 2021 sets benchmark debt raising costs at 10 bp, but will also consider alternative proposals by individual businesses on a case-by-case basis;[98]

- the ICRC's WACC review final report reduces benchmark debt raising costs from 12.5 bp to 10 bp, giving more weight to recent estimates over older estimates;[99]

- OTTER's draft report on its investigation for TasWater adopts benchmark debt raising costs of 8 bp based on recent decisions by the AER;[100] and

- the WASC's judgment for Perth Airport adopts IPART's method for estimating the cost of debt, which implicitly includes 12.5 bp of debt raising costs.[101]

The AER's preferred position in its December 2021 omnibus final working paper involves collecting data on debt raising costs from a debt Regulatory Information Notice (RIN), compared to its current approach that refers to historical criteria.[102]

Taking the above regulatory precedent into account, we consider it well accepted to continue adopting debt raising costs of 10 bp for the benchmark efficient port.

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[93] AER, *Rate of return instrument*, December 2018, p 19 cl 26(d).

[94] PwC, *Energy Networks Association: Debt financing costs*, June 2013.

[95] ESC, *Inquiry into the Port of Melbourne compliance with the pricing order*, Final report, 31 December 2021, p 74.

[96] CEPA, *Port of Melbourne five-year review – WACC*, Final report, 17 December 2021, p 79.

[97] ERA, *2022 gas rate of return instrument review*, Discussion paper, December 2021, 43 [245]-[247]. Chairmont, *Debt raising and hedging costs*, 21 December 2021, p 2. Chairmont, *Debt raising and hedging costs*, 21 December 2021, p 2.

[98] QCA, *Rate of return review*, Final report, November 2021, p 51.

[99] ICRC, *Review of methodologies for the weighted average cost of capital*, Final report, April 2021, pp 33-34.

[100] OTTER, *Investigation into TasWater's prices and services for the period 1 July 2022 to 30 June 2026*, Draft report, February 2022, pp 67.

[101] *Perth Airport Pty Ltd v Qantas Airways Ltd [No 3]* [2022] WASC 51 [335]. IPART, *Review of our WACC method*, Final Report, February 2018, p 51.

[102] AER, *Overall rate of return, equity and debt omnibus*, Final working paper, December 2021, p 28. AER, *Draft Debt Omnibus Paper*, Draft working paper, July 2021, p 34.

4.5   Cost of debt estimate

Consistent with clause 27(b)(iii)-(iv) of the Undertaking and the approach set out in PoM's 2021-22 TCS, we estimate the 10-year trailing average BBB cost of debt using data from the Bloomberg BVAL and RBA broad BBB curves. We calculate the cost of debt as the average over 20 working days from 4 March 2022 to 31 March 2022. The ESC accepted that referring to data from third parties such as Bloomberg and the RBA is consistent with the practices of Australian regulators,[103] and CEPA agreed that such an approach was well-accepted.[104]

Bloomberg publishes daily estimates of the AUD Australian corporate BBB yield curve (BVCSAB10 Index) up to a 10-year tenor. Since these estimates are provided on a semi-annual basis, we annualise the published yields first before averaging.

The RBA publishes month-end estimates of the yield curve for non-financial corporate BBB rated bonds. The RBA's curve fitting methodology, coupled with the small number of long-maturity bonds in its sample, results in a 10-year yield estimate with an effective tenor less than ten years.

PoM's approach extrapolates the yields out to a ten-year tenor based on the slope of the three-, five-, seven- and ten-year estimates.[105] PoM then derives its RBA cost of debt estimate as the average of the three most recent month ends. In contrast, CEPA obtained yields for a ten-year tenor by extrapolating only the seven- and ten-year estimates while taking the average of the two most recent month ends.[106]

We use the AER's approach to obtain a daily series of 10-year BBB RBA yields. This approach involves:[107]

- linearly extrapolating only the seven- and 10-year BBB spread to swap estimates to obtain month-end ten-year BBB yields with a ten-year effective tenor; and

- linearly interpolating the month-end 10-year BBB spread to CGS to obtain a daily BBB yield series.

We consider that the AER's method for interpolating daily yields is likely to be more accurate than taking the average of the most recent month ends, although any difference is likely to be small.

Using the above approach, we estimate the prevailing cost of debt at 5.08 per cent as at 31 March 2022 for the benchmark efficient port, calculated by assigning equal weight to the RBA and Bloomberg curves. This results in a 4.78 per cent trailing average return on debt, consisting of:

- debt raising costs: 10 bp; and

- trailing average cost of debt: 4.68 per cent;[108]

  > 2017-18 prevailing cost of debt (50 per cent weight): 5.35 per cent;

  > 2018-19 prevailing cost of debt (10 per cent weight): 4.48 per cent;

  > 2019-20 prevailing cost of debt (10 per cent weight): 4.11 per cent;

  > 2020-21 prevailing cost of debt (10 per cent weight): 3.32 per cent;

  > 2021-22 prevailing cost of debt (10 per cent weight): 3.02 per cent; and

  > 2022-23 prevailing cost of debt (10 per cent weight): 5.08 per cent.

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[103] ESC, *Inquiry into the Port of Melbourne compliance with the pricing order*, Final report, 31 December 2021, p 74.

[104] CEPA, *Port of Melbourne five-year review – WACC*, Final report, 17 December 2021, p 77.

[105] Synergies' extrapolation method is set out in its report for PoM's 2020-21 TCS. See: Synergies, *Determining a WACC estimate for Port of Melbourne*, May 2020, p 218.

[106] CEPA, *Port of Melbourne five-year review – WACC*, Final report, 17 December 2021, p 78.

[107] See: AER, *Rate of return instrument*, December 2018, pp 11-15.

[108] These estimates exclude 10 bp debt raising costs. See: Synergies, *Determining a WACC estimate for Port of Melbourne*, May 2021, p 3.

5. Cost of equity and gearing

We estimate a benchmark risk free rate of 2.57 per cent using the same sources used in PoM's 2020-21 and 2021-22 TCS, which the ESC considered well-accepted.[109]

Our approach for estimating the other cost of equity parameters differs from PoM's earlier approaches, but is nevertheless consistent with clauses 18 and 20 to 22 of the Undertaking. Our approach uses:

- **0.72 asset beta and 0.90 relevered equity beta**: we calculate weekly and 4-weekly betas for our comparator sample and use only the Sharpe-Lintner CAPM (SL-CAPM) without correcting for low beta bias or giving weight to the Black CAPM or the Fama-French model (FFM), with the latter two considered not well-accepted by the ESC;[110]

- **6.63 per cent market risk premium**: we assign 85 per cent weight to the 6.62 per cent estimate from historical excess returns (HER) and 15 per cent weight to the 6.68 per cent estimate from forward-looking returns:[111]

    > we assign equal weight to the Brailsford, Handley, and Maheswaran (BHM) and NERA datasets when implementing the HER, instead of placing exclusive reliance on the NERA dataset, which the ESC did not consider to be well-accepted;[112]

    > we use IPART's current MRP estimate and DDM estimates from AER, ERA and QCA, where we calculate the mean DDM MRP for each regulator, before taking the median across the four regulators;[113] and

    > we do not use the Wright approach in our estimate, which the ESC considered not well-accepted.[114]

In addition, we estimate a benchmark gearing of 0.20, which reflects the average gearing of our comparator sample. This approach is consistent with clause 23 of the Undertaking, and the ESC considered it to be well-accepted.[115]

Using the above parameters, we estimate 8.54 per cent per cent cost of equity for the benchmark efficient port.

Our alternative sample generates a benchmark asset beta of 0.71 and benchmark gearing of 0.21, which is not materially different from the asset beta and gearing derived from our preferred sample. This results in an alternative cost of equity of 8.53 per cent, which is in line with the estimated cost of equity in our preferred sample.

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[109] ESC, *Inquiry into the Port of Melbourne compliance with the pricing order*, Final report, 31 December 2021, pp 49-50. CEPA, *Port of Melbourne five-year review – WACC*, Final report, 17 December 2021, p 23.

[110] ESC, *Inquiry into the Port of Melbourne compliance with the pricing order*, Final report, 31 December 2021, pp 47-48. CEPA, *Port of Melbourne five-year review – WACC*, Final report, 17 December 2021, pp 22, 57-60.

[111] The ESC considered that PoM's approach of placing higher weights on the Wright and DDM approaches is not well accepted. See: ESC, *Inquiry into the Port of Melbourne compliance with the pricing order*, Final report, 31 December 2021, p 58.

[112] ESC, *Inquiry into the Port of Melbourne compliance with the pricing order*, Final report, 31 December 2021, pp 56-57. CEPA, *Port of Melbourne five-year review – WACC*, Final report, 17 December 2021, pp 33-35.

[113] The ESC finds that PoM did not correctly implement the DDMs that IPART and ERA use. See: ESC, *Inquiry into the Port of Melbourne compliance with the pricing order*, Final report, 31 December 2021, p 57.

[114] ESC, *Inquiry into the Port of Melbourne compliance with the pricing order*, Final report, 31 December 2021, p 54. CEPA, *Port of Melbourne five-year review – WACC*, Final report, 17 December 2021, p 36.

[115] ESC, *Inquiry into the Port of Melbourne compliance with the pricing order*, Final report, 31 December 2021, pp 72-73 CEPA, *Port of Melbourne five-year review – WACC*, Final report, 17 December 2021, p 75.

5.1   Overall approach

PoM's 2021-22 TCS adopts the SL-CAPM without assigning weight to the Black CAPM or the FFM.[116] The ESC considered this approach to be well-accepted.[117]

There has been no major shift in the overall return on equity approach adopted by Australian regulators since the ESC's final report. In particular, we note that:

- the AER's preliminary position in its December 2021 omnibus final working paper is to retain the SL-CAPM without assigning weight to the Black CAPM;[118]

- the ERA's discussion paper for its 2022 gas RoRI affirms its present approach that does not apply the Black CAPM or adjust for low beta bias;[119]

- the QCA's rate of return review in November 2021 adopts the SL-CAPM without adjusting for low beta bias;[120]

- the ICRC's WACC review final report retains its approach that uses the SL-CAPM while having regard to low beta bias;[121] and

- OTTER's draft report on its investigation for TasWater uses the SL-CAPM.[122]

Having regard to the regulatory precedent, we consider it well accepted to adopt the SL-CAPM when calculating the cost of equity for the benchmark efficient port without correcting for low beta bias and without giving weight to the Black CAPM or the FFM. This is consistent with clause 18 of the Undertaking.

5.2   Gearing

PoM's 2021-22 TCS derives the benchmark gearing by referring to:[123]

- the range of gearing levels for the subset of comparators from Synergies' sample with investment grade ratings and the acquisition gearings of privatised Australian ports;

- the average gearing from Incenta's comparator set; and

- precedent from transport regulatory decisions.

The ESC considered that precedent from Australian regulators and financial practitioners do not support using long term debt or acquisition gearings.[124]

In addition, CEPA found that five regulators used evidence from comparators to set the benchmark gearing, while three refer to regulatory precedent or maintain a previously determined gearing. CEPA also observed that Australian regulators used different debt measures when calculating gearing, with some using gross debt and others using net debt.[125]

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[116] Synergies, *Determining a WACC estimate for Port of Melbourne*, May 2021, p 10.

[117] ESC, *Inquiry into the Port of Melbourne compliance with the pricing order*, Final report, 31 December 2021, pp 47-48. CEPA, *Port of Melbourne five-year review – WACC*, Final report, 17 December 2021, pp 22, 57-60.

[118] AER, *Overall rate of return, equity and debt omnibus*, Final working paper, December 2021, p 118.

[119] ERA, *2022 gas rate of return instrument review*, Discussion paper, December 2021, p 83 [476].

[120] QCA, *Rate of return review*, Final report, November 2021, p 81.

[121] ICRC, *Review of methodologies for the weighted average cost of capital*, Final report, April 2021, pp 22-23.

[122] OTTER, *Investigation into TasWater's prices and services for the period 1 July 2022 to 30 June 2026*, Draft report, February 2022, pp 71, 76.

[123] Synergies, *Determining a WACC estimate for Port of Melbourne*, May 2021, p 55. We note that Synergies uses long term debt in its gearing formula, while Incenta uses net debt.

[124] ESC, *Inquiry into the Port of Melbourne compliance with the pricing order*, Final report, 31 December 2021, pp 72-73.

[125] CEPA, *Port of Melbourne five-year review – WACC*, Final report, 17 December 2021, p 73.

There has been no major shift in the approach adopted by Australian regulators for estimating the benchmark gearing since the ESC's final report. In particular, we note that:

- the AER's preliminary position in its working papers proposes to use a benchmark gearing consistent with market estimates from its comparator sample, including possibly adjusting its previous estimate to align more closely with market data;[126]

- the ERA's discussion paper for its 2022 gas RoRI affirms its present approach that gearing should be determined from the observed gearing levels of the comparator sample;[127]

- the QCA's rate of return review in November 2021 uses the current regulatory gearing of the business as a starting point, and will only deviate from it if there is persuasive evidence that it no longer reflects an efficient benchmark;[128]

- the ICRC's WACC review final report continues to determine the gearing ratio from a comparator sample;[129]

- OTTER's draft report on its investigation for TasWater retains the 60 per cent gearing assumption that it has used in its previous pricing investigations;[130] and

- the WASC's judgment for Perth Airport adopts the NZCC's method for estimating the benchmark gearing, which is based on the average gearing of the comparator sample.[131]

CEPA derived a gearing range for five-year and ten-year averaging periods. We adopt a similar approach where we calculate the benchmark gearing as the average of five-year and ten-year gearings.[132] We use the same estimation periods when deriving the asset beta for the benchmark efficient port in section 5.4.

We use the book value of net debt as our measure of debt. This is consistent with CEPA's approach, and is also consistent with precedent from the ERA and NZCC.[133] Furthermore, we note that the AER, QCA and IPART use net debt as part of their financeability tests[134] and it would be internally consistent to also use net debt when calculating the benchmark gearing.

Consistent with the NZCC's approach, we set a lower bound of zero gearing for each company.[135] This means that companies with negative net debt, which often reflect large cash holdings, will be treated as having zero leverage.

In summary, we consider it well accepted to derive the benchmark gearing from our comparator sample, with a preference for maintaining a stable gearing estimate from previous determinations. This is consistent with clause 23 of the Undertaking. We use net debt as our debt measure when calculating gearing and use the

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[126] AER, *Overall rate of return*, Draft working paper, July 2021, pp 32-34. AER, *Overall rate of return, equity and debt omnibus*, Final working paper, December 2021, p 28.

[127] The ERA calculates the five-year average gearing for its comparator sample and has regard for the fact that one of the comparators is delisted. See: ERA, *2022 gas rate of return instrument review*, Discussion paper, December 2021, pp 28-30 [142]-[154].

[128] QCA, *Rate of return review*, Final report, November 2021, p 23.

[129] ICRC, *Review of methodologies for the weighted average cost of capital*, Final report, April 2021, pp 13-14.

[130] OTTER, *Investigation into TasWater's prices and services for the period 1 July 2022 to 30 June 2026*, Draft report, February 2022, p 65.

[131] *Perth Airport Pty Ltd v Qantas Airways Ltd [No 3]* [2022] WASC 51 [337]-[338]. New Zealand Commerce Commission, *Input methodologies review decisions*, Topic paper 4: Cost of capital issues, 20 December 2016, p 141 [546].

[132] Commerce Commission of *New Zealand*, *Input methodologies review decisions*, Topic paper 4: Cost of capital issues, 20 December 2016, pp 147-148 [571]-[572]. *Perth Airport Pty Ltd v Qantas Airways Ltd [No 3]* [2022] WASC 51 [288], [337]-[339].

[133] ERA, *Final Gas Rate of Return Guidelines Explanatory Statement*, 18 December 2018, pp 219-220 [1,400]. New Zealand Commerce Commission, *Input methodologies review decisions*, Topic paper 4: Cost of capital issues, 20 December 2016, p 66 [287].

[134] AER, *Overall rate of return, equity and debt omnibus*, Final working paper, December 2021, pp 124-127. QCA, *Gladstone Area Water Board price monitoring 2020–25 Part B: Accumulated underrecovery*, Final report, May 2020, pp 42-44. IPART, *Review of our financeability test*, Final report, November 2018, pp 73-75.

[135] We observe this approach by comparing Bloomberg data against the NZCC's gearing estimates. See: Commerce Commission of *New Zealand*, *Input methodologies review decisions*, Topic paper 4: Cost of capital issues, 20 December 2016, p 246.

same estimation periods that we use for estimating asset beta, ie, average of five-year and ten-year estimates.

Using this approach, we obtain a benchmark gearing of 0.20 as at 31 March 2022. The average gearing for the alternative wider sample is 0.21.

Appendix A2 sets out the gearing estimates for each firm in the comparator samples.

5.3 Risk free rate

PoM's 2021-22 TCS derives the benchmark risk free rate using a 20-day average of the 10-year Commonwealth Government Securities (CGS) yield.[136] Both the ESC and CEPA accepted that this approach is well-accepted.[137]

Recent developments in regulatory precedent on the risk free rate include that:

- the AER is consulting on whether the term of the return on equity should be set at five years or ten years, but affirms the use of CGS yields as a proxy for the risk free rate;[138]

- the ERA's discussion paper for its 2022 gas RoRI affirms its present approach that adopts the five-year CGS yield as the risk free rate, although we note that the ERA uses the 10-year CGS yield for regulated rail companies;[139]

- the QCA's rate of return review in November 2021 uses the 10-year CGS yield as the risk free rate;[140]

- the ICRC's WACC review final report retains the 10-year CGS yield as the risk free rate;[141]

- OTTER's draft report on its investigation for TasWater retains the 10-year CGS yield as the risk free rate;[142] and

- the WASC's judgment for Perth Airport adopts IPART's method for estimating the risk free rate, which uses the 10-year CGS yield.[143]

Based on the above assessment, we consider that PoM's approach from the 2021-22 TCS is well accepted, and we apply the same approach when estimating the risk free rate for the benchmark efficient port.

Consistent with clause 20(b)(ii) of the Undertaking, we adopt the linear interpolation approach that the AER and ERA use to calculate the 10-year CGS yield, whereby the 10-year yield is obtained by linearly interpolating between the yields of the two CGS with the closest remaining maturities on either side of the 10-year target.[144] Since the RBA reports CGS yields on a semi-annual basis, we annualise the CGS yields

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[136] Synergies, *Determining a WACC estimate for Port of Melbourne*, May 2021, p 23.

[137] ESC, *Inquiry into the Port of Melbourne compliance with the pricing order*, Final report, 31 December 2021, p 50. CEPA, *Port of Melbourne five-year review – WACC*, Final report, 17 December 2021, p 23.

[138] AER, *Overall rate of return, equity and debt omnibus*, Final working paper, December 2021, pp 24-25. AER, *Rate of return – Term of the rate of return & Rate of return and cashflows in a low interest rate environment*, Final working paper, September 2021, pp 46-48, 102-103.

[139] ERA, *2022 gas rate of return instrument review*, Discussion paper, December 2021, p 50 [286]. ERA, *2018 and 2019 Weighted Average Cost of Capital | For the Freight and Urban Networks, and the Pilbara Railways*, Final determination, 22 August 2019, p 22.

[140] QCA, *Rate of return review*, Final report, November 2021, p 83.

[141] ICRC, *Review of methodologies for the weighted average cost of capital*, Final report, April 2021, pp 21-22.

[142] OTTER, *Investigation into TasWater's prices and services for the period 1 July 2022 to 30 June 2026*, Draft report, February 2022, pp 65-67.

[143] IPART's method assigns equal weight to: a current estimate derived as the average over the same two-month window for the most recent five years (equal to the length of the regulatory period); and a long term estimate derived as the average over the same two-month window for the most recent ten years. See: *Perth Airport Pty Ltd v Qantas Airways Ltd [No 3]* [2022] WASC 51 [330]-[332]. IPART, *Review of our WACC method*, Final Report, February 2018, pp 24-25, 47.

[144] AER, *Rate of return instrument*, December 2018, pp 12-13. ERA, *2022 gas rate of return instrument review*, Discussion paper, December 2021, p 50 [286].

after carrying out the linear interpolation using the formula in clause 20(b)(iii) of the Undertaking. We note that IPART does not use such an interpolation approach,[145] but the difference is likely to be small.

We estimate a benchmark risk-free rate of 2.57 per cent, averaged over the 20 trading days from 4 March 2022 to 31 March 2022. This is consistent with clause 20(b)(i) of the Undertaking.

5.4 Beta

PoM's 2021-22 TCS estimates the benchmark asset beta and equity beta from a sample of comparator firms. This process involves:[146]

- estimating raw equity betas using ordinary least squares (OLS) over five- and ten-year averaging periods for a combination of weekly and monthly frequencies;
- de-levering the equity betas using the Brealey-Myers formula to obtain asset betas; and
- re-levering the average asset beta using the benchmark gearing to obtain a re-levered benchmark equity beta.

Notwithstanding the ESC's criticisms about PoM's sample selection process, which we discuss in section 3, the ESC also stated that the exclusive use of monthly returns does not reflect the practice of Australian regulators, which have placed greater reliance on weekly returns data in their recent decisions.[147]

In addition, CEPA considered that there was agreement among Australian regulators that betas should be estimated for each weekly return interval, ie, Monday to Monday, Tuesday to Tuesday, etc. CEPA named this approach 'Weekly AD'.[148]

Recent developments in regulatory precedent include that:

- the AER's omnibus:[149]
  > presents weekly betas without mentioning monthly betas; and
  > states its preliminary view that the most weight should be applied to beta estimates from the longest period available;
- the ERA's working view in its discussion paper for the 2022 gas RoRI affirms its present approach that:[150]
  > uses weekly data for estimating betas; and
  > uses a five-year estimation window;
- the QCA's rate of return review in November 2021:[151]
  > proposes estimating betas using weekly AD returns, compared to its present approach that has regard to weekly and monthly returns; and
  > proposes to use a ten-year estimation window;
- the ICRC's WACC review final report estimates equity betas based on regulatory decisions by other Australian regulators, while having regard to low beta bias;[152]

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[145] IPART sources the 10-year risk free rate from RBA series FCMYGBAG10D, which takes the yield of a CGS with remaining maturity close to ten years. See: IPART, Spreadsheet - WACC model - February 2022, 'Daily data' sheet.

[146] Synergies, *Determining a WACC estimate for Port of Melbourne*, May 2021, pp 34, 46-47.

[147] ESC, *Inquiry into the Port of Melbourne compliance with the pricing order*, Final report, 31 December 2021, p 66.

[148] CEPA, *Port of Melbourne five-year review – WACC*, Final report, 17 December 2021, p 53.

[149] AER, *Overall rate of return, equity and debt omnibus*, Final working paper, December 2021, pp 103-107.

[150] ERA, *2022 gas rate of return instrument review*, Discussion paper, December 2021, p 81 [462].

[151] QCA, *Rate of return review*, Final report, November 2021, pp 76-77.

[152] ICRC, *Review of methodologies for the weighted average cost of capital*, Final report, April 2021, pp 22-23.

- OTTER's draft report on its investigation for TasWater retains its equity beta estimate from the previous regulatory period, which was itself obtained from the AER's 2013 Guideline;[153] and

- the WASC's judgment for Perth Airport refers to the NZCC's approach that calculates equity betas at five-year intervals using the average of weekly AD and four-weekly AD frequencies.[154]

We estimate raw equity betas and asset betas for the comparator sample using weekly and four-weekly frequencies, where the estimate for each frequency is the average of the estimates derived for each day of the period, ie, a 'weekly AD' and a 'four-weekly AD'.

Consistent with CEPA's approach, we refer to five-year and ten-year averaging periods.[155] Our point estimate takes the average of the betas from both averaging periods. CEPA found unanimous support for OLS and the Brealey-Myers formula among Australian regulators.[156] Similarly, we consider both OLS and the Brealey-Myers formula to be well-accepted, and adopt them for deriving our beta estimates.

Table 5.1 summarises the asset beta estimates for the comparator sample that we identify in section 3. The average weekly AD and four-weekly AD asset betas for a five-year averaging period are 0.68 and 0.72 respectively, while the corresponding asset betas for the ten-year averaging period are 0.73 and 0.76 respectively.

We then average the four estimates to obtain an asset beta point estimate of 0.72 for the preferred sample, which we re-lever using the benchmark 0.20 gearing to obtain an equity beta estimate of 0.90. We have also estimated the asset beta for the alternative sample, which we have used to cross check the estimate from our preferred sample. We estimate an asset beta of 0.71 for this alternative sample and a gearing of 0.21, which we re-lever to obtain an equity beta estimate of 0.90.

Table 5.1: Beta estimates for the preferred and alternative comparator samples

	5 year averaging period	10 year averaging period	Average
Preferred comparator sample			
Weekly AD asset beta	0.68	0.73	0.71
Four-weekly AD asset beta	0.72	0.76	0.74
Asset beta point estimate	0.70	0.75	0.72
Gearing	0.19	0.22	0.20
Relevered equity beta			0.90
Alternative comparator sample			
Weekly AD asset beta	0.67	0.72	0.70
Four-weekly AD asset beta	0.70	0.75	0.73
Asset beta point estimate	0.69	0.74	0.71
Gearing	0.20	0.22	0.21
Relevered equity beta			0.90

Source: Bloomberg, HoustonKemp analysis

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[153] OTTER, *Investigation into TasWater's prices and services for the period 1 July 2022 to 30 June 2026*, Draft report, February 2022, pp 74-76.

[154] The NZCC calculates asset betas for multiple five-year intervals and assigns weights to them. *Perth Airport Pty Ltd v Qantas Airways Ltd [No 3]* [2022] WASC 51 [201], [272]. New Zealand Commerce Commission, *Input methodologies review decisions*, Topic paper 4: Cost of capital issues, 20 December 2016, p 61 [268]-[269].

[155] CEPA, *Port of Melbourne five-year review – WACC*, Final report, 17 December 2021, p 56.

[156] CEPA, *Port of Melbourne five-year review – WACC*, Final report, 17 December 2021, p 52.

Appendix A2 sets out the asset beta estimates for each firm in the comparator samples.

We further conduct a sensitivity analysis on the estimates of asset beta and gearing by applying the following tighter filtering criteria one by one to each of the preferred and alternative comparator samples:

- firms with China as a country of domicile;

- firms with China as a country of risk; and

- firms with developing country risk.

Table 5.2 compares the asset beta and gearing estimates between the base case samples, ie, without applying the tighter filtering criteria, and the samples obtained from applying one of the tighter filtering criteria on the base cases. The sensitivity-checking samples generate asset beta estimates that are not much different from those in our base case samples. This supports the robustness of our approach of estimating asset beta that does not involve the application of a country filtering.

Table 5.2: Comparison of beta estimates between the base case samples and samples with tighter filtering criteria

	Base case	Remove Chinese domiciled	Remove Chinese risk	Remove developing country risk
Preferred comparator sample				
Number of comparators*	22/18	Loss of 9 comparators	Loss of 11 comparators	Loss of 17/15 comparators
Weekly AD asset beta	0.71	0.67	0.68	0.70
Four-weekly AD asset beta	0.74	0.73	0.75	0.75
Asset beta point estimate	**0.72**	**0.70**	**0.72**	**0.72**
Gearing	0.20	0.19	0.16	0.10
Alternative comparator sample				
Number of comparators*	28/23	Loss of 11 comparators	Loss of 13 comparators	Loss of 19/17 comparators
Weekly AD asset beta	0.70	0.67	0.68	0.68
Four-weekly AD asset beta	0.73	0.72	0.74	0.74
Asset beta point estimate	**0.71**	**0.70**	**0.71**	**0.71**
Gearing	0.21	0.19	0.16	0.14

Source: Bloomberg, HoustonKemp analysis.

*Note: *The figures in the base case column represent the number of comparators in the preferred and alternative comparator sample, whereas the figures in the remaining columns represent the change in the number of comparators relative to that in the base case.*

***When there are two figures separated by a slash, the figure before the slash is applicable to the 5-year sample, whereas the figure after the slash is applicable to the 10-year sample.*

5.5 Market risk premium

PoM's 2021-22 TCS derives the MRP by assigning:[157]

- 85 per cent weight to the Ibbotson HER MRP, whereby PoM adopts the average of the BHM and NERA estimates as its point estimate;

- 15 per cent weight to DDMs, whereby PoM assigns equal weights to the DDMs estimated by three regulators, namely IPART, ERA, and QCA; and

- zero weight to the Wright approach.

PoM uses the arithmetic average when deriving the Ibbotson HER MRP, which CEPA considered well accepted.[158]

The above approach differs from the one that PoM applies for its 2020-21 TCS, which instead assigns 70 per cent weight to the Ibbotson HER MRP and 15 per cent weight to the Wright approach.[159] Under this approach, the Ibbotson HER MRP is calculated using the median estimate from five historical periods based on NERA data.[160]

The ESC considered that approach as not well accepted because:[161]

- it uses data sources and averaging periods that are not well-accepted for estimating the HER MRP;[162]

- it assigns higher weight to estimates from DDMs and the Wright approach compared to most regulators; and

- it uses DDM specifications that are inconsistent with that of other Australian regulators.

In addition, CEPA considered that there was limited precedent for the Wright method among Australian regulators, and also stated that it is open for PoM to use DDM estimates in combination with other methods.[163] CEPA further considered it appropriate to use a range of DDMs that reflect Australian regulatory precedent, and that the median DDM estimate is more robust to extreme observations.[164]

5.5.1 Recent regulatory developments

Since the ESC's final report, several regulators have provided guidance on their approaches for estimating the MRP:

- the AER's Omnibus states that the AER:[165]

  > previously considered changing the data source for the Ibbotson HER estimate from the BHM series to a new RBA return series, but its most recent view is that the new price series cannot be relied on while it may be possible to adjust the new dividend series;

  > considers the HER best estimate is somewhere between the geometric and arithmetic mean of annual excess returns;

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[157] Synergies, *Determining a WACC estimate for Port of Melbourne*, May 2021, pp 3, 26.

[158] CEPA, *Port of Melbourne five-year review – WACC*, Final report, 17 December 2021, pp 33-35.

[159] Synergies, *Determining a WACC estimate for Port of Melbourne*, May 2021, p 3.

[160] The five historical periods are: 1883-2019; 1937-2019; 1958-2019; 1980-2019; and 1988-2019. See: Synergies, *Determining a WACC estimate for Port of Melbourne*, May 2020, pp 131-133.

[161] ESC, *Inquiry into the Port of Melbourne compliance with the pricing order*, Final report, 31 December 2021, p 58.

[162] The ESC's criticism about PoM's choice of averaging periods relates to earlier TCS that relied only on the HER series starting in 1883. See: CEPA, *Port of Melbourne five-year review – WACC*, Final report, 17 December 2021, p 25.

[163] CEPA, *Port of Melbourne five-year review – WACC*, Final report, 17 December 2021, p 33.

[164] CEPA, *Port of Melbourne five-year review – WACC*, Final report, 17 December 2021, p 36.

[165] AER, *Overall rate of return, equity and debt omnibus*, Final working paper, December 2021, pp 32-33, 41-43, 63-64.

> - has an open position for estimating a forward-looking MRP, for which it is considering three options, ie:

>   - maintaining its current approach that gives most weight to the HER estimate and less to other approaches;

>   - using DGM estimates to inform the point estimate of the MRP within the HER range; and

>   - adopting a mechanical approach that assigns weight to DGM estimates; and

> - will not estimate or employ a relationship between the MRP and risk free rate, ie, the AER will not give weight to the Wright approach;

- the ERA's discussion paper for its 2022 gas RoRI states the working view that the ERA will:[166]

  > - use the BHM exclusively when estimating the HER estimate, compared to its previous approach that refers to both the BHM and NERA estimates;

  > - derive the HER estimate using the average of the lowest arithmetic mean and the highest geometric mean from three overlapping periods starting from 1958, 1980, and 1980, with further consideration for an additional period from 2000 onwards;

  > - maintain the use of its two-stage DDM and conditioning variables;

  >   - the ERA's working view in its subsequent consultation paper is that it may be appropriate to incorporate DGM estimates mechanically, such as by assigning 50 per cent weight to DGM estimates or, as an illustrative example, assigning 20 per cent weight to DGM estimates;[167]

  > - place more reliance on the HER estimate compared to the DDM, and determine a final point estimate by applying regulatory judgement, including considering conditioning variables; and

  > - will not apply the Wright approach though the ERA will continue to review regulatory developments on the relationship between MRP and risk free rates;

- the QCA's rate of return review in November 2021 states that the QCA will:[168]

  > - calculate the HER estimate using the arithmetic average of the BHM series starting from 1958;

  > - not use DDMs to estimate the MRP, but will use DDM outputs for directional guidance in evaluating the overall cost of equity as part of its top-down assessment;

  > - not apply the Wright approach, though the QCA will continue to monitor future movements in the risk free rate and MRP; and

  > - not use evidence from survey methods;

- the ICRC's WACC review final report:[169]

  > - gives preference to arithmetic averages when calculating the HER; and

  > - adopts the QCA's 2018 approach that balances forward-looking and historical estimates of excess returns;

- OTTER's draft report on its investigation for TasWater:[170]

  > - places most weight on historical returns and less weight on DDMs, while taking survey results into consideration; and

  > - adopts its benchmark MRP point estimate based on AER and ERA precedent;

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[166] ERA, *2022 gas rate of return instrument review*, Discussion paper, December 2021, pp 55-67.

[167] ERA, *Focused consultation for the 2022 gas rate of return instrument review*, Discussion paper, 4 April 2022, p 12 [70]-[72].

[168] QCA, *Rate of return review*, Final report, November 2021, pp 59-65.

[169] ICRC, *Review of methodologies for the weighted average cost of capital*, Final report, April 2021, pp 20-21.

[170] OTTER, *Investigation into TasWater's prices and services for the period 1 July 2022 to 30 June 2026*, Draft report, February 2022, pp 73-74.

- the WASC's judgment for Perth Airport adopts IPART's approach for estimating the MRP as the midpoint of the short term MRP and long term MRP estimates, with additional adjustments that incorporate the WASC's 0.585 gamma estimate.[171]

Taking the above developments into account, we estimate the MRP by retaining the approach that PoM uses for its 2021-22 TCS. We note that this approach incorporates the criticisms from the Inquiry by:

- modifying the data sources and averaging periods for estimating the HER MRP to no longer rely exclusively on NERA data and to include estimates from multiple averaging periods; and

- assigning no weight to the Wright approach and increasing the weight of the Ibbotson HER MRP to 85 per cent.

We note the QCA's working view that no longer assigns an explicit weight to DDM estimates. However, since the QCA will continue to use DDM outputs for directional guidance on the overall cost of equity, we consider that DDM estimates continue to be an appropriate consideration when estimating the MRP.

This contrasts with the ERA's working view in its consultation paper that it may be appropriate to incorporate DGM estimates mechanically, such as by assigning 50 per cent weight to DGM estimates or, as an illustrative example, assigning 20 per cent weight to DGM estimates.

Overall, we consider 15 per cent to be an appropriate weight to be assigned to DDM estimates.

We modify PoM's DDM approach by:

- using IPART's reported short-term MRP estimate instead of only estimating three of IPART's six models;

- incorporating estimates from the AER's DDMs; and

- adopting the median estimate from each regulator's DDM instead of the mean.

The following sections provide additional details about our approach for estimating the MRP and underlying reasoning.

5.5.2   Historical excess returns

We estimate the HER MRP using:

- the midpoint of BHM and NERA data, consistent with clause 21(e)(i) of the Undertaking; and

- 0.625 imputation credit utilisation rate, consistent with our gamma estimates in section 6.

We note that the current approaches of two regulators, ERA and ESCOSA, use both BHM and NERA data in their HER MRP estimates.[172] However, our discussion in section 5.5.1 identifies that the ERA's working view for the 2022 gas RoRI uses the BHM exclusively.[173]

Table 5.3 shows our Ibbotson HER MRP estimates. The median of the arithmetic mean estimates across five averaging periods is 6.49 per cent using BHM data and 6.75 per cent using NERA data. Assigning equal weights to both data sources results in a 6.62 per cent point estimate of the Ibbotson HER MRP. This is 6 bp higher than the midpoint of the arithmetic mean estimates across BHM and NERA data for the five averaging periods.

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[171] *Perth Airport Pty Ltd v Qantas Airways Ltd [No 3]* [2022] WASC 51 [328]-[329]. Also see: IPART, *Review of our WACC method*, Final Report, February 2018, pp 50-59. IPART, *Review of WACC Methodology*, Research — Final Report, December 2013, pp 17-18.

[172] See: CEPA, *Port of Melbourne five-year review – WACC*, Final report, 17 December 2021, pp 34-35.

[173] ERA, *2022 gas rate of return instrument review*, Discussion paper, December 2021, p 57 [325].

We note that the Ibbotson HER MRP point estimate using BHM data exclusively is 6.49 per cent, which is 13 bp smaller than our point estimate. This is consistent with the ERA's observation that the BHM and NERA datasets are converging over time.[174]

We do not assign weight to the geometric mean estimates.

Table 5.3: Historical excess returns estimates

	Arithmetic mean		Geometric mean	
	BHM	**NERA**	**BHM**	**NERA**
1883-2021	6.41%	6.76%	5.09%	5.43%
1937-2021	6.21%	6.15%	4.45%	4.39%
1958-2021	6.75%	6.75%	4.55%	4.55%
1980-2021	6.80%	6.80%	4.76%	4.76%
1988-2021	6.49%	6.49%	5.06%	5.06%
Mean	**6.53%**	**6.59%**	**4.78%**	**4.84%**
Median	**6.49%**	**6.75%**	**4.76%**	**4.76%**

Source: ABS, ATO, Bloomberg, BHM, NERA, HoustonKemp analysis.

Appendix A4 sets out additional details behind our approach for estimating the Ibbotson HER estimates.

5.5.3   DDM estimates

We generate DDM estimates based on the models adopted by four regulators, namely:[175]

- IPART current MRP estimate: 8.83 per cent;

- AER two-stage and three-stage DDMs: 6.64 per cent;

- ERA two-stage Gordon DDM: 6.72 per cent;

- QCA Cornell DDM: 6.11 per cent.

We adopt a DDM MRP point estimate of 6.68 per cent, calculated as the median of the above four estimates. This is lower than the average DDM MRP of 7.08 per cent.

In generating these estimates, we assume:

- the proportion of fully franked dividends is 0.75, which reflects the estimate adopted by the AER and QCA;[176] and

- the imputation credit utilisation rate is 0.625, consistent with our gamma estimates in section 6.

The remainder of this section provides brief summaries about our approach for estimating each DDM. In appendix A1 we set out additional details about the models and our cross-checks against each regulator's previous DDM estimates.

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[174] ERA, *2022 gas rate of return instrument review*, Discussion paper, December 2021, p 57 [325].

[175] We note that the date of IPART's DDM estimate from 31 January 2022 differs from the estimation dates of the other WACC parameters, which we estimate as at 31 March 2022. However, this difference is unlikely to affect our median DDM MRP point estimate, which effectively takes the midpoint of the AER and ERA DDM MRP estimates.

[176] The approach we use for deriving this estimate is shown in appendix A3.1. See: ATO, https://www.ato.gov.au/rates/company-tax---imputation--average-franking-credit---rebate-yields/, accessed 16 March 2022.

We observe that our estimates are within approximately 0.1 per cent of each regulator's previous estimates, with the remaining discrepancy potentially arising from rounding error. We consider these discrepancies to be immaterial, such that our DDM estimates continue to be derived from well-accepted methods.

IPART current MRP estimate

PoM's 2021-22 TCS adopts the simple average estimate from three of the DDM estimates that IPART uses, ie, Damodaran (2013), Bank of England (2002), and Bank of England (2010).[177]

The ESC observed that PoM did not use all five of IPART's DDMs, and that IPART uses the median estimate instead of the simple average. The ESC further stated that PoM's estimates were lower than IPART's by approximately 20 bp, possibly due to different data sources.[178]

Given the ESC's observations, we do not derive our own estimates of IPART's DDMs, and instead adopt IPART's current MRP estimate as at 31 January 2022. IPART derives a point estimate based on the weighted average of five DDMs and an additional market indicator method, whereby two-third weight is applied to the median DDM estimate and one-third weight is applied to the market indicators MRP.[179]

IPART's current MRP is 8.6 per cent as at 31 January 2022.[180] This estimate is consistent with IPART's 0.25 gamma estimate, and includes a gamma adjustment from its 2013 WACC method.[181] We adjust IPART's estimate to be consistent with our 0.5 gamma estimate and our 2.57 per cent risk free rate estimate, resulting in a point estimate of 8.83 per cent as at 31 March 2022.

We note that the date of IPART's DDM estimate differs from the estimation dates of the other WACC parameters, which we estimate as at 31 March 2022. However, this difference is unlikely to affect our median DDM MRP point estimate, which effectively takes the midpoint of the AER and ERA DDM MRP estimates.

Appendix A3.1.1 provides further details about our method for adjusting IPART's current MRP.

AER two-stage and three-stage DDMs

The AER publishes estimates for its two-stage DDM and three-stage DDM.

The two-stage DDM uses analyst dividend forecasts for the ASX 200 index for the current financial year and the next two financial years, adjusted for the effect of imputation credits. Dividends are assumed to grow by 4.6 per cent in all subsequent years. The three-stage DDM includes an additional transition stage from years three to nine, where dividend growth converges linearly towards 4.6 per cent long-term growth.[182]

The AER's rate of return annual updates include sensitivity estimates for:[183]

- 5.1 per cent and 3.78 per cent long-term growth;
- different averaging periods;
- ±10 per cent variations to analyst forecasts; and
- estimates that combine low and high parameters.

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[177] Synergies, *Determining a WACC estimate for Port of Melbourne*, May 2021, p 28.

[178] ESC, *Inquiry into the Port of Melbourne compliance with the pricing order*, Final report, 31 December 2021, p 58.

[179] IPART, *Review of our WACC method*, Final Report, February 2018, pp 52, 59.

[180] IPART, *WACC Biannual Update*, Fact sheet, February 2021, p 3.

[181] IPART, *Review of our WACC method*, Final Report, February 2018, p 53. IPART, *Review of WACC Methodology*, Research — Final Report, December 2013, pp 17-18.

[182] AER, *Rate of Return Guideline (Appendices)*, Explanatory Statement, December 2013, pp 114-118.

[183] AER, *Rate of return Annual Update*, December 2021, p 17.

For the 20 trading days to 31 March 2022, we estimate an average MRP of 6.89 per cent for the two-stage DDM and 6.40 per cent for the three-stage DDM, with a midpoint estimate of 6.64 per cent. These estimates assume 75 per cent of dividends are fully franked and an imputation credit utilisation rate is 0.625. We estimate the MRP using the AER's baseline assumptions for 20 trading days without assigning weight to the alternative sensitivity formulations.

Appendix A3.2 provides further details about the AER's DDMs, as well as comparisons between the estimates of our models against AER's previous estimates. In particular, our estimates are within 0.1 per cent of the AER's, with the small discrepancy possibly arising due to rounding issues.

ERA two-stage Gordon DDM

The ERA uses a two-stage Gordon DDM. The first stage uses analyst dividend forecasts for the All Ordinaries Index for the current financial year and the next two financial years, adjusted for the effect of imputation credits. The second stage assumes that dividends grow by 4.6 per cent in all subsequent years.[184]

For the 20 trading days to 31 March 2022, we estimate an average MRP of 6.72 per cent, assuming 75 per cent of dividends are fully franked and an imputation credit utilisation rate is 0.625. This estimate corresponds to our 2.57 per cent ten-year risk free rate, which differs from the ERA's five-year risk free rate assumption in its Gas RoR guideline, but is consistent with the ERA's ten-year risk free rate assumption for its rail WACC decision.[185]

Appendix A3.4 provides further details about the ERA's Gordon DDM, and compares our model estimates against the ERA's.

In particular, we note that the ESC observed that PoM's implementation of the ERA's DDM was 50 bp higher than the ERA's 2018 and 2019 rail WACC decision.[186] The estimates from our model are within 0.1 per cent of the ERA's estimate for 31 October 2018. Our model also generates estimates that are consistent with the ERA's 2018 and 2019 rail WACC decision, depending on the estimation date used by the ERA.

QCA Cornell DDM

The QCA uses a three-stage Cornell DDM to generate six MRP estimates, consisting of two models with different transition lengths and three different estimates of long-term growth. The QCA adopts the median of the six MRP estimates as its point estimate of the DDM MRP.[187]

The first stage of each DDM uses analyst dividend forecasts for the ASX 200 index for the current financial year and the next two financial years, adjusted for the effect of imputation credits. The second stage assumes that dividend growth converges linearly towards long-term growth. The two DDMs assume that dividend growth reaches the long-term growth rate in the 10th year and 20th year respectively.[188]

For the third stage, the QCA presents results assuming long-term growth rates of 4.04 per cent, 4.55 per cent, and 5.06 per cent.[189] We round these long-term growth rates to one decimal place in order to maintain consistency with the DDMs adopted by the AER and ERA. However, we retain the two decimal places when verifying our model against the QCA's in appendix A3.5.

[184] ERA, *Final Decision on Proposed Revisions to the Access Arrangement for the Dampier to Bunbury Natural Gas Pipeline 2016 – 2020 | Appendix 4 Rate of Return*, 30 June 2016, pp 114-116 [543]-[546].

[185] ERA, *2022 gas rate of return instrument review*, Discussion paper, December 2021, p 49 [284]. ERA, *2018 and 2019 Weighted Average Cost of Capital | For the Freight and Urban Networks, and the Pilbara Railways*, Final determination, 22 August 2019, p 9 [28].

[186] ESC, *Inquiry into the Port of Melbourne compliance with the pricing order*, Final report, 31 December 2021, p 57.

[187] QCA, *Cost of capital: market parameters*, Final decision, August 2014, pp 72-73.

[188] QCA, *Cost of capital: market parameters*, Final decision, August 2014, pp 67-68, 72.

[189] QCA, *Cost of capital: market parameters*, Final decision, August 2014, p 72.

We have consulted extensively with the QCA when constructing our model. The QCA have informed us that their Cornell DDM now assumes a single discount rate across all stages, compared to their previous approach that specified a term structure with a long-run market return on equity of 11.80 per cent after ten years.[190] The QCA uses its new DDM implementation in its final decision for Seqwater.[191]

Table 5.4 presents our MRP estimates using the QCA DDM for the 20 trading days to 31 March 2022, assuming 75 per cent of dividends are fully franked and an imputation credit utilisation rate is 0.625. We estimate a median MRP of 6.11 per cent.

Table 5.4: QCA DDM estimates

Long-term growth	10-year convergence	20-year convergence
4.0%	5.94%	5.49%
4.6%	6.45%	5.93%
5.1%	6.87%	6.29%

Source: Bloomberg, QCA, HoustonKemp analysis

Appendix A3.5 provides further details about the QCA's Cornell DDM, along with comparisons of our model estimates against the QCA's. In particular, we note that our point estimate is within 0.1 per cent of the QCA's estimate for Seqwater.

DDM MRP point estimate

We adopt a DDM MRP point estimate of 6.68 per cent, calculated as the median of the estimates from each regulator. This is consistent with CEPA's view that the median DDM estimate was preferable to the mean because of its robustness to extreme observations:[192]

> Given the variety of DDMs and their potential to produce widely different MRP estimates, we consider it appropriate that Synergies uses a range of DDMs that is as comprehensive and reflective of Australian regulatory precedent as possible. Therefore, Synergies' selection of DDMs in 2020-21 appears reasonable, **although arguably the median, rather than the average of different DDM specifications, is more robust to extreme observations. Taking the median of different DDMs would also be in line with the approaches by IPART and the QCA.** (emphasis added)

5.5.4   Wright approach

As section 5.5.1 explains, Australian regulators currently do not apply the Wright approach. Consistent with clause 21(b) of the Undertaking, we assign no weight to the Wright approach, although we note that regulators in the UK currently use it when estimating the MRP and this point has been noted by Australian regulators.[193]

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[190] QCA, *Cost of capital: market parameters*, Final decision, August 2014, pp 71-72.

[191] See: QCA, *Seqwater Bulk Water Price Review 2022–26*, Final report, March 2022, p 69.

[192] CEPA, *Port of Melbourne five-year review – WACC*, Final report, 17 December 2021, p 36.

[193] See: AER, *Overall rate of return, equity and debt omnibus*, Final working paper, December 2021, pp 55-56. ERA, *2022 gas rate of return instrument review*, Discussion paper, December 2021, pp 64-65 [367].

5.5.5   MRP point estimate

Our MRP point estimate is 6.63 per cent. Consistent with our discussion in section 5.5.1, we retain the approach from PoM's 2021-22 TCS, which applies:

- 85 per cent weight to the mean HER estimate: 6.62 per cent; and
- 15 per cent weight to the median DDM estimate: 6.68 per cent.

6. Tax rate and gamma

PoM estimates a gamma of 0.50 for its 2021-22 TCS.[194] The ESC's analysis concluded that PoM's 0.50 gamma estimate is consistent with well accepted approaches for 2019-20 and 2020-21, while the corresponding gamma estimate is 0.45 for 2017-18 and 2018-19.[195]

We have retained PoM's 0.50 gamma estimate for this report, which is calculated as the product of:

- 0.625 utilisation rate; and
- 0.8 distribution rate.

This approach is consistent with clause 22 of the Undertaking.

We adopt a corporate tax rate of 30 per cent, consistent with Australian legislation.[196]

6.1 Gamma

PoM's previous approach for its 2020-21 TCS assigns:[197]

- 66.7 per cent weight to the equity ownership approach, which generates a 0.5 gamma estimate; and
- 33.3 per cent weight to evidence from financial practitioners, which generates a zero gamma estimate.

The ESC considered the approach as not well-accepted, since majority of Australian regulators use the equity ownership approach. In particular, the ESC considered that since the imputation credit system is only used in a few jurisdictions, it is appropriate to identify the approach for estimating gamma by referring to Australian regulatory approaches.[198] The ESC further observed that aside from IPART, most economic regulators adopt a gamma that ranges between 0.4 and 0.585.[199]

PoM's approach for its 2021-22 TCS uses a gamma estimate of 0.50, which it estimates using the equity ownership approach. This estimate is cross-checked against estimates derived from dividend drop-off studies and evidence from financial practitioners and academic evidence.[200]

The ESC concluded that PoM's 0.50 gamma estimate for 2020-21 was consistent with a well-accepted approach.[201]

There has been no major shift in the gamma estimates adopted by Australian regulators since the ESC's final report. In particular:

- the AER's December 2021 omnibus final working paper expresses:[202]
  - > its preferred position to retain its current approach for estimating the distribution rate and utilisation rate of imputation credits, pending investigation of ATO data; and

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[194] Synergies, *Determining a WACC estimate for Port of Melbourne*, May 2021, p 63.

[195] ESC, *Inquiry into the Port of Melbourne compliance with the pricing order*, Final report, 31 December 2021, p 81.

[196] ATO, https://www.ato.gov.au/Rates/Company-tax/, accessed 17 March 2022.

[197] Synergies, *Determining a WACC estimate for Port of Melbourne*, May 2020, p 4.

[198] ESC, *Inquiry into the Port of Melbourne compliance with the pricing order*, Final report, 31 December 2021, p 77.

[199] ESC, *Inquiry into the Port of Melbourne compliance with the pricing order*, Final report, 31 December 2021, p 77.

[200] Synergies, *Determining a WACC estimate for Port of Melbourne*, May 2021, pp 63-64.

[201] ESC, *Inquiry into the Port of Melbourne compliance with the pricing order*, Final report, 31 December 2021, p 81.

[202] AER, *Overall rate of return, equity and debt omnibus*, Final working paper, December 2021, p 28.

> its preliminary position to assume foreign non-resident investors assign no value to imputation credits;

- the ERA's working view in the discussion paper for its 2022 gas RoRI maintains the 0.5 gamma estimate from its 2018 Gas Guidelines, consisting of the product of 0.9 distribution rate and 0.6 utilisation rate, rounded to one decimal place, though the ERA will continue to review additional developments clarifying the use of ATO tax statistics;[203]

- the QCA's rate of return review in November 2021 states its preliminary view that its current 0.484 gamma estimate remains appropriate, corresponding to a distribution rate of 0.88 and a utilisation rate of 0.55;[204]

- the ICRC's WACC review final report does not provide a gamma estimate, but states that the ICRC will evaluate the interrelationship between gamma and MRP as part of its next price investigation;[205]

- OTTER's draft report on its investigation for TasWater does not include a gamma estimate, other than to acknowledge that the AER's MRP estimate adjusts for imputation credits;[206] and

- the WASC's judgment for Perth Airport adopts the same gamma estimate as the AER, ie, 0.585 gamma, reflecting a distribution rate of 0.90 and a utilisation rate of 0.65.[207]

Taking the above regulatory precedent into account, we continue adopting a benchmark gamma of 0.5 from PoM's 2021-22 TCS, which the ESC considered as having been derived from well accepted approaches, and which is consistent with clause 23 of the Undertaking. This retains a 0.625 utilisation rate and 0.8 distribution rate.

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[203] ERA, *2022 gas rate of return instrument review*, Discussion paper, December 2021, pp 93-94 [536]-[541].

[204] QCA, *Rate of return review*, Final report, November 2021, pp 87-88.

[205] ICRC, *Review of methodologies for the weighted average cost of capital*, Final report, April 2021, p 15.

[206] OTTER, *Investigation into TasWater's prices and services for the period 1 July 2022 to 30 June 2026*, Draft report, February 2022, p 73.

[207] *Perth Airport Pty Ltd v Qantas Airways Ltd [No 3]* [2022] WASC 51 [187], [190]-[191].

7. Weighted average cost of capital

Based on the discussion in the previous sections, we estimate a pre-tax nominal WACC estimate of 8.99 per cent using approaches that we consider to be well accepted.

The Inquiry included a comparison of PoM's 2020-21 WACC parameters against the estimates for selected regulated transport infrastructure businesses. We consider this line of reasoning to be flawed because industry specific WACC parameters are not directly comparable across industries with substantially different characteristics and across different time periods, while cost of debt estimates are affected by the date of the transition to the trailing average.

Furthermore, we note that clause 4.3 of the Pricing Order focuses on the use of 'well accepted approaches', instead of a 'well accepted WACC estimate', while clause 4.1.1 stipulates that the estimated rate of return should be 'commensurate with that which would be required by a benchmark efficient entity providing services with a similar degree of risk'.

As such, we consider that this analysis cannot be used to determine whether PoM's overall WACC estimate reflects a commensurate return, since it compares PoM's WACC estimates against other entities that may not provide services with a similar degree of risk. Instead, in this report we have focused our analysis on identifying and applying well accepted approaches for estimating the WACC, which ensures that the overall WACC estimate is commensurate with that required by a benchmark efficient entity providing services with a similar degree of risk of risk.

7.1   Estimate of pre-tax nominal WACC

Table 7.1 presents our estimates of the individual WACC parameters for PoM's 2022-23 TCS and compares them to the estimates from PoM's 2021-22 TCS. The formula we use to calculate the pre-tax nominal WACC is consistent with clause 17(b) of the Undertaking.

We note that our pre-tax nominal WACC estimate of 8.99 per cent is 76 bp higher than the 8.23 per cent estimate from PoM's 2021-22 TCS. This is primarily caused by the 87 bp increase in the risk free rate from 1.70 per cent to 2.57 per cent. As Table 7.1 shows, had the risk free rate remained unchanged at 1.70 per cent, our pre-tax nominal WACC estimate for 2022-23 would instead have been 8.26 per cent, which is 3 bp higher than the corresponding 8.23 per cent estimate from PoM's 2021-22 TCS.

Table 7.1: Weighted average cost of capital estimates

	Parameter	2021-22 TCS	HoustonKemp 2022-23	HoustonKemp 2022-23, risk free rate unchanged	Formula
(a)	Return on debt (including debt raising costs)	4.90%	4.78%	4.69%	Rounded to two decimal places.
(b)	Return on equity	8.24%	8.54%	7.78%	(b1) + (b2) × (b3)
(b1)	- risk free rate	1.70%	2.57%	1.70%	Rounded to two decimal places.
(b2)	- MRP	6.54%	6.63%	6.76%	Rounded to two decimal places.
(b3)	- equity beta	1.0[208]	0.90	0.90	(b3b) ÷ (1 – (c))
(b3b)	- asset beta	0.70	0.72	0.72	Rounded to two decimal places.
(c)	Gearing	30%	20%	20%	Rounded to nearest percentage point.
(d)	Tax rate	30%	30%	30%	
(e)	Gamma	0.50	0.50	0.50	(e1) × (e2)
(e1)	- utilisation rate	0.625	0.625	0.625	
(e2)	- distribution rate	0.8	0.8	0.80	
	Pre-tax nominal WACC	**8.23%**	**8.99%**	**8.26%**	$(c) \times (a) + \dfrac{(1-(c)) \times (b)}{1-(d) \times (1-(e))}$

Source: Synergies, Determining a WACC estimate for Port of Melbourne, May 2021, pp 3-4, 65; HoustonKemp analysis. We round the parameter estimates to two decimal places before inserting them into the formulae shown in the rightmost column without subsequently rounding the intermediate steps, ie, the equity beta, return on equity, and gamma estimates are unrounded.

7.2   Comparison against other regulated transport businesses

The Inquiry included a comparison of PoM's 2020-21 WACC parameters against the estimates for selected regulated transport infrastructure businesses. Based on this analysis, the ESC concluded that PoM's MRP, equity beta and gamma are consistently 'within the range that lends itself to higher WACC estimates'.

We consider this line of reasoning to be flawed because:

- industry-specific WACC parameters for the benchmark efficient port are difficult to compare against other industries;

- WACC estimates from different time periods are not comparable; and

- cost of debt estimates are affected by the date of the transition to the trailing average.

Regarding the first dot point, we consider that PoM's estimates for industry specific parameters are not comparable against other regulatory decisions, since those regulators have derived their estimates for different industries that is not comparable to container ports.

We note as well that this observation is consistent with the ESC's reluctance to include out-of-sector comparators when estimating the benchmark asset beta.[209] That is, if the ESC considered that including out-of-sector comparators will lead to estimates that are inappropriately biased, then it logically follows that industry-specific parameter estimates derived from regulatory decisions for other industries will also not reflect the benchmark estimates for the benchmark efficient port.

Regarding the second dot point, we note that the ESC compared PoM's estimates against regulator estimates from different time periods. For example, PoM's 2020-21 TCS was published in May 2020, but the

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[208] ESC, *Inquiry into the Port of Melbourne compliance with the pricing order*, Final report, 31 December 2021, pp 41-44.

[209] ESC, *Inquiry into the Port of Melbourne compliance with the pricing order*, Final report, 31 December 2021, p 65.

ESC cited regulatory decisions as early as December 2018 and as recent as August 2021. Such substantial differences in estimation timeframes mean that the parameter estimates will not be comparable across businesses.

Finally, as the third dot point states, the benchmark cost of debt will differ depending on when the regulated business began its transition to the trailing average. We note that the ESC compared PoM's WACC estimates against those of ACCC, IPART, ERA, and QCA. Of these regulators, the ACCC does not apply a trailing average, while the others apply a trailing average with no transition. These differences mean that PoM's cost of debt estimates cannot be compared directly against that of other regulatory decisions.

Furthermore, we note that clause 4.3 of the Pricing Order focuses on the use of 'well accepted approaches', instead of a 'well accepted WACC estimate', while clause 4.1.1 stipulates that the estimated rate of return should be 'commensurate with that which would be required by a benchmark efficient entity providing services with a similar degree of risk'.

Overall, we consider that this analysis cannot be used to determine whether PoM's overall WACC estimate is a commensurate return, since it compares PoM's WACC estimates against other entities that may not provide services with a similar degree of risk. Instead, in this report we have focused our analysis on identifying well accepted approaches for estimating the WACC, which ensures that the overall WACC estimate is commensurate with that required by a benchmark efficient entity providing services with a similar degree of risk of risk.

8. Declaration

In accordance with the requirements of the Code of Conduct, we declare that we have made all inquiries that we believe are desirable and appropriate, and that no matters of significance that we regard as relevant have, to our knowledge, been withheld from the Court. We declare that we have read the Code of Conduct and agreed to be bound by it.

In accordance with the requirements of the Practice Notice, we declare that we have made all the inquiries that we believe are desirable and appropriate and that no matters of significance which we regard as relevant have to our knowledge been withheld from the Tribunal. We declare that we have read the Practice Notice and agreed to be bound by it.

Brendan Quach

11 May 2022

Johnathan Wongsosaputro

11 May 2022

A1.   List of firms in the comparator samples

As section 3.1 describes, we identify the comparator sample by:

- using Bloomberg's EQS to identify potential comparators based on the BICS and GICS classifications;
- applying filters for market capitalisation and liquidity; and
- analysing the remaining companies manually to remove those that do not own and operate container port and channel infrastructure.

This is consistent with clause 25(c) of the Undertaking.

Table A.1 sets out the list of firms in our preferred and alternative comparator samples.

Table A.1: List of comparators

Ticker	Company	Sample	Bloomberg description	Inclusions in previous samples
000582 CH Equity	Beibuwan Port Co Ltd	Preferred and alternative	Beibuwan Port Co., Ltd. provides support services for water transportation, including loading and unloading, storage, transportation, and other port related services. Through its subsidiaries, the company also acts as an overseas transportation agent and develops real estate.	Incenta
1199 HK Equity	COSCO SHIPPING Ports Ltd	Preferred and alternative	COSCO SHIPPING Ports Limited, through its subsidiaries, provides ports services worldwide. The company operates container terminals, and provides container handling, storage, transportation, management, and stevedoring services.	Synergies, Incenta, CEPA A, CEPA B
144 HK Equity	China Merchants Port Holdings Co Ltd	Preferred and alternative	China Merchants Port Holdings Company Limited, through its subsidiaries and associated companies, operates ports, airports, and other container and cargo terminals around the world. The company also manages toll roads, properties, and assets management.	Synergies, Incenta, CEPA A, CEPA B
2880 HK equity	Liaoning Port Co Ltd	Preferred and alternative	Liaoning Port Co.,Ltd. provides logistics services. The company offers container handling, container transportation, crude oil warehousing, gross cargo transportation, and other services. Liaoning Port provides its services throughout China.	CEPA A, CEPA B
600017 CH Equity	Rizhao Port Co Ltd	Preferred and alternative	Rizhao Port Co.,Ltd. conducts port management and operation businesses. The company provides cargo warehousing, handling, transportation, and transit services. Rizhao Port provides port services for coal, cements, steel materials, minerals, and wood products.	Incenta
600018 CH Equity	Shanghai International Port Group Co Ltd	Preferred and alternative	Shanghai International Port (Group) Co., Ltd. offers port operation services. The company provides cargo handling, port logistics, port commerce, pilotage, tugboat, shipping tally, and other port related services. Shanghai International Port (Group) provides services for worldwide customers.	Incenta
600317 CH Equity	Yingkou Port Liability Co Ltd	Preferred and alternative	Yingkou Port Liability Co.,Ltd operates ports. The company provides cargo loading, cargo unloading, storage, port facilities maintenance, and other services. Yingkou Port Liability also sales metal ores, steel materials, wood chips, soybean oils, and other products.	Incenta
601008 CH Equity	Jiangsu Lianyungang Port Co Ltd	Preferred and alternative	Jiangsu Lianyungang Port Co.,Ltd. operates port and harbors. The company provides loading, unloading, storage, port equipment rentals, port maintenance, and other services. Jiangsu Lianyungang Port also operates equipment repairing.	Incenta
601018 CH Equity	Ningbo Zhoushan Port Co Ltd	Preferred and alternative	Ningbo Zhoushan Port Company Limited operates port transportation and logistics businesses. The company provides container, iron ore, crude oil, and other cargo handling and loading services. Ningbo Zhoushan Port provides services for worldwide customers.	Incenta
6198 HK Equity	Qingdao Port International Co Ltd	Preferred and alternative	Qingdao Port International Co.,Ltd. operates ports and harbors. The company provides loading, unloading, cargo storage, tugboat operation, port passenger transportation, and other services. Qingdao Port International also operates financing, ports construction, and other businesses.	Incenta, CEPA A, CEPA B
ADSEZ IN Equity	Adani Ports & Special Economic Zone Ltd	Preferred and alternative	Adani Ports and Special Economic Zone Limited operates a shipping port on the west coast of India. The company provides cargo handling, transportation, storage, logistics, and evacuation services to energy, railway, thermal power generation and transmission, agricultural, and logistics industries.	Incenta
GPPV IN Equity	Gujarat Pipavav Port Ltd	Preferred and alternative	Gujarat Pipavav Port Ltd. operates a marine shipping port. The port loads and unloads container, bulk, and liquid cargo.	Incenta
HHFA GR Equity	Hamburger Hafen und Logistik AG	Preferred and alternative	Hamburger Hafen und Logistik AG (HHLA) provides services to the port in the European North Range. The company's container terminals, transport systems, and logistic services provide a network between overseas port and European hinterland.	Synergies, CEPA A, CEPA B

Ticker	Company	Sample	Bloomberg description	Inclusions in previous samples
POT NZ Equity	Port of Tauranga Ltd	Preferred and alternative	Port of Tauranga Limited activities include the provision of wharf facilities, back up land for the storage and transit of import and export cargo, berthage, cranes, tug and pilotage services for exporters, importers and shipping companies and the leasing of land and buildings. The group also operates a container terminal and has bulk cargo marshalling operations.	Synergies, Incenta, CEPA A, CEPA B
PPA GA Equity	Piraeus Port Authority SA	Preferred and alternative	Piraeus Port Authority SA manages the Piraeus harbor. The company provides services such as loading and unloading cargo, warehousing, and transportation of cars. Piraeus Port Authority offers electricity, water, and other services. Piraeus Port Authority responsible for maintaining the port and controlling the movement of ships.	CEPA A, CEPA B
WPRTS MK Equity	Westports Holdings Bhd	Preferred and alternative	Westports Holdings Berhad provides port services. The company offers container and cargo services, marine services, rental services and other ancillary services. Westports provides its services to the import and export industries.	CEPA A, CEPA B
002040 CH Equity	Nanjing Port Co Ltd	Preferred and alternative	Nanjing Port Co., Ltd. operates as a port transportation service agency. The company transports crude oil, refined oil, and liquid chemical products. Nanjing Port also provides general cargo handling and warehousing, container disassembly, electronic data exchange, information consultation, and logistics services.	-
201872 CH Equity	China Merchants Port Group Co Ltd	Preferred and alternative	China Merchants Port Group Co., Ltd. offers port operation services. The company mainly develops, operates, and manages ports. China Merchants Port Group also provides bonded logistics services.	-
601228 CH Equity	Guangzhou Port Co Ltd	Preferred and alternative	Guangzhou Port Company Limited provides port and harbor operation services. The company offers loading, discharging, storing, bonded warehousing, logistics, and other port services. Guangzhou Port also operates technology import and export, commodity trade, and other businesses.	-
DVP VN Equity	Dinh Vu Port Investment & Development JSC	Preferred and alternative	Dinh Vu Port Investment & Development JSC owns and operates the Dinh Vu Port. The company is involved in port development, general cargo, container, dry bulk and combined terminals.	-
GMD VN Equity	Gemadept Corporation	Preferred and alternative	Gemadept Corporation is a shipping company. The company's business activities include port operations, container liner service, shipping and forwarding agency logistics, project cargo transport, real estate, and financial investment.	-
NMTP RM Equity	Novorossiysk Commercial Sea Port PJSC	Preferred and alternative	Novorossiysk Commercial Sea Port PJSC owns and operates the Novorossiysk Port on the BlackSea. The company processes, loads, and unloads cargo. Novorossiysk Commercial Sea Trade Port handles mainly crude oil but also services dry cargo such as metals, cement, sugar, grain and containers.	-
SISCO AB Equity	Saudi Industrial Services Co (SISCO)	Preferred and alternative	SISCO provides catering services, operates gasoline filling stations, and manages the desalination project of the Jeddah Islamic Seaport.	-
STBP3 BZ Equity	Santos Brasil Participacoes S/A	Preferred and alternative	Santos Brasil Participacoes S.A., through its subsidiaries, operates and manages container terminals in ports of Brazil. The company provides logistics, transportation and distribution services integrated to port terminals.	-
NYT TB Equity	Namyong Terminal PCL	Alternative only	Namyong Terminal PCL is a roll on roll off terminal operator. The company offers terminal services, car storage areas and warehousing services in Thailand.	CEPA A
2607 TT Equity	Evergreen International Storage & Transport Corp	Alternative only	Evergreen International Storage & Transport Corporation provides motor freight transportation and warehousing, cargo handling operation, as well as automobile repairing services.	-
2613 TT Equity	China Container Terminal Corp	Alternative only	China Container Terminal Corporation operates container terminals. The company's terminals are located in the ports of Kaohsiung, Taichung, and Keelong in Taiwan.	CEPA C, CEPA D
600717 CH Equity	Tianjin Port Co Ltd	Alternative only	Tianjin Port Holdings Co., Ltd. provides port operation services. The company offers commodity storage, transit transportation, container handling, dismantling and loading, and other services. Tianjin Port Holdings also provides financial services.	-
900952 CH	Jinzhou Port Co Ltd	Alternative	Jinzhou Port Co.,Ltd. operates ports and harbors. The company provides loading, unloading, warehousing,	-

Ticker	Company	Sample	Bloomberg description	Inclusions in previous samples
Equity		only	port facilities management, and other services. Jinzhou Port also operates house loans, power supply, property management, and other businesses.	
9364 JP Equity	Kamigumi Co Ltd	Alternative only	Kamigumi Co., Ltd. provides port-harbor transportation services. The company's services include port-harbor transport, warehousing, trucking, packing, and heavy cargo transport. Kamigumi also provides other services like real estate, insurance agency operations, sports clubs, and restaurant management.	-

Source: Bloomberg, HoustonKemp analysis
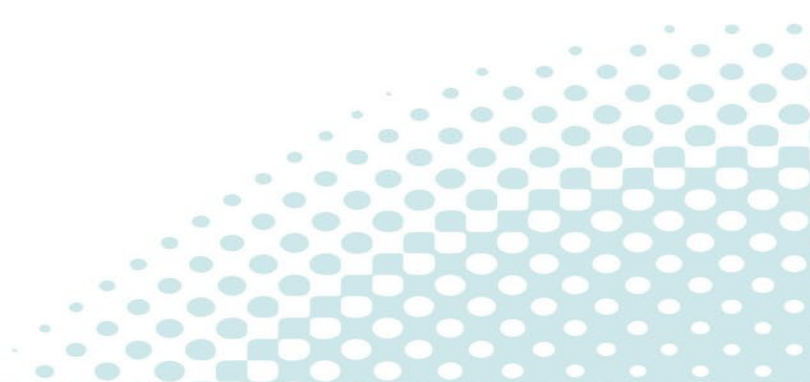
Table A.2 sets out the full list of 186 tickers that we obtain from BICS and GICS. Tickers that pass the market cap and liquidity filters are indicated as 'In', while those that fail the filters are indicated with blank cells. The '5y candidate' and '10y candidate' columns set out the tickers that pass both filters.

Table A.2: List of exclusions from BICS and GICS samples

Ticker	5y market cap	5y liquidity	5y candidate	10y market cap	10y liquidity	10y candidate
000507 CH Equity	In	In	In	In	In	In
000582 CH Equity	In	In	In	In	In	In
000905 CH Equity	In	In	In	In	In	In
002040 CH Equity	In	In	In	In	In	In
002492 CH Equity	In	In	In	In	In	In
002930 CH Equity	In			In		
004140 KS Equity	In	In	In	In	In	In
004360 KS Equity	In	In	In	In	In	In
1199 HK Equity	In	In	In	In	In	In
144 HK Equity	In	In	In	In	In	In
1719 HK Equity	In			In		
201872 CH Equity	In	In	In	In	In	In
219426 MK Equity						
2258 HK Equity						
2607 TT Equity	In	In	In	In	In	In
2613 TT Equity	In	In	In	In	In	In
2880 HK equity	In			In	In	In
3369 HK Equity	In	In	In	In		
3378 HK Equity	In			In		
3382 HK Equity	In			In		
498 HK Equity						
517 HK Equity	In	In	In	In	In	In
5601 TT Equity						
600017 CH Equity	In	In	In	In	In	In
600018 CH Equity	In	In	In	In	In	In
600279 CH Equity	In	In	In	In	In	In
600317 CH Equity	In			In	In	In
600575 CH Equity	In	In	In	In	In	In
600717 CH Equity	In	In	In	In	In	In
601000 CH Equity	In	In	In	In	In	In
601008 CH Equity	In	In	In	In	In	In
601018 CH Equity	In	In	In	In	In	In
601228 CH Equity	In	In	In	In		
6117 HK Equity	In			In		
6119 HK Equity						
6198 HK Equity	In	In	In	In		
8502 HK Equity						
871 HK Equity						

Ticker	5y market cap	5y liquidity	5y candidate	10y market cap	10y liquidity	10y candidate
900952 CH Equity	In	In	In	In	In	In
9066 JP Equity	In	In	In	In	In	In
9301 JP Equity	In	In	In	In	In	In
9303 JP Equity	In	In	In	In	In	In
9351 JP Equity		In			In	
9353 JP Equity						
9355 JP Equity						
9357 JP Equity	In			In		
9359 JP Equity	In			In		
9361 JP Equity						
9364 JP Equity	In	In	In	In	In	In
9365 JP Equity						
9367 JP Equity						
ADPORTS UH Equity						
ADSEZ IN Equity	In	In	In	In	In	In
AIHC1 PE Equity						
ALCN EY Equity	In			In		
APMTB BI Equity	In			In		
ATI PM Equity	In			In		
B TB Equity						
BBRM IJ Equity						
BLH GR Equity						
BMS LN Equity						
BPH MK Equity	In			In		
CARC AR Equity						
CCP VN Equity						
CCR VN Equity						
CCT VN Equity						
CDN VN Equity	In			In		
CHL JA Equity						
CLL VN Equity						
CMVX RO Equity						
CPI VN Equity						
CQN VN Equity						
CSAG EY Equity	In			In		
CSEC SS Equity						
DBI AU Equity	In			In		
DCIL IN Equity	In	In	In	In	In	In
DVP VN Equity	In	In	In	In		
DXP VN Equity						
EMRN US Equity						
EUK2 GR Equity	In			In		
FROWARD CI Equity						
FSJ LN Equity	In	In	In	In	In	In

Ticker	5y market cap	5y liquidity	5y candidate	10y market cap	10y liquidity	10y candidate
GDPL IN Equity	In	In	In	In	In	In
GLPR LI Equity	In			In		
GMD VN Equity	In	In	In	In	In	In
GND SJ Equity	In			In	In	In
GOLD IT Equity	In			In		
GPH LN Equity						
GPPV IN Equity	In	In	In	In	In	In
GSSC EY Equity						
HAH VN Equity	In	In	In	In		
HHFA GR Equity	In	In	In	In	In	In
HPHT SP Equity	In			In		
ICT PM Equity	In	In	In	In	In	In
IPCC IJ Equity						
IPCM IJ Equity	In			In		
JDGT CZ Equity						
JITFIN IN Equity						
JTC KK Equity						
KARW IJ Equity						
KGL KK Equity						
KW JA Equity	In			In		
LBGD SG Equity						
LGT/A CN Equity	In			In		
LKLG SG Equity						
LKPC CZ Equity						
LKPG SV Equity	In			In		
LKRI CZ Equity						
MAC VN Equity						
MMH NZ Equity	In			In		
MMTP RU Equity						
MPL LN Equity						
MSA MC Equity	In			In		
MSCP RU Equity						
MTPV RU Equity	In			In		
MUSH RU Equity						
NACO IN Equity		In				
NAP VN Equity						
NHC IN Equity						
NKHP RM Equity	In	In	In	In		
NMDC UH Equity	In			In		
NMTP RM Equity	In	In	In	In	In	In
NOLE RU Equity						
NPH NZ Equity	In			In		
NSRZ RU Equity						
NYT TB Equity	In	In	In	In		

Ticker	5y market cap	5y liquidity	5y candidate	10y market cap	10y liquidity	10y candidate
OCN LN Equity	In			In		
ODES BU Equity						
OLTH GA Equity	In			In		
OSRP RU Equity						
OVRS IT Equity						
PAP VN Equity	In			In		
PDN VN Equity						
PFB BU Equity						
PHP VN Equity	In			In		
PIBTL PA Equity						
PICT PA Equity	In			In		
PLD TP Equity						
PORT IJ Equity	In			In		
PORT PM Equity	In			In		
PORT TB Equity		In				
PORT3 BZ Equity	In			In		
POT NZ Equity	In	In	In	In	In	In
PPA GA Equity	In	In	In	In	In	In
PRC VN Equity						
PRK MK Equity						
PSN VN Equity						
PSP VN Equity						
PSVM11 BZ Equity	In			In		
PTIS IJ Equity						
QUB AU Equity	In			In		
SAC VN Equity						
SAPORTL BD Equity						
SGLY US Equity						
SGP VN Equity	In			In		
SICL IN Equity						
SISCO AB Equity	In	In	In	In	In	In
SMSAAM CI Equity	In			In		
SOCP RO Equity						
SPN NZ Equity	In			In		
SPSI OM Equity	In			In		
STAEL IN Equity						
STBP3 BZ Equity	In	In	In	In		
SUH LN Equity						
SURIA MK Equity	In			In		
SVOC BC Equity						
TCL VN Equity						
TEBE IJ Equity						
TGMP RU Equity						
TLMAN TI Equity		In				

Ticker	5y market cap	5y liquidity	5y candidate	10y market cap	10y liquidity	10y candidate
TMTP RU Equity						
TOUP FP Equity		In			In	
TPOP RU Equity						
TSM1T ET Equity	In			In		
TUGS PM Equity						
UASG EY Equity						
ULPL CZ Equity						
VENTANA CI Equity	In			In		
VGP VN Equity						
VGR VN Equity						
VMS VN Equity						
VMSI IN Equity						
VOPT RU Equity						
WPRTS MK Equity	In	In	In	In		
WTE CN Equity	In	In	In	In	In	In
YRIV US Equity	In			In		

Source: Bloomberg, HoustonKemp analysis.

As section 3.1.1 sets out, we apply filters for market cap and liquidity, which reduce the number of potential comparators to 48 for the five-year sample and 42 for the ten-year sample. We then manually identify appropriate comparators using the process set out in section 3.1.2.

Table A.3 shows the findings from our manual checking of the companies that meet the market cap and liquidity criteria. Our manual checking primarily refers to Bloomberg's description of each company, as well its segment revenues for the most recent year as reported by Bloomberg. Where necessary, we carry out additional desktop research to ascertain the comparability of the firm.

We note that we have applied judgement in deriving the preferred and comparator samples without setting explicit minimum thresholds for revenues derived from container port infrastructure services. For example, we include Novorossiysk Commercial Sea Port (NMTP RM Equity) in our preferred and alternative samples even though Bloomberg states that it derives 97% of its revenues from 'stevedoring services'. We make this decision because our desktop research suggests that the company owns substantial assets in sea berths and port terminals.[210]

Table A.3: Manual check of comparators

Ticker	Name	Manual check	Final
000507 CH Equity	ZHUHAI PORT CO LTD-A	Company has substantial trading, electric, and beverages activities. 'Port transportation services' make up 7% of revenues. Excluded.	
000582 CH Equity	BEIBUWAN PORT CO LTD-A	Provides support services for water transportation, including loading and unloading, storage, transportation, and other port related services. Through its subsidiaries, the company also acts as an oversea transportation agent and develops real estate. 90% of revenues are attributed to 'loading/unloading and storage services'; 8% of revenues attributed to 'tugboat berthing and other port management services'. Included in preferred sample.	Pref
000905 CH	XIAMEN PORT DEVELOPMENT	87% of revenues derived from 'trading'. Excluded.	

[210] NCSP Group, *NCSP Annual report 2019*, pp 8-9.

Ticker	Name	Manual check	Final
Equity	CO-A		
002040 CH Equity	NANJING PORT CO LTD -A	Operates as a port transportation service agency. The company transports crude oil, refined oil, and liquid chemical products. Nanjing Port also provides general cargo handling and warehousing, container disassembly, electronic data exchange, information consultation, and logistics services. 74% of revenues derived from 'Container', remaining 26% derived from 'goods loading/unloading and storage'. Included in preferred sample.	Pref
002492 CH Equity	ZHUHAI WINBASE INTERNATION-A	Constructs and operates liquefied chemical port and storage facility. Services are provided for petrochemical producers instead of container shippers. Excluded.	
004140 KS Equity	DONGBANG TRANSPORT LOGISTICS	Provides stevedoring, forwarding, and container storage services. 36% of revenues derived from 'trucking transportation', 33% from 'loading & warehouse', 28% from 'marine transportation'. Excluded.	
004360 KS Equity	SEBANG CO LTD	Provides inland transportation services and container storage services. 23% of revenues derived from 'other harbor operations', 19% from 'harbor operations', and 14% from 'container yard operations'. Excluded.	
1199 HK Equity	COSCO SHIPPING PORTS LTD	Company operates container terminals, and provides container handling, storage, transportation, management, and stevedoring services. Company holds stakes in port terminals. All revenues derived from 'container terminal & related businesses'. Included in preferred sample.	Pref
144 HK Equity	CHINA MERCHANTS PORT HOLDING	Operates ports, airports, and other container and cargo terminals around the world. The company also manages toll roads, properties, and assets management. 93% of revenues derived from 'ports operations'. Included in preferred sample.	Pref
201872 CH Equity	CHINA MERCHANTS PORT GROUP-B	Offers port operation services. The company mainly develops, operates, and manages ports. It also provides bonded logistics services. 95% of revenues derived from 'port services'. Included in preferred sample.	Pref
2607 TT Equity	EVERGREEN INTERNATIONAL STOR	Provides motor freight transportation and warehousing, cargo handling operation, as well as automobile repairing services. 62% of revenues from 'international marine transportation'. Website shows that the company also has inland container haulage and inland container terminals, vehicle maintenance, and gas stations. The descriptions suggest that the company leases wharfs instead of investing in port infrastructure assets. (see: https://www.evergreen-eitc.com.tw/eitchtdocs/jsp/c_3/ce_3_0.jsp) Included in alternative sample.	Alt
2613 TT Equity	CHINA CONTAINER TERMINAL COR	60% of revenues from 'stevedoring operations', 35% from 'container operation'. Website suggests the company leases wharfs instead of investing in port infrastructure assets. (see: https://www.cctcorp.com.tw/terminal.php) Included in alternative sample.	Alt
2880 HK equity	LIAONING PORT CO LTD-H	Liaoning Port Co.,Ltd. provides logistics services. The company offers container handling, container transportation, crude oil warehousing, gross cargo transportation, and other services. Liaoning Port provides its services throughout China. 38% of revenues from 'container logistic services' and 16% from 'port terminal logistics services'. Another 40% of revenues from 'oil & liquid chemical logistics services' and 'bulk grains terminal and logistics services'. Included in preferred sample.	Pref
3369 HK Equity	QINHUANGDAO PORT CO LTD-H	Qinhuangdao Port Company Limited loads, stores, transports port cargo. The company's main products include liquid chemicals, iron ore and coal, oil and other cargo, containers and other products. All revenues derived from 'integrated port services', but only 1% comes from 'container'. 89% of revenues are from 'dry bulk'. Excluded.	
517 HK Equity	COSCO SHIPPING INTERNATIONAL	COSCO SHIPPING International (Hong Kong) Co., Ltd. provides shipping related services. The company offers shipping, logistics, shipbuilding and ship repair services, ship trading agency services, marine insurance brokerage services, marine equipment and spare parts, coating products, and marine fuel and other related shipping products. COSCO International serves clients around the world. 77% of revenues derived from 'shipping services' including 38% from 'marine equipment and spare parts' and 32% from 'coatings'. Remaining 23% from 'general trading'.	

Ticker	Name	Manual check	Final
		Excluded.	
600017 CH Equity	RIZHAO PORT CO LTD -A	Operates harbor operation business. The company provides cargo handling, warehousing services, port equipment leasing, and other services. Rizhao Port Jurong offers services in China.	Pref
		52% of revenues from 'port and harbor operations', 11% from 'port logistics business'.	
		Included in preferred sample.	
600018 CH Equity	SHANGHAI INTERNATIONAL POR-A	Shanghai International Port (Group) Co., Ltd. offers port operation services. The company provides cargo handling, port logistics, port commerce, pilotage, tugboat, shipping tally, and other port related services. Shanghai International Port (Group) provides services for worldwide customers.	Pref
		All revenues from 'container cargo', 'port logistics', 'port development', 'port operation services', 'cargo handling', and 'other operations'.	
		Included in preferred sample.	
600279 CH Equity	CHONGQING PORT CO L-A	Chongqing Port Co.,Ltd. offers harbor and port operation services. The company provides inland water freight, passenger transportation, cargo loading, cargo unloading, ship repairing, and other services. Chongqing Port also operates merchandise import and export businesses.	
		65% of revenues from 'sales of merchandise', 25% from 'goods loading/ unloading'.	
		Excluded.	
600317 CH Equity	YINGKOU PORT LIABILITY CO-A	Yingkou Port Liability Co.,Ltd operates ports. The company provides cargo loading, cargo unloading, storage, port facilities maintenance, and other services. Yingkou Port Liability also sales metal ores, steel materials, wood chips, soybean oils, and other products.	Pref
		97% of revenues from 'toll port', 3% from 'other operations (storage & labor services)'.	
		Included in preferred sample.	
600575 CH Equity	HUAIHE ENERGY GROUP CO LTD-A	Anhui Wanjiang Logistics (Group) Co.,Ltd conducts port logistics businesses. The company provides coal logistics, container transit, warehousing, and cargo tracking services. Anhui Wanjiang Logistics (Group) also offers railway transportation services.	
		55% of revenues from 'logistics', 24% from 'electric power'.	
		Excluded.	
600717 CH Equity	TIANJIN PORT CO LTD-A	Tianjin Port Holdings Co., Ltd. provides port operation services. The company offers commodity storage, transit transportation, container handling, dismantling and loading, and other services. Tianjin Port Holdings also provides financial services.	Alt
		51% of revenues from 'Port and harbor operations', including 47% from 'loading and unloading' and 4% from 'port service'. 41% of revenues from 'sales' and 11% from 'port logistics business'.	
		Included in alternative sample.	
601000 CH Equity	TANGSHAN PORT GROUP CO LTD-A	Tangshan Port Group Co.,Ltd operates port businesses. The company provides port construction, operation, bulk cargo handling, transport, warehousing, and other logistics businesses. Tangshan Port Group transports ores, coal, steel materials, and other products.	
		57% of revenues from 'loading and storage income', 37% from 'sale of basic materials'.	
		Excluded.	
601008 CH Equity	JIANGSU LIANYUNGANG PORT -A	Jiangsu Lianyungang Port Co.,Ltd. operates port and harbors. The company provides loading, unloading, storage, port equipment rentals, port maintenance, and other services. Jiangsu Lianyungang Port also operates equipment repairing.	Pref
		Fitch refers to the tariffs of Lianyungang port when evaluating the credit rating of its parent company (Lianyungang Port Group Co Ltd). See: Fitch, https://www.fitchratings.com/research/infrastructure-project-finance/fitch-assigns-lianyungang-port-first-time-rating-of-bbb-outlook-stable-21-03-2022, accessed 7 April 2022.	
		74% of revenues from 'loading and uploading'.	
		Included in preferred sample.	
601018 CH Equity	NINGBO ZHOUSHAN PORT CO LT-A	Ningbo Zhoushan Port Company Limited operates port transportation and logistics businesses. The company provides container, iron ore, crude oil, and other cargo handling and loading services. Ningbo Zhoushan Port provides services for worldwide customers.	Pref
		31% of revenues from 'integrated logistics', 26% from 'container handling', 16% from 'trade sales', 12% from 'other cargo handling', 10% from 'iron ore handling'.	
		Included in preferred sample.	
601228 CH Equity	GUANGZHOU PORT CO LTD-A	Guangzhou Port Company Limited provides port and harbor operation services. The company offers loading, discharging, storing, bonded warehousing, logistics, and other port services. Guangzhou Port also operates technology import and export, commodity trade, and other businesses.	Pref
		54% of revenues from 'loading and related business income', 11% from 'logistics and port auxiliary service' and 31% from 'trading business'.	
		Included in preferred sample.	
6198 HK Equity	QINGDAO PORT INTERNATIONAL-H	Qingdao Port International Co.,Ltd. operates ports and harbors. The company provides loading, unloading, cargo storage, tugboat operation, port passenger transportation, and other services. Qingdao Port International also operates financing, ports construction, and other businesses.	Pref
		The company's website states that it is the primary operator of the Port of Qingdao and operates	

Ticker	Name	Manual check	Final
		four port areas in Qingdao. See: https://www.qingdao-port.com/portal/en/11) 37% of revenues from 'logistics and port value-added services', 20% from 'port construction and other services'. Another 25% of revenues from 'metal ore, coal and other cargo handling and ancillary services' and 17% from 'liquid bulk handling and ancillary services'. Included in preferred sample.	
900952 CH Equity	JINZHOU PORT CO LTD-B	Jinzhou Port Co.,Ltd. operates ports and harbors. The company provides loading, unloading, warehousing, port facilities management, and other services. Jinzhou Port also operates house loans, power supply, property management, and other businesses. 25% of revenues from 'port services', remainder from 'other operations (include disposal of property & equipment, gain from debts restructuring)'. Included in alternative sample.	Alt
9066 JP Equity	NISSIN CORP	NISSIN CORPORATION is a transport company. The company provides port-harbor, land, air transport services, and warehousing. Nissin has operation bases overseas including the United States, China, Europe, and Russia. 97% of revenues from 'logistics services'. Excluded.	
9301 JP Equity	MITSUBISHI LOGISTICS CORP	Mitsubishi Logistics Corporation provides warehousing, logistics, and other distribution services in Japan, the United States, and Asia. The company operates ground, port-harbor, and international intermodal transport as well as real estate leasing. 84% of revenues from 'logistics', 16% from 'real estate'. Excluded.	
9303 JP Equity	SUMITOMO WAREHOUSE CO LTD	The Sumitomo Warehouse Co., Ltd. operates warehousing and freight transportation businesses. The company provides integrated transportation services including marine, land, and air freight, and stores cargos in warehouses throughout Japan. Sumitomo Warehouse also operates a real estate leasing business. 83% of revenues from 'logistics business', 11% from 'marine transportation business' and 5% from 'real estate business'. Excluded.	
9364 JP Equity	KAMIGUMI CO LTD	Kamigumi Co., Ltd. provides port-harbor transportation services. The company's services include port-harbor transport, warehousing, trucking, packing, and heavy cargo transport. Kamigumi also provides other services like real estate, insurance agency operations, sports clubs, and restaurant management. Company's website states that it operates container terminals in Tokyo and Kobe ports. (see: https://www.kamigumi.co.jp/english/service/logistics/port.html) 79% of revenues from 'domestic logistics', 12% from 'international logistics'. Included in alternative sample.	Alt
ADSEZ IN Equity	ADANI PORTS AND SPECIAL ECON	Adani Ports and Special Economic Zone Limited operates a shipping port on the west coast of India. The company provides cargo handling, transportation, storage, logistics, and evacuation services to energy, railway, thermal power generation and transmission, agricultural, and logistics industries. Company's website states that the company is India's largest private port operator and an end-to-end logistics provider. The company also refers to its portfolio of ports infrastructure and services. See: https://www.adaniports.com/Ports-and-Terminals 92% of revenues from 'port & SEZ activities'. Included in preferred sample.	Pref
DCIL IN Equity	DREDGING CORP OF INDIA LTD	Dredging Corporation of India Ltd. carries out dredging activities which include executing capital and maintenance dredging for ports to open new parts and to expand the existing ports. The company is active in sand trap dredging as well as inland dredging. All revenues from 'dredging activities'. Excluded.	
DVP VN Equity	DINH VU PORT INVESTMENT & DE	Dinh Vu Port Investment & Development JSC owns and operates the Dinh Vu Port. The company is involved in port development, general cargo, container, dry bulk and combined terminals. All revenues from 'port and harbor operations'. Included in preferred sample.	Pref
FSJ LN Equity	JAMES FISHER & SONS PLC	James Fisher & Sons P.L.C. is an ocean shipping company. The company's operations include shipowning, ship management, chartering, freight forwarding, and insurance consulting. Fisher also operates as ships' agency, in shipbroking, contracting, stevedoring, transport, port operations, and warehousing. The company operates in the United Kingdom. 48% of revenues from 'marine support', 25% from 'specialist technical services', 15% from 'offshore oil services', and 12% from 'tankships'. Excluded.	
GDPL IN Equity	GATEWAY DISTRIPARKS LTD	Gateway Distriparks Limited provides integrated logistics services both in domestic and international areas. The company offers cargo loading and unloading, transportation, and cargo storage management services to shipping lines, freight forwarders, and buying houses. All revenues from 'transport support services'.	

Ticker	Name	Manual check	Final
		Excluded.	
GMD VN Equity	GEMADEPT CORP	Gemadept Corporation is a shipping company. The company's business activities include port operations, container liner service, shipping and forwarding agency logistics, project cargo transport, real estate, and financial investment. 83% of revenues from 'port operation', 16% from 'logistics'. Included in preferred sample.	Pref
GND SJ Equity	GRINDROD LTD	Grindrod Limited is an investment holding company for a group of companies which ship and transport goods by air, land and sea, as well as provide financial services. Group companies operate both nationally and internationally. Excluding 'segmental adjustment', 71% of revenues from 'marine fuels & agricultural logistics', 18% from 'logistics' and 8% from 'port and terminal'. Excluded.	
GPPV IN Equity	GUJARAT PIPAVAV PORT LTD	Gujarat Pipavav Port Ltd. operates a marine shipping port. The port loads and unloads container, bulk, and liquid cargo. The company's 2020-21 annual report refers to upgrades of berth infrastructure. See: Gujarat Pipavav Port Ltd, *Annual report 2020-21*, 27 May 2021, p 2. All revenues from 'port services'. Included in preferred sample.	Pref
HAH VN Equity	HAI AN TRANSPORT & STEVEDORI	Hai An Transport & Stevedoring JSC loads and unloads transportation vessels in Vietnam. The company also provides transportation vessels. 82% of revenues from 'marine shipping', 11% from 'port operators', 7% from 'other'. Excluded.	
HHFA GR Equity	HAMBURGER HAFEN UND LOGISTIK	Hamburger Hafen und Logistik AG (HHLA) provides services to the port in the European North Range. The company's container terminals, transport systems, and logistic services provide a network between overseas port and European hinterland. 97% of revenues from 'port logistic', including 56% from 'container'. Included in preferred sample.	Pref
ICT PM Equity	INTL CONTAINER TERM SVCS INC	International Container Terminal Services, Inc. (ICTSI) develops, manages, and operates container ports and terminals. The company offers container packing, weighing, storage, inspection, cargo management, and other related services. ICTSI serves customers worldwide. All revenues from 'cargo handling services'. Excluded.	
NKHP RM Equity	NOVOROSSYISK GRAIN PLANT PJS	Novorossyisk Grain Plant PJSC operates a grain terminal and services related to grain cargo transsshipment. The company's infrastructure includes railways and roads, transport garages, mechanical workshops, power plants, and laboratories. Novorossyisk Grain Plant operates in Russia. 79% of revenues from 'grain trading', 15% from 'port cargo handling'. Excluded.	
NMTP RM Equity	NOVOROSSIYSK COMMERCIAL SEA	Novorossiysk Commercial Sea Port PJSC owns and operates the Novorossiysk Port on the BlackSea. The company processes, loads, and unloads cargo. Novorossiysk Commercial Sea Trade Port handles mainly crude oil but also services dry cargo such as metals, cement, sugar, grain and containers. Company's annual report suggests that it owns substantial assets in sea berths and port terminals. See: NCSP Group, *NCSP Annual report 2019*, pp 8-9. 97% of revenues from 'stevedoring services'. Included in preferred sample.	Pref
NYT TB Equity	NAMYONG TERMINAL PCL	Namyong Terminal PCL is a roll on roll off terminal operator. The company offers terminal services, car storage areas and warehousing services in Thailand. 73% of revenues from 'seaport and related services', remainder from 'warehouse service'. Included in alternative sample.	Alt
POT NZ Equity	PORT OF TAURANGA LTD	Port of Tauranga Limited activities include the provision of wharf facilities, back up land for the storage and transit of import and export cargo, berthage, cranes, tug and pilotage services for exporters, importers and shipping companies and the leasing of land and buildings. The group also operates a container terminal and has bulk cargo marshalling operations. 90% of revenues from 'port operation'. Included in preferred sample.	Pref
PPA GA Equity	PIRAEUS PORT AUTHORITY SA	Piraeus Port Authority SA manages the Piraeus harbor. The company provides services such as loading and unloading cargo, warehousing, and transportation of cars. Piraeus Port Authority offers electricity, water, and other services. Piraeus Port Authority responsible for maintaining the port and controlling the movement of ships. Company's financial report states that it retains the exclusive right to use and exploit the land, buildings and infrastructure that are included in the Piraeus Port until 13/02/2052. See: Piraeus Port Authority SA, *Annual financial report for the year ended 31 December, 2021*, 14 March 2022, p 4.	Pref

Ticker	Name	Manual check	Final
		50% of revenues from 'revenue from Concession Piers II + III', 18% from 'container terminal', 10% from 'ship repairing'. Included in preferred sample.	
SISCO AB Equity	SAUDI INDUSTRIAL SERVICES CO	Saudi Industrial Services Company (SISCO) provides catering services, operates gasoline filling stations, and manages the desalination project of the Jeddah Islamic Seaport. SISCO's website indicates that it invests in container terminals, including the Red Sea Gateway Terminal that it was involved in from inception and construction to operation. See: https://www.sisco.com.sa/ports.php 98% of revenues from 'port development and operations'. Included in preferred sample.	Pref
STBP3 BZ Equity	SANTOS BRASIL PARTICIPACOES	Operates and manages container terminals in ports of Brazil. The company provides logistics, transportation and distribution services integrated to port terminals. 72% of revenues derived from 'Port and harbor operations'. Included in preferred sample.	Pref
WPRTS MK Equity	WESTPORTS HOLDINGS BHD	Westports Holdings Berhad provides port services. The company offers container and cargo services, marine services, rental services and other ancillary services. Westports provides its services to the import and export industries. Company's website states that it primarily manages port operations dealing with container and conventional cargo. It also provides a wide range of port services, including marine services, rental services and other ancillary services. See: https://www.westportsholdings.com/ 98% of revenues from 'port'. Included in preferred sample.	Pref
WTE CN Equity	WESTSHORE TERMINALS INVESTME	Westshore Terminals Investment Corp. operates a coal storage and loading terminal in British Columbia, Canada. All revenues from 'coal storage'. Excluded.	

Table A.4 lists the comparator samples previously adopted by Synergies, Incenta, and CEPA. It also sets out which of those firms are included in our preferred and alternative samples. The last column of the table explains why individual companies have been omitted from our samples.

Table A.4: Companies included in previous samples

Ticker	Company name	Synergies	Incenta	CEPA A	CEPA B	HoustonKemp	Explanation
QUB AU Equity	Qube Holdings Ltd	In		In			Illiquid
POT NZ Equity	Port of Tauranga Ltd	In	In	In	In	Pref & Alt	
HHFA GR Equity	Hamburger Hafen Und Logistik	In		In	In	Pref & Alt	
144 HK Equity	China Merchants Port Holding	In	In	In	In	Pref & Alt	
1199 HK Equity	Cosco Shipping Ports Ltd	In	In	In	In	Pref & Alt	
2880 HK equity	Liaoning Port Co Ltd-H	In	In	In	In	10y Pref & Alt	5y illiquid
HPHT SP Equity	Hutchison Port Holdings TR-U	In	In				Illiquid
ADSEZ IN Equity	Adani Ports and Special Econ		In			Pref & Alt	
GPPV IN Equity	Gujarat Pipavav Port Ltd		In			Pref & Alt	
600017 CH Equity	Rizhao Port Co Ltd -A		In			Pref & Alt	
LKPG SV Equity	Luka Koper		In				Illiquid
3382 HK Equity	Tianjin Port Dvlp Hlds Ltd		In				Illiquid
3378 HK Equity	Xiamen International Port-H		In				Illiquid
600317 CH Equity	Yingkou Port Liability Co-A		In			10y Pref & Alt	5y illiquid
MSA MC Equity	Marsa Maroc		In				Illiquid
601008 CH Equity	Jiangsu Lianyungang Port -A		In			Pref & Alt	
600018 CH Equity	Shanghai International Por-A		In			Pref & Alt	
601018 CH Equity	Ningbo Zhoushan Port Co LTt-A		In			Pref & Alt	

Ticker	Company name	Synergies	Incenta	CEPA A	CEPA B	HoustonKemp	Explanation
6198 HK Equity	Qingdao Port International-H		In	In	In	5y Pref & Alt	10y illiquid
000582 CH Equity	Beibuwan Port Co Ltd-A		In			Pref & Alt	
3369 HK Equity	Qinhuangdao Port Co Ltd-H			In			
9351 JP Equity	Toyo Wharf & Warehouse Co			In			Low market cap
219426 MK Equity	Maybank-Cw22 MMC Corp BHD			In	In		Delisted
NYT TB Equity	Namyong Terminal Pcl			In		Alt only	
PPA GA Equity	Piraeus Port Authority Sa			In	In	Pref & Alt	
WPRTS MK Equity	Westports Holdings Bhd			In	In	5y Pref & Alt	10y illiquid
WTE CN Equity	Westshore Terminals Investment	In	In	In	In		

Source: Bloomberg, Synergies, Incenta, CEPA, HoustonKemp analysis.

A2. Industry-specific parameter estimates derived from the comparator sample

This appendix sets out our approach for using the comparator firms set out in appendix A1 to estimate the benchmark gearing and asset beta in sections 5.2 and 5.4 respectively.

A2.1 Gearing

As section 5.2 sets out, we derive the benchmark gearing as the average of the five-year and ten-year gearing estimates observed for our comparator sample, using the book value of net debt as our measure of debt. This is consistent with clause 23 of the Undertaking.

Table A.5 sets out the five-year and ten-year gearing estimates for each company in our preferred and alternative samples. We adopt the average of the mean five-year and ten-year gearings as our point estimate:

- 0.20 gearing for our preferred sample; and

- 0.21 gearing for our alternative sample.

Table A.5: Five-year and ten-year gearing estimates for the preferred and comparator samples

Ticker	Name	Sample	5 yr gearing	10 yr gearing
000582 CH Equity	Beibuwan Port Co Ltd	Pref & Alt	0.18	0.19
1199 HK Equity	COSCO SHIPPING Ports Ltd	Pref & Alt	0.44	0.33
144 HK Equity	China Merchants Port Holdings Co Ltd	Pref & Alt	0.37	0.28
2880 HK equity	Liaoning Port Co Ltd	Pref & Alt	-	0.29
600017 CH Equity	Rizhao Port Co Ltd	Pref & Alt	0.40	0.34
600018 CH Equity	Shanghai International Port Group Co Ltd	Pref & Alt	0.15	0.13
600317 CH Equity	Yingkou Port Liability Co Ltd	Pref & Alt	-	0.10
601008 CH Equity	Jiangsu Lianyungang Port Co Ltd	Pref & Alt	0.38	0.33
601018 CH Equity	Ningbo Zhoushan Port Co Ltd	Pref & Alt	0.19	0.15
6198 HK Equity	Qingdao Port International Co Ltd	Pref & Alt	0.00	-
ADSEZ IN Equity	Adani Ports & Special Economic Zone Ltd	Pref & Alt	0.21	0.24
GPPV IN Equity	Gujarat Pipavav Port Ltd	Pref & Alt	0.00	0.00
HHFA GR Equity	Hamburger Hafen und Logistik AG	Pref & Alt	0.23	0.19
POT NZ Equity	Port of Tauranga Ltd	Pref & Alt	0.10	0.10
PPA GA Equity	Piraeus Port Authority SA	Pref & Alt	0.02	0.07
WPRTS MK Equity	Westports Holdings Bhd	Pref & Alt	0.07	-
002040 CH Equity	Nanjing Port Co Ltd	Pref & Alt	0.16	0.12
201872 CH Equity	China Merchants Port Group Co Ltd	Pref & Alt	0.43	0.26
601228 CH Equity	Guangzhou Port Co Ltd	Pref & Alt	0.19	-
DVP VN Equity	Dinh Vu Port Investment & Development JSC	Pref & Alt	0.00	-
GMD VN Equity	Gemadept Corp	Pref & Alt	0.16	-
NMTP RM Equity	Novorossiysk Commercial Sea Port PJSC	Pref & Alt	0.26	0.41
SISCO AB Equity	Saudi Industrial Services Co^	Pref & Alt	0.29	0.37
STBP3 BZ Equity	Santos Brasil Participacoes SA	Pref & Alt	0.00	-
NYT TB Equity	Namyong Terminal PCL	Alt only	0.00	-
2607 TT Equity	Evergreen International Storage & Transport Corp	Alt only	0.11	0.02

Ticker	Name	Sample	5 yr gearing	10 yr gearing
2613 TT Equity	China Container Terminal Corp	Alt only	0.61	0.48
600717 CH Equity	Tianjin Port Co Ltd	Alt only	0.23	0.22
900952 CH Equity	Jinzhou Port Co Ltd	Alt only	0.56	0.44
9364 JP Equity	Kamigumi Co Ltd	Alt only	0.00	0.00
Mean - preferred			**0.19**	**0.22**
Mean - alternative			**0.20**	**0.22**

Source: Bloomberg, HoustonKemp analysis. ^ SISCO AB Equity currently trades on a Sunday through Thursday weekly cycle. As such, our calculations shift the relevant data forward by one day to obtain a Monday through Friday cycle that is consistent with the other comparators.

A2.2   Asset beta

As section 5.4 sets out, we derive the benchmark asset beta as the average of the five-year and ten-year asset beta estimates observed for our comparator sample.

Table A.6 sets out the five-year and ten-year asset beta estimates for each company in our preferred and alternative samples. We adopt the average of:

- the weekly and four-weekly asset beta estimates, where each estimate is itself the average of betas derived for each day of the week/four weeks; and

- the five-year and ten-year asset beta estimates.

Our asset beta point estimates are:

- 0.72 for our preferred sample; and

- 0.71 for our alternative sample.

Table A.6: Five-year and ten-year asset beta estimates for the preferred and alternative samples

Ticker	Name	Sample	5-yr weekly AD	5-yr 4-weekly AD	10-yr weekly AD	10-yr 4-weekly AD
000582 CH Equity	Beibuwan Port Co Ltd	Pref & Alt	0.69	0.64	0.79	0.72
1199 HK Equity	COSCO SHIPPING Ports Ltd	Pref & Alt	0.47	0.46	0.56	0.55
144 HK Equity	China Merchants Port Holdings Co Ltd	Pref & Alt	0.63	0.63	0.75	0.75
2880 HK equity	Liaoning Port Co Ltd	Pref & Alt	-	-	0.65	0.69
600017 CH Equity	Rizhao Port Co Ltd	Pref & Alt	0.54	0.59	0.76	0.76
600018 CH Equity	Shanghai International Port Group Co Ltd	Pref & Alt	0.89	0.89	0.91	0.89
600317 CH Equity	Yingkou Port Liability Co Ltd	Pref & Alt	-	-	0.85	0.86
601008 CH Equity	Jiangsu Lianyungang Port Co Ltd	Pref & Alt	0.66	0.78	0.79	0.84
601018 CH Equity	Ningbo Zhoushan Port Co Ltd	Pref & Alt	0.80	0.83	0.97	1.09
6198 HK Equity	Qingdao Port International Co Ltd	Pref & Alt	0.59	0.62	-	-
ADSEZ IN Equity	Adani Ports & Special Economic Zone Ltd	Pref & Alt	0.84	0.91	0.89	0.90
GPPV IN Equity	Gujarat Pipavav Port Ltd	Pref & Alt	0.71	1.01	0.69	1.06
HHFA GR Equity	Hamburger Hafen und Logistik AG	Pref & Alt	0.91	0.87	0.76	0.81
POT NZ Equity	Port of Tauranga Ltd	Pref & Alt	0.59	0.67	0.57	0.64
PPA GA Equity	Piraeus Port Authority SA	Pref & Alt	0.48	0.50	0.54	0.59
WPRTS MK Equity	Westports Holdings Bhd	Pref & Alt	0.53	0.58	-	-
002040 CH Equity	Nanjing Port Co Ltd	Pref & Alt	0.84	0.82	0.91	0.84
201872 CH Equity	China Merchants Port Group Co Ltd	Pref & Alt	0.37	0.30	0.63	0.64

Ticker	Name	Sample	5-yr weekly AD	5-yr 4-weekly AD	10-yr weekly AD	10-yr 4-weekly AD
601228 CH Equity	Guangzhou Port Co Ltd	Pref & Alt	0.73	0.69	-	-
DVP VN Equity	Dinh Vu Port Investment & Development JSC	Pref & Alt	0.42	0.46	-	-
GMD VN Equity	Gemadept Corp	Pref & Alt	0.81	0.71	-	-
NMTP RM Equity	Novorossiysk Commercial Sea Port PJSC	Pref & Alt	0.51	0.57	0.40	0.46
SISCO AB Equity	Saudi Industrial Services Co^	Pref & Alt	0.65	0.71	0.71	0.68
STBP3 BZ Equity	Santos Brasil Participacoes SA	Pref & Alt	1.39	1.47	-	-
NYT TB Equity	Namyong Terminal PCL	Alt only	0.79	0.77	-	-
2607 TT Equity	Evergreen International Storage & Transport Corp	Alt only	0.67	0.77	0.77	0.86
2613 TT Equity	China Container Terminal Corp	Alt only	0.27	0.35	0.39	0.49
600717 CH Equity	Tianjin Port Co Ltd	Alt only	0.73	0.72	0.88	0.83
900952 CH Equity	Jinzhou Port Co Ltd	Alt only	0.41	0.44	0.53	0.56
9364 JP Equity	Kamigumi Co Ltd	Alt only	0.85	0.90	0.84	0.85
Mean – preferred sample			**0.68**	**0.72**	**0.73**	**0.76**
Mean – alternative sample			**0.67**	**0.70**	**0.72**	**0.75**

Source: Bloomberg, HoustonKemp analysis. ^ SISCO AB Equity currently trades on a Sunday through Thursday weekly cycle. As such, our calculations shift the relevant data forward by one day to obtain a Monday through Friday cycle that is consistent with the other comparators.

A2.3   Sensitivity estimates for asset beta and gearing

Table A.7 sets out sensitivity estimates when Chinese firms are excluded from our comparator sample. We use Bloomberg's 'country of risk' field to identify Chinese firms.

We observe that:

- the average asset beta declines from 0.72 to 0.70 for the preferred sample, and 0.71 to 0.70 for the alternative sample; and

- the average gearing declines from 0.20 to 0.16 for the preferred sample, and from 0.21 to 0.16 for the alternative sample.

Table A.7: Asset beta and gearing estimates excluding Chinese firms

Sample	5y weekly AD	5y 4-weekly AD	5y gearing	10y weekly AD	10y 4-weekly AD	10y gearing
Preferred	**0.68**	**0.72**	**0.19**	**0.73**	**0.76**	**0.22**
Preferred ex-China domicile	0.69	0.74	0.17	0.65	0.71	0.22
Preferred ex-China and HK domicile	0.71	0.77	0.12	0.65	0.73	0.20
Preferred ex-China risk	0.71	0.77	0.12	0.65	0.73	0.20
Preferred ex-China and HK risk	0.71	0.77	0.12	0.65	0.73	0.20
Alt	**0.67**	**0.70**	**0.20**	**0.72**	**0.75**	**0.22**
Alt ex-China domicile	0.68	0.73	0.17	0.66	0.72	0.21
Alt ex-China and HK domicile	0.69	0.75	0.14	0.66	0.73	0.19
Alt ex-China risk	0.69	0.75	0.14	0.66	0.73	0.19
Alt ex-China and HK risk	0.69	0.75	0.14	0.66	0.73	0.19

Source: Bloomberg, HoustonKemp analysis.

A3. DDM estimation

This appendix sets out our approach for deriving our DDM estimates in section 5.5.3. We describe how we adjust the DDM MRP estimates for the value of imputation credits, and then describe the DDM formulations for the models used by each regulator.

A3.1 Adjusting for the value of imputation credits

Australian regulators adjust their DDMs for the value of imputation credits in two ways:

- IPART first generates DDM MRP estimates that are not adjusted for imputation credits before applying an adjustment to the model outputs; and

- AER, ERA, and QCA adjust the inputs of their DDMs for the value of imputation credits before estimating the models.

A3.1.1 IPART

As mentioned in section 5.5.3, we use the approach from IPART's 2013 WACC review to adjust IPART's current market risk premium estimate in order to maintain internal consistency with our gamma estimate. This adjustment is necessary because our gamma estimate of 0.5 differs from IPART's estimate of 0.25. The WASC's judgment for Perth Airport accepts IPART's method for adjusting the current market risk premium.[211]

IPART's 2013 WACC review sets out the following formula:[212]

$$Return\ incl.\ imputation\ benefits = Return\ excl.\ imputation\ benefits \div \frac{1 - tax\ rate}{1 - tax\ rate(1 - gamma)}$$

IPART's total market return for January 2022 is 10.4 per cent, consisting of 1.8 per cent current risk free rate for a five-year regulatory period plus 8.6 per cent current MRP.[213] Assuming a corporate tax rate of 30 per cent, we apply the above formula to derive the gamma-adjusted total market return as follows:[214]

$$Gamma\ adjusted\ total\ market\ return = \frac{IPART\ total\ market\ return \times \frac{1 - tax\ rate}{1 - tax\ rate(1 - IPART\ gamma)}}{\left(\frac{1 - tax\ rate}{1 - tax\ rate(1 - PoM\ gamma)}\right)}$$

$$= \frac{IPART\ total\ market\ return \times \frac{1 - 0.3}{1 - 0.3(1 - 0.25)}}{\left(\frac{1 - 0.3}{1 - 0.3(1 - 0.5)}\right)}$$

$$= 10.4\% \times 1.10 = 11.4\%$$

---

[211] The Court accepts this approach for adjusting the current market risk premium. However, we note that the Court applies the approach incorrectly, such that its current market risk premium estimate of 9.2 per cent as at 30 June 2018 actually corresponds to a gamma of 0.455. Correcting this error results in a current market risk premium of 9.7 per cent as at 30 June 2018 for a gamma of 0.585. See: *Perth Airport Pty Ltd v Qantas Airways Ltd [No 3]* [2022] WASC 51 [328]-[329].

[212] We note that our preferred method for adjusting the current market risk premium replaces the gamma term with an estimate of the proportion of dividends that are franked in the market portfolio multiplied by the market value of franked credits (theta). Nevertheless, our estimates in this report adopt the approach set out in IPART's 2013 WACC review and applied by the Court.

[213] See: IPART, Spreadsheet-WACC-model-February-2022.XLSX, 'WACC Calculator' sheet assuming a five-year regulatory period.

[214] The total market return is defined as the sum of the risk free rate and the market risk premium.

We then obtain the gamma adjusted current market risk premium by deducting our 2.57 per cent ten-year risk free rate estimate. This results in a 'current' market risk premium estimate of 8.83 per cent.

A3.1.2   AER, ERA, and QCA

AER, ERA, and QCA adjust their dividend forecasts for the impact of imputation credits.[215] We use the following formula to gross up the cash dividend yields obtained from Bloomberg:[216]

$$Gross\ div.\ yield = Cash\ div.\ yield \times \left(1 + \frac{Tax\ rate \times Proportion\ of\ fully\ franked\ div. \times Utilisation\ rate}{1 - Tax\ rate}\right)$$

We understand that when using the above formula, the AER and QCA use the same utilisation rates as that used for calculating the gamma parameters in their regulatory determinations.[217] The ERA's DDM estimate in 2016 uses a utilisation rate of 0.53 based on BHM academic literature,[218] but does not otherwise describe how it will update its utilisation rate estimates for its most recent DDMs.

We note that the ERA's 2018 guideline uses ATO data on credit yields for deriving HER MRP estimates from 1998 onwards.[219] However, the ERA does not explicitly indicate that it will use the same approach for deriving utilisation rates to be applied for grossing up DDM cash dividend yields.

Consistent with the discussion in section 6.1, we adopt a utilisation rate of 0.625 when grossing up DDM cash dividend yields.

We use 0.75 as our estimate of the proportion of fully franked dividends, consistent with the approaches used by the AER and QCA:

- the AER adopts 0.75 as its estimate as at 2013, but does not provide additional guidance about how it calculates or updates its estimate of the proportion of fully franked credits;[220]

- the ERA uses 0.75 as its estimate for in its 2016 decision for DBNGP, while its 2018 Gas Guidelines refers to ATO data on credit yields when calculating its HER MRP estimate without confirming whether it uses the same approach for its DDM estimate;[221] and

- the QCA adopts 0.75 as its estimate, which we confirm from communications with QCA staff.

A3.2   IPART forward looking MRP

As section 5.5.3 describes, we do not derive our own estimates of IPART's DDMs, and instead adopt IPART's current MRP estimate as at 31 January 2022.

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[215] See discussions in: AER, *Rate of Return Guideline (Appendices)*, Explanatory Statement, December 2013, p 117. ERA, *Final Decision on Proposed Revisions to the Access Arrangement for the Dampier to Bunbury Natural Gas Pipeline 2016 – 2020 | Appendix 4 Rate of Return*, 30 June 2016, pp 112-113 [539]-[542]. QCA, *Cost of capital: market parameters*, Final decision, August 2014, pp 1-2.

[216] See formula in: AER, *Rate of Return Guideline (Appendices)*, Explanatory Statement, December 2013, p 117. QCA staff have confirmed with us that they use the same formula when adjusting their cash dividend forecasts.

[217] QCA staff confirmed that they use the same utilisation rate for grossing up dividends and for estimating gamma. The AER's 2013 rate of return guideline uses a utilisation rate of 0.7 when grossing up cash dividend yields, which is the same as the utilisation rate used in their gamma estimate. See: AER, *Rate of Return Guideline (Appendices)*, Explanatory Statement, December 2013, pp 117, 147.

[218] ERA, *Final Decision on Proposed Revisions to the Access Arrangement for the Dampier to Bunbury Natural Gas Pipeline 2016 – 2020 | Appendix 4 Rate of Return*, 30 June 2016, p 111 footnote 435.

[219] ERA, *Final Gas Rate of Return Guidelines Explanatory Statement*, 18 December 2018, p 177 [1105].

[220] AER, *Rate of Return Guideline (Appendices)*, Explanatory Statement, December 2013, p 117.

[221] ERA, *Final Decision on Proposed Revisions to the Access Arrangement for the Dampier to Bunbury Natural Gas Pipeline 2016 – 2020 | Appendix 4 Rate of Return*, 30 June 2016, p 111 footnote 435. ERA, *Final Gas Rate of Return Guidelines Explanatory Statement*, 18 December 2018, p 177 [1105].

Thus, our approach for an IPART forward looking estimate of the MRP that is internally consistent with our overall WACC is as follows:

- take IPART's 8.6 per cent current MRP estimate from its February 2022 WACC update;

- add IPART's 1.8 per cent current risk free rate to obtain a market return of 10.4 per cent;

- adjust the market return estimate for a gamma of 0.5 using the formula set out in appendix A3.1.1, obtaining a market return of 11.4 per cent; and

- deduct our 2.57 per cent risk free rate as at 31 March 2022 from section 5.3 to obtain a point estimate of 8.83 per cent.

We note that the date of IPART's DDM estimate from 31 January 2022 differs from the estimation dates of the other WACC parameters, which we estimate as at 31 March 2022. However, this difference is unlikely to affect our median DDM MRP point estimate, which effectively takes the midpoint of the AER and ERA DDM MRP estimates.

A3.3   AER DDM

As section 5.5.3 describes, the AER publishes estimates for its two-stage DDM and three-stage DDM.

A3.3.1   Description of AER DDMs

The two-stage DDM assumes that future dividends are characterised by the following formula:[222]

$$P_c = \frac{m \times E(D_c)}{(1+k)^{m/2}} + \sum_{t=1}^{N} \frac{E(D_t)}{(1+k)^{m+t-0.5}} + \frac{\left[\frac{E(D_N)(1+g)}{k-g}\right]}{(1+k)^{m+N-0.5}}$$

$$= \frac{m \times E(D_c)}{(1+k)^{m/2}} + \frac{E(D_1)}{(1+k)^{m+0.5}} + \frac{E(D_2)}{(1+k)^{m+1.5}} + \frac{\left[\frac{E(D_2)(1+g)}{k-g}\right]}{(1+k)^{m+1.5}}$$

where:

- P_c is the current price of equity;

- $E(D_c)$ is the current expectation of dividends per share for the current financial year;

- $E(D_t)$ is the current expectation of dividends per share for the financial year t years after the current financial year;

- m is the fraction of the current financial year remaining, expressed as a decimal point;

- N is the time period after which dividend growth reverts to its long-term rate (for the two-stage model, N = 2, for the three-stage model N = 9);

- g is the long-term growth rate in nominal dividends per share; and

- k is the discount rate—that is, the return on equity.

The second equality in the above equation substitutes N = 2, since Bloomberg provides analyst forecasts for the current financial year and for the subsequent two financial years.[223] The AER uses the ASX 200 index as its market proxy and assumes a long-term dividend growth rate of g = 4.6 per cent.[224]

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[222] AER, *Rate of Return Guideline (Appendices)*, Explanatory Statement, December 2013, pp 116-117.

[223] AER, *Rate of Return Guideline (Appendices)*, Explanatory Statement, December 2013, p 117.

[224] AER, *Rate of Return Guideline (Appendices)*, Explanatory Statement, December 2013, pp 117-118.

The three-stage DDM uses the first equality in the above equation with $N = 9$. Dividend forecasts three to nine years out assume that dividend growth transitions linearly towards the long-run growth rate of $g = 4.6$ per cent, which is achieved from year 10 onwards.

In constructing the AER's DDMs, we gross up all dividend forecasts, ie, the numerator of each term on the right hand side of the above equation, using the method set out in appendix A3.1.2 above.

We use Excel's Goalseek function to solve for the discount rate, k, before deducting the risk free rate to obtain the DDM MRP estimate.

A3.3.2 Comparison against AER DDM forecasts

We compare our two-stage and three-stage DDM estimates against two-month estimates based on a 4.6 per cent long-term growth rate as reported in:

- the AER's original December 2013 Guideline; and

- the AER's most recent December 2021 rate of return annual update.

Table A.8 compares our DDM estimates against the AER's. Our estimates are within ±0.1 per cent of the AER's. We have not isolated the source of the small residual discrepancy, which may be due to rounding at various stages of the modelling.

Table A.8: Comparison of DDM estimates against AER estimates

Averaging period	AER two-stage	HoustonKemp two-stage	AER three-stage	HoustonKemp three-stage
Oct – Nov 2013	6.7%	6.6%	7.1%	7.1%
Jul – Aug 2021	7.81%	7.72%	6.93%	6.98%

Source: AER, *Rate of Return Guideline (Appendices)*, Explanatory Statement, December 2013, p 119. AER, *Rate of return Annual Update*, December 2021, p 17. *Bloomberg, HoustonKemp analysis.*

A3.4 ERA DDM

As section 5.5.3 describes, the ERA uses a two-stage Gordon DDM.

A3.4.1 Description of ERA Gordon DDM

The two-stage DDM assumes that future dividends are characterised by the same formula that the AER uses, which we reproduce below from appendix A3.3.1:[225]

$$
\begin{aligned}
P_c &= \frac{m \times E(D_c)}{(1+k)^{m/2}} + \sum_{t=1}^{N} \frac{E(D_t)}{(1+k)^{m+t-0.5}} + \frac{\left[\frac{E(D_N)(1+g)}{k-g}\right]}{(1+k)^{m+N-0.5}} \\
&= \frac{m \times E(D_c)}{(1+k)^{m/2}} + \frac{E(D_1)}{(1+k)^{m+0.5}} + \frac{E(D_2)}{(1+k)^{m+1.5}} + \frac{\left[\frac{E(D_2)(1+g)}{k-g}\right]}{(1+k)^{m+1.5}}
\end{aligned}
$$

As is the case for the AER's DDMs, the second equality in the above equation substitutes $N = 2$, since Bloomberg provides analyst forecasts for the current financial year and for the subsequent two financial

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[225] ERA, *Final Decision on Proposed Revisions to the Access Arrangement for the Dampier to Bunbury Natural Gas Pipeline 2016 – 2020 | Appendix 4 Rate of Return*, 30 June 2016, p 115.

years. The ERA similarly assumes a long-term dividend growth rate of g = 4.6 per cent, but uses the All Ordinaries Index as a market proxy instead of the ASX 200.[226]

In constructing the ERA's DDMs, we gross up all dividend forecasts, ie, the numerator of each term on the right hand side of the above equation, using the method set out in appendix A3.1.2 above.

We use Excel's Goalseek function to solve for the discount rate, k, before deducting the risk free rate to obtain the DDM MRP estimate.

A3.4.2 Comparison against ERA DDM estimates

We compare our Gordon DDM estimates against the ERA's estimates as reported in its:

- 2016 decision for the Dampier to Bunbury Natural Gas Pipeline (DBNGP);
- 2018 rate of return guideline; and
- 2018 and 2019 rail WACC decision.

The ERA's 2016 decision for DBNGP estimates a Gordon DDM of 8.12 per cent for the end of May 2016.[227] Our estimate is 8.19 per cent, assuming:

- the estimate is obtained for 31 May 2016, ie, an averaging period of only one trading day;
- the proportion of fully franked dividends is 0.75;
- the utilisation rate is 0.53;
- the long-term dividend growth rate is 4.6 per cent; and
- the term of the risk free rate is five years.

The ERA's 2018 Gas Guidelines estimates a Gordon DDM MRP of 7.6 per cent as at 31 October 2018.[228] Our closest reproduction of the ERA's estimate is 7.69 per cent. This estimate assumes a 40-day averaging period up to 31 October 2018 while retaining all other assumptions for our 31 May 2016 estimate.[229]

The ERA's 2018 and 2019 rail WACC decision estimates a DDM MRP of 7.2 per cent as at October 2018.[230] The precise dates of the ERA's averaging period are not clear to us, but our closest Gordon DDM MRP estimate is 7.29 per cent using a 40-day averaging period ending 31 October 2018. This is consistent with the ERA's assumed averaging period for the risk free rate.[231]

Our replication of the ERA's 2018 and 2019 rail WACC decision retains the other assumptions from our 31 May 2016 estimate, except that this MRP estimate uses a 10-year risk free rate.[232]

In making the above comparisons, we have used a single-day averaging period for reproducing the ERA's Gordon DDM MRP estimates in May 2016, while using 40-day averaging periods for reproducing estimates

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[226] ERA, *Final Decision on Proposed Revisions to the Access Arrangement for the Dampier to Bunbury Natural Gas Pipeline 2016 – 2020 | Appendix 4 Rate of Return*, 30 June 2016, p 114-115 [544].

[227] ERA, *Final Decision on Proposed Revisions to the Access Arrangement for the Dampier to Bunbury Natural Gas Pipeline 2016 – 2020 | Appendix 4 Rate of Return*, 30 June 2016, p 114-115 [544].

[228] ERA, *Final Gas Rate of Return Guidelines*, Explanatory statement, 18 December 2018, p 204 [1312].

[229] We note that the ERA's 2018 guideline adjusts its risk free rate averaging period from 40 days to 20 days. Our DDM MRP estimate for 31 October 2018 is 7.95 per cent, while the 20-day estimate is 7.82 per cent. See: ERA, *Final Gas Rate of Return Guidelines*, Explanatory statement, 18 December 2018, p 289.

[230] ERA, *2018 and 2019 Weighted Average Cost of Capital | For the Freight and Urban Networks, and the Pilbara Railways*, Final determination, 22 August 2019, p 47 [231].

[231] ERA, *2018 and 2019 Weighted Average Cost of Capital | For the Freight and Urban Networks, and the Pilbara Railways*, Final determination, 22 August 2019, pp 21-22 [85]-[88].

[232] ERA, *2018 and 2019 Weighted Average Cost of Capital | For the Freight and Urban Networks, and the Pilbara Railways*, Final determination, 22 August 2019, p 22 [96].

at other time periods. We consider this appropriate since the ERA's 2016 decision for DBNGP specifically references a monthly DGM series,[233] which suggests that the ERA likely reported a single-day estimate in that decision. This contrasts with the other reports, for which the ERA provides no additional guidance on the averaging period.

The ERA also provides a DDM MRP estimate in its discussion paper for the 2022 Gas RoRI, but does not state its averaging period.[234] As such, we have not attempted to reproduce the ERA's estimate from that paper.

A3.5 QCA DDM

As section 5.5.3 describes, the QCA adopts the median of six sets of Cornell DDM estimates, consisting of two models with different transition lengths and three different estimates of long-term growth.

A3.5.1 Description of QCA Cornell DDM

The Cornell DDM assumes that future dividends are characterised by the following formula:[235]

$$P_c = \sum_{t=1}^{N} \frac{D(1+g_1)\dots(1+g_t)}{(1+k)^{t-0.5}} + \frac{\left[\dfrac{D(1+g_1)\dots(1+g_N)(1+g)}{k-g}\right]}{(1+k)^{N-0.5}}$$

The QCA uses three-stage DDMs with transition periods that end in years nine and 19, ie, $N = 9$ and 19. The QCA also assumes long-term dividend growth rates of 4.04 per cent, 4.55 per cent, and 5.06 per cent.[236]

In constructing the QCA's DDMs, we gross up all dividend forecasts, ie, the numerator of each term on the right hand side of the above equation, using the method set out in appendix A3.1.2 above.

We use Excel's Goalseek function to solve for the discount rate, k, before deducting the risk free rate to obtain the DDM MRP estimate.

A3.5.2 Comparison against QCA DDM estimates

As section 5.5.3 states, QCA staff have informed us that their implementation of the Cornell DDM has changed recently. The most material change is that the QCA no longer specifies a term structure for the return on equity, whereby the discount rate is set at 11.80 per cent after 10 years.[237] Instead, the QCA now assumes a single discount rate across all future dividends.[238]

As such, we only compare our Cornell DDM estimates against the QCA's November 2021 draft report for Seqwater, where the QCA derives an estimate of 6.7 per cent.[239] Table A.9 shows our Cornell DDM estimates for the 20 trading days up to 1 November 2021, which is the same averaging period that the QCA

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[233] Specifically, the ERA's point estimate references figure 5 of its report, which shows monthly DGM implied equity returns, MRP estimates, and CGS yields. See: ERA, *Final Decision on Proposed Revisions to the Access Arrangement for the Dampier to Bunbury Natural Gas Pipeline 2016 – 2020 | Appendix 4 Rate of Return*, 30 June 2016, p 116-117 [549].

[234] ERA, *2022 gas rate of return instrument review*, Discussion paper, December 2021, p 60 [341].

[235] The formula includes a few notational changes to maintain consistency with the formulae that we set out for the AER and ERA. We have also adjusted the formula based on our communications with QCA staff, namely that the denominators of the terms on the right hand side apply half-year discounts instead of full-year discounts. See: QCA, *Cost of capital: market parameters*, Final decision, August 2014, pp 75-76.

[236] QCA staff provided us with long-term dividend growth rate assumptions to two decimal places. We retain these assumptions when reproducing the QCA DDM MRP estimates. However, we round these assumptions to one decimal place when deriving the DDM MRP estimate for benchmark efficient port in order to maintain consistency with our assumptions for the DDMs adopted by the AER and ERA. See: QCA, *Cost of capital: market parameters*, Final decision, August 2014, pp 67-68, 72.

[237] QCA, *Cost of capital: market parameters*, Final decision, August 2014, p 71.

[238] See: QCA, *Seqwater Bulk Water Price Review 2022–26*, Final report, March 2022, p 69.

[239] QCA, *Seqwater Bulk Water Price Review*, Draft report, November 2021, p 76.

uses for estimating the risk-free rate.[240] Our median estimate is 6.59 per cent, which is approximately 0.1 per cent lower than the QCA's.

Table A.9: Replication of QCA's November 2021 DDM estimates

Long-term growth	10-year convergence	20-year convergence
4.04%	6.43%	5.99%
4.55%	6.87%	6.37%
5.06%	7.31%	6.75%

Source: Bloomberg, QCA, HoustonKemp analysis.

A3.6   DDM estimates as at 31 March 2022

Table A.10 shows our DDM estimates for the 20-day averaging period up to 31 March 2022. Our point estimates for each regulator are:

- IPART current MRP estimate: 8.83 per cent;

- AER two-stage and three-stage DDMs: 6.64 per cent;

- ERA two-stage Gordon DDM: 6.72 per cent;

- QCA Cornell DDM: 6.11 per cent.

We adopt a DDM point estimate of 6.68 per cent, calculated as the median of the above four estimates.

Table A.10: DDM estimates for 20-day averaging period up to 31 March 2022

Date	IPART	ERA	QCA 10yr g = 4.0%	QCA 20yr g = 4.0%	QCA 10yr g = 4.6%	QCA 20yr g = 4.6%	QCA 10yr g = 5.1%	QCA 20yr g = 5.1%	AER 2 stage	AER 3 stage
4/03/2022	9.24%	7.18%	6.60%	6.34%	7.11%	6.76%	7.53%	7.12%	7.36%	7.05%
7/03/2022	9.26%	7.25%	6.66%	6.39%	7.16%	6.81%	7.58%	7.16%	7.43%	7.11%
8/03/2022	9.16%	7.20%	6.58%	6.28%	7.08%	6.70%	7.50%	7.05%	7.38%	7.03%
9/03/2022	9.08%	7.07%	6.45%	6.15%	6.95%	6.57%	7.38%	6.93%	7.24%	6.90%
10/03/2022	9.03%	6.96%	6.32%	6.00%	6.82%	6.42%	7.25%	6.78%	7.13%	6.77%
11/03/2022	8.99%	6.99%	6.29%	5.92%	6.80%	6.35%	7.22%	6.71%	7.16%	6.74%
14/03/2022	8.94%	6.92%	6.15%	5.72%	6.66%	6.15%	7.09%	6.51%	7.09%	6.61%
15/03/2022	8.87%	6.91%	6.13%	5.69%	6.64%	6.12%	7.06%	6.48%	7.06%	6.58%
16/03/2022	8.89%	6.87%	6.09%	5.66%	6.60%	6.09%	7.02%	6.46%	7.02%	6.55%
17/03/2022	8.88%	6.80%	6.04%	5.62%	6.54%	6.05%	6.97%	6.41%	6.96%	6.49%
18/03/2022	8.81%	6.69%	5.93%	5.52%	6.44%	5.95%	6.87%	6.32%	6.85%	6.39%
21/03/2022	8.81%	6.67%	5.92%	5.49%	6.42%	5.92%	6.85%	6.29%	6.84%	6.38%
22/03/2022	8.67%	6.48%	5.73%	5.31%	6.23%	5.75%	6.67%	6.11%	6.65%	6.19%
23/03/2022	8.61%	6.39%	5.63%	5.21%	6.15%	5.65%	6.57%	6.01%	6.56%	6.10%
24/03/2022	8.62%	6.41%	5.55%	5.02%	6.06%	5.47%	6.49%	5.84%	6.57%	6.02%
25/03/2022	8.61%	6.41%	5.49%	4.92%	6.01%	5.36%	6.44%	5.74%	6.58%	5.97%
28/03/2022	8.48%	6.29%	5.34%	4.74%	5.86%	5.19%	6.29%	5.56%	6.46%	5.82%

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[240] QCA, *Cost of capital: market parameters*, Final decision, August 2014, p 71.

Date	IPART	ERA	QCA 10yr g = 4.0%	QCA 20yr g = 4.0%	QCA 10yr g = 4.6%	QCA 20yr g = 4.6%	QCA 10yr g = 5.1%	QCA 20yr g = 5.1%	AER 2 stage	AER 3 stage
29/03/2022	8.49%	6.27%	5.33%	4.73%	5.84%	5.18%	6.27%	5.56%	6.44%	5.80%
30/03/2022	8.59%	6.34%	5.28%	4.58%	5.80%	5.03%	6.23%	5.42%	6.50%	5.76%
31/03/2022	8.54%	6.30%	5.24%	4.53%	5.75%	4.98%	6.19%	5.37%	6.47%	5.72%
Average	**8.83%**	**6.72%**	**5.94%**	**5.49%**	**6.45%**	**5.93%**	**6.87%**	**6.29%**	**6.89%**	**6.40%**

Source: Bloomberg, AER, ERA, QCA, WASC, HoustonKemp analysis.

A4. Estimating historical excess returns

This appendix sets out our approach for deriving our Ibbotson HER MRP estimates in section 5.5.2.

We obtain raw data from 1883 to 2010 from the BHM and NERA reports.[241] We then obtain the following raw data to update the estimates up to 2021, which we use to calculate the following parameters for year t:

- stock accumulation index: obtained from Bloomberg using the 'ASA30 Index' ticker;
  - with-dividend return ('RTDASX'): $\frac{average\ of\ the\ index\ for\ the\ month\ of\ December\ in\ year\ t}{average\ of\ the\ index\ for\ the\ month\ of\ December\ in\ year\ (t-1)} - 1$;

- stock price index: obtained from Bloomberg using the 'AS30 Index' ticker;
  - without-dividend return ('EXDASX'): $\frac{average\ of\ the\ index\ for\ the\ month\ of\ December\ in\ year\ t}{average\ of\ the\ index\ for\ the\ month\ of\ December\ in\ year\ (t-1)} - 1$;
  - without-dividend ratio ('EXDRAT'): $\frac{average\ of\ the\ index\ for\ all\ trading\ days\ in\ year\ t}{average\ of\ the\ index\ for\ the\ month\ of\ December\ in\ year\ t}$

- government bond yields: obtained from RBA table F2, series 'FCMYGBAG10D';
  - end-of-year bond yield ('BND'): observation on the last trading day of each year divided by 100; and

- credit yields: obtained from the ATO website:[242]
  - average franking rebate yield obtained for 31 December of each year ('ATOCRD').

We use the following equation to estimate the market return in each year, assuming 0.625 utilisation rate as set out in section 6.1:[243]

$$Market\ return = RTDASX + 0.625 \times ATOCRD \times EXDRAT \times (1 + EXDASX)$$

Finally, we deduct the end-of-year bond yield ('BND') from the market return estimate to obtain the Ibbotson HER MRP. We use the same process for estimating both BHM and NERA estimates, with the difference being that the two series use different RTDASX estimates up to 1957.

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[241] Brailsford, T Handley J and Maheswaran K, *The historical equity risk premium in Australia: Post-GFC and 128 years of data*, Accounting and Finance, 2012, pp 237-247. NERA, *The market risk premium: Analysis in response to the AER's Draft Rate of Return Guidelines: A report for the Energy Networks Association*, October 2013. NERA, *Further Assessment of the Historical MRP: Response to the AER's Final Decisions for the NSW and ACT Electricity Distributors*, June 2015.

[242] ATO, https://www.ato.gov.au/rates/company-tax---imputation--average-franking-credit---rebate-yields/, accessed 16 March 2022.

[243] This formula only applies for estimates from 1987 onwards. The market return up to 1986 is equal to the with-dividend return on the index, ie, RTDASX.

Annexure A   Instructions

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Economists