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Economists

# Estimation of the weighted average cost of capital and forecast inflation for the Port of Melbourne

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Report for Herbert Smith Freehills

15 May 2023

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## Executive summary

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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); and
- the methodology for forecast inflation consistent with clause 8.2.2 of the Pricing Order made under section 49A of the *Port Management Act 1995* (Vic) (PMA).

The WACC estimate in this report serves as an update to the estimate set out in our previous report for HSF.<sup>1</sup>

The rate of return is an input to the accrual building block model (ABBM) that PoM uses to derive its annual revenue requirement. The WACC estimates from this report will inform PoM's rate of return for the 1 July 2023 to 30 June 2028 pricing period (2023-28 pricing period), 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:<sup>2</sup>

... 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:<sup>3</sup>

... 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.

Using methods that we consider well-accepted, we estimate a benchmark pre-tax nominal WACC as at 31 March 2023 of:<sup>4</sup>

- 9.49 per cent using on our preferred broad comparator sample that does not apply a country filter;
  - > this estimate is 50 basis points (bp) higher than the 8.99 per cent preferred estimate from PoM's 2022-23 TCS, which is primarily caused by the 88 bp increase in the risk free rate; and
- 9.34 per cent using an alternative narrow comparator sample that omits firms with a country of risk outside the FTSE Developed and Advanced emerging countries;
  - > this estimate is 35 bp higher than the 8.99 per cent preferred estimate from PoM's 2022-23 TCS.

We have derived the individual WACC parameters after reviewing precedent from regulators in Australia and New Zealand. We have also considered the recent judgment of the Supreme Court of Western Australia (WASC) that determined the WACC for aeronautical services at Perth Airport as at 30 June 2018.<sup>5</sup>

In addition, we have reviewed the ESC's recent commentary on PoM's previous WACC estimation approaches, including:

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<sup>1</sup> HoustonKemp, *Estimation of the weighted average cost of capital for the Port of Melbourne*, 11 May 2022.

<sup>2</sup> Victoria Government Gazette, *Port Management Act 1995* (Vic.) Pricing Order, No. S 201, 24 June 2016, para 4.1.1(a).

<sup>3</sup> Victoria Government Gazette, *Port Management Act 1995* (Vic.) Pricing Order, No. S 201, 24 June 2016, paras 4.3.1-4.3.2.

<sup>4</sup> See: Port of Melbourne, *2022-23 Tariff Compliance Statement*, General statement, 31 May 2022, p 11.

<sup>5</sup> *Perth Airport Pty Ltd v Qantas Airways Ltd* [No 3] [2022] WASC 51 [282].

- the ESC's Statement of Regulatory Approach 3.0 (SoRA);<sup>6</sup>
- the ESC's interim commentary on PoM's TCS for 2022 to 2023 (Interim Commentary);<sup>7</sup>
- the ESC's five-yearly inquiry into PoM's compliance with the Pricing Order (Inquiry);<sup>8</sup> and
- the advice from the ESC's consultants, Cambridge Economic Policy Associates (CEPA).<sup>9</sup>

The approach we adopt is also consistent with PoM's undertaking to the ESC Minister (the Undertaking).<sup>10</sup>

## 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 ESC's Interim Commentary on 20 December 2022 sets out its preliminary views that PoM's approach generally reflects the ESC's views from the Inquiry. However, the ESC also states that PoM should consider using country filters when identifying its comparator sample for estimating beta and gearing. The ESC also observes that PoM's WACC estimate is relatively high compared to recent Australian regulatory determinations.

When estimating market wide parameters, we apply the approaches adopted by Australian regulators and courts. However, when estimating industry specific parameters, 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 note that there have been several updates to Australian regulatory precedent since the Inquiry, including WACC decisions by five Australian regulators. We refer extensively to this recent precedent in our discussion of WACC parameters, but continue to assign weight to the existing methods that other Australian regulators and courts apply.

## Comparator sample

In our previous report, we identified a comparator sample by:<sup>11</sup>

- using Bloomberg's EQS to identify companies with relevant industry classifications;
- applying filters that remove companies with low market capitalisations and illiquid stocks; and
- manually removing companies that do not own and operate container port and channel infrastructure.

<sup>6</sup> ESC, *Statement of Regulatory Approach - version 3.0*, Port of Melbourne pricing order, 20 December 2022.

<sup>7</sup> ESC, *Interim commentary – Port of Melbourne Tariff Compliance Statement 2022–23*, 20 December 2022.

<sup>8</sup> ESC, *Inquiry into the Port of Melbourne compliance with the pricing order*, Final report, 31 December 2021.

<sup>9</sup> CEPA, *Port of Melbourne five-year review – WACC*, Final report, 17 December 2021.

<sup>10</sup> Port of Melbourne, *Undertaking to the Essential Services Commission Minister*, April 2022.

<sup>11</sup> HoustonKemp, *Estimation of the weighted average cost of capital for the Port of Melbourne*, 11 May 2022, pp 11-14.

However, the Interim Commentary states the ESC's view that filtering the comparator sample for Financial Times Stock Exchange (FTSE) developed and advanced emerging countries is well accepted, and that PoM should consider using these filters in its subsequent WACC estimates.<sup>12</sup>

In our view, the issue of whether a country filter should be applied involves a trade-off between bias and variance. This trade off arises because the 'true' asset beta and gearing of the benchmark efficient firm are unobserved and must be estimated, commonly through taking some average of the parameters calculated from a sample of comparator firms.

Our empirical analysis suggests that there are several drawbacks to introducing a country filter, namely that it results in a small comparator sample that:

- generates more volatile estimates across regulatory periods since fluctuations in the estimates for individual companies will be less likely to offset one another overall; and
- increases the influence of outlier firms on the final parameter estimate.

In addition, we consider that an important consideration for assessing this trade-off is whether the industry exhibits systematic risks that are uniform or diverse. When evaluating the trade-offs between using a smaller sample with comparators that are more similar to the benchmark efficient port against a larger sample with comparators that are less similar to the benchmark efficient port, we consider that the diversity of characteristics across different ports results in varied systematic risks, such that the trade-offs favour the latter approach.

It is also unclear to us that including comparator firms operating in developing countries necessarily introduces bias to the parameter estimates, since sovereign risks may be captured in market returns such that estimated betas are unaffected by these risks. Thus, we consider that identifying a comparator sample without a country filter is a well-accepted approach in the context of a firm such as PoM, which operates in an industry with diverse systematic risks.

Nevertheless, we also note there is some regulatory precedent that supports adopting a small sample for diverse industries such as rail and toll roads, for which the QCA's preferred comparator sample includes:

- only six railroad companies in USA and Canada; and
- only four toll road companies in Australia, Italy and Germany.

However, we note that the QCA expanded its asset beta comparator samples by referring to asset beta estimates from multiple industries in several of its decisions, such as:

- using regulated energy and water businesses as comparators for Aurizon rail;<sup>13</sup>
- referring to a sample of regulated utilities and a sample of toll roads as comparators for Queensland Rail;<sup>14</sup> and
- calculating asset betas for several industries identified as potential comparators for DBCT, namely, coal mining, rail, container ports, toll roads, regulated energy, and regulated water, although it referred primarily to estimates from regulated energy and water firms before applying an uplift based on regulatory judgement.<sup>15</sup>

Given the regulatory precedent, we agree with the ESC that identifying a comparator sample of ports with a country filter is also well-accepted.

<sup>12</sup> ESC, *Interim commentary – Port of Melbourne Tariff Compliance Statement 2022–23*, 20 December 2022, pp 12-13.

<sup>13</sup> QCA, *Aurizon Network's 2017 draft access undertaking*, Appendices, December 2018, p 117.

<sup>14</sup> QCA, *Queensland Rail 2020 draft access undertaking*, Decision, February 2020, pp 36-38.

<sup>15</sup> QCA, *DBCT Management's 2015 draft access undertaking*, Final decision, November 2016, pp 87, 93.



Having concluded that including and excluding a country filter when identifying comparator firms are both well accepted, we consider it appropriate for us to publish two sets of WACC parameter estimates, with and without the country filter.

While expressing our preference for excluding a country filter when identifying comparator firms, we consider that it is also open for PoM to adopt our alternative asset beta and gearing estimates based on the sample that includes a country filter.

We identify two samples of firms that own and operate container port and channel infrastructure, and whose revenues are primarily derived from container port operations, ie:

- our preferred sample of 21 unique firms which omits the country filter; and
- our alternative sample of five firms applying a country filter.

## Cost of debt

The building block regulatory framework involves setting a mechanical approach for deriving regulated revenues and prices over a defined regulatory period. Once the methodology has been determined for the regulatory period, there is limited scope to change it until the review for the next regulatory period.

Consistent with this, while regulators may update various building block parameters within a regulatory period, the methodology for these updates tends to be set out in the regulatory determination at the beginning of the regulatory period. This allows such parameters to be updated mechanically without introducing scope for discretion.

One parameter that Australasian regulators commonly update annually within a regulatory period is the cost of debt.<sup>16</sup> PoM is proposing to include an annually updating cost of debt over the 2023-28 pricing period. The annually updated cost of debt will be calculated at the end of the pricing period used to calculate the annual aggregate revenue requirement.

The Interim Commentary found that consistent with the Inquiry, PoM's approach for estimating the cost of debt is well-accepted.<sup>17</sup> We have retained all 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 4.88 per cent as at 31 March 2023, which reflects:

- a BBB credit rating;
- a 10-year term of debt;
- a 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.

At the end of the 2023-28 pricing period, PoM will update the cost of debt estimate annually by:

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<sup>16</sup> Examples of decisions in which regulators include a within-period annual update to the cost of debt are: Australian Energy Regulator, Rate of Return Instrument, February 2023. ERA, Explanatory statement for the 2022 gas rate of return instrument, 16 December 2023. ERA, Determination on the 2022 weighted average cost of capital for the freight and urban railway networks, and for Pilbara railways, 3 August 2022, table 1. 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 82-83. IPART, Spreadsheet-WACC-model-August-2022.xlsx, Spreadsheet, August 2022. QCA, Rate of return review, Final report, November 2021, pp iii-iv. ICRC, Review of methodologies for the weighted average cost of capital, Final report, April 2021, pp 1-2, 25-27.

<sup>17</sup> ESC, *Interim commentary – Port of Melbourne Tariff Compliance Statement 2022–23*, 20 December 2022, p 10.

- calculating annual cost of debt updates using estimates from averaging periods that may change from year to year, provided the averaging period is nominated in advance; or
- deciding in advance to continue using its current averaging period, ie, 20 trading days to 31 March of each year, consistent with clause 27(b)(iii) of the Undertaking.

When calculating the trailing average cost of debt, the on-the-day cost of debt estimates for 2024-25 onwards inclusive of debt raising costs will also include:

- 5.18 per cent for the 2022-23 prevailing cost of debt; and
- 6.53 per cent for the 2023-24 prevailing cost of debt.

## Cost of equity and gearing

We estimate a benchmark risk free rate of 3.45 per cent using the same sources used as in PoM's 2020-21 to 2022-23 TCS, which the ESC considered well-accepted.<sup>18</sup>

We retain our approach to estimating the gearing, equity beta and asset beta as in PoM's 2022-23 TCS. Aside from the application of the country filter, the ESC appears to consider PoM's approach well-accepted.<sup>19</sup> Omitting the country filter, we estimate:

- a benchmark gearing of 0.20, reflecting the average of our comparator sample; and
- an asset beta of 0.71 and a relevered equity beta of 0.89, calculated using only the Sharpe-Lintner CAPM (SL-CAPM) without correcting for low beta bias and without using the Black CAPM or the Fama-French model (FFM).

Consistent with the 2022-23 TCS we have estimated the MRP by assigning 85 per cent weight to historical excess returns (HER) - ie, 6.33 per cent - and 15 per cent weight to the forward-looking returns - 6.20 per cent - which results in an MRP of 6.31 per cent. In particular:

- we assign 100 per cent weight to the Brailsford, Handley, and Maheswaran (BHM) dataset when implementing the HER without using the NERA dataset, noting that only one regulator continues to give weight to the NERA dataset;
- we continue using the median estimate from dividend discount models adopted by IPART, AER, ERA and QCA, which the ESC considers a well-accepted approach to calculating MRP;<sup>20</sup> and
- we do not use the Wright approach in our estimate, which the ESC considered not well-accepted.<sup>21</sup>

Using the above parameters, we estimate a 9.05 per cent cost of equity for the benchmark efficient port.

Our alternative sample that applies a country filter generates a benchmark asset beta of 0.70 and benchmark gearing of 0.10, resulting in an alternative cost of equity of 8.36 per cent.

## Tax rate and gamma

PoM adopted a gamma of 0.50 for its 2022-23 TCS.<sup>22</sup> We have retained PoM's 0.50 gamma estimate for this report, which is calculated as the product of:

- 0.625 utilisation rate; and

<sup>18</sup> ESC, *Interim commentary – Port of Melbourne Tariff Compliance Statement 2022–23*, 20 December 2022, p 10.

<sup>19</sup> ESC, *Interim commentary – Port of Melbourne Tariff Compliance Statement 2022–23*, 20 December 2022, pp 10-11.

<sup>20</sup> ESC, *Interim commentary – Port of Melbourne Tariff Compliance Statement 2022–23*, 20 December 2022, p 10.

<sup>21</sup> ESC, *Interim commentary – Port of Melbourne Tariff Compliance Statement 2022–23*, 20 December 2022, p 10.

<sup>22</sup> Port of Melbourne, *2022-23 Tariff Compliance Statement*, General statement, 31 May 2022, p 80.

- 0.8 distribution rate.

This approach is consistent with clause 22 of the Undertaking. The ESC also considers that PoM's approach to estimating gamma is well accepted because PoM employs the utilisation approach based on an equity ownership methodology for estimating gamma, and does not use the market valuation or finance practitioner approaches.<sup>23</sup>

We adopt a corporate income tax rate of 30 per cent, consistent with Australian legislation.<sup>24</sup>

## Weighted average cost of capital

Based on the discussion in the previous sections, we estimate a pre-tax nominal WACC estimate of 9.49 per cent using approaches that we consider to be well accepted. This estimate is derived from a comparator sample that does not apply a country filter. Our alternative pre-tax nominal WACC estimate derived from a comparator sample that applies a country filter is 9.34 per cent.

While the ESC considers that PoM's approach to estimating its WACC generally reflects the ESC's views from the Inquiry,<sup>25</sup> the ESC states in the Interim Commentary that PoM's WACC estimate is relatively high compared to recent Australian regulatory determinations.<sup>26</sup>

As discussed in our previous report, we consider this line of reasoning to be flawed because:<sup>27</sup>

- 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.

This is consistent with clause 4.1.1 of the Pricing Order, which 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'.

We also note that the WACC estimates derived by the ESC do not account for the recent material changes to the risk-free rate. We note that our pre-tax nominal WACC estimate of 9.49 per cent is 50 bp higher than the 8.99 per cent estimate from PoM's 2022-23 TCS. This is primarily caused by the 88 bp increase in the risk free rate from 2.57 per cent to 3.45 per cent. Had the risk free rate remained unchanged at 2.57 per cent, our pre-tax nominal WACC estimate for 2023-24 would instead have been 8.67 per cent, which is 32 bp lower than the corresponding 8.99 per cent estimate from PoM's 2022-23 TCS.

Table 1 sets out our pre-tax WACC estimates for 2023-24 with and without the country filter.

<sup>23</sup> ESC, *Interim commentary – Port of Melbourne Tariff Compliance Statement 2022–23*, 20 December 2022, p 11.

<sup>24</sup> ATO, <https://www.ato.gov.au/Rates/Company-tax/>, accessed 17 March 2022.

<sup>25</sup> ESC, *Interim commentary – Port of Melbourne Tariff Compliance Statement 2022–23*, 20 December 2022, pp v-vi.

<sup>26</sup> ESC, *Interim commentary – Port of Melbourne Tariff Compliance Statement 2022–23*, 20 December 2022, pp 13-14.

<sup>27</sup> HoustonKemp, *Estimation of the weighted average cost of capital for the Port of Melbourne*, 11 May 2022, pp 39-40.

Table 1: Weighted average cost of capital estimates with and without country filter

Parameter	HoustonKemp 2023-24	HoustonKemp 2023-24, country filter applied	Formula
(a) Return on debt (including debt raising costs)	4.88%	4.88%	Rounded to two decimal places.
(b) Return on equity	9.05%	8.36%	(b1) + (b2) × (b3)
(b1) - risk free rate	3.45%	3.45%	Rounded to two decimal places.
(b2) - MRP	6.31%	6.31%	Rounded to two decimal places.
(b3) - equity beta	0.89	0.78	(b3b) ÷ (1 - (c))
(b3b) - asset beta	0.71	0.70	Rounded to two decimal places.
(c) Gearing	20%	10%	Rounded to nearest percentage point.
(d) Tax rate	30%	30%	
(e) Gamma	0.50	0.50	(e1) × (e2)
(e1) - utilisation rate	0.625	0.625	
(e2) - distribution rate	0.80	0.80	
<b>Pre-tax nominal WACC</b>	<b>9.49%</b>	<b>9.34%</b>	$(c) \times (a) + \frac{(1 - (c)) \times (b)}{1 - (d) \times (1 - (e))}$

Source: 2022-23 TCS; 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.

The WACC outlined above in table 1, will only apply for 2023-24, in each subsequent year of the 2023-28 pricing period a new WACC will be calculated with an updated cost of debt (see section 4). This update will be undertaken by PoM at the end of the regulatory period.

## Forecast inflation

The Pricing Order provides PoM with an ex post real return on capital using an ‘indexed capital base’ approach, where clause 4.1.1(d) requires PoM to deduct its indexation allowance when determining its aggregate revenue requirement, while clauses 4.2.1 and 4.6.1 require PoM to roll forward its capital base using the percentage change in CPI for the relevant financial year.

Thus, PoM is compensated for inflation through the indexation of its capital base, such that its inflation allowance is recovered over the life of its assets. This generates a smoother revenue path and maintains a real capital base that is closer to its replacement value compared to an alternative that compensates for inflation upfront. It also is consistent with standard regulatory practice in Australia and New Zealand.

Several Australian regulators calculate the indexation allowance for regulated businesses using estimates of inflation expectations instead of attempting to forecast actual inflation. This means that these regulators define the ‘best’ estimate as one that matches investors’ expectations at the time when the estimate is made, which also will not predict inflation outcomes that investors did not expect. This is consistent with clause 8.2.2(b) of the Pricing Order, which refers to the ‘best’ forecast or estimate possible ‘in the circumstances’.

Regulatory precedent supports using RBA forecasts for forecasting inflation. Six Australian regulators and the NZCC adopt some variation of this approach, which pairs short-term central bank inflation forecasts with a longer-term forecast equal to the midpoint of central bank inflation targets and then takes the geometric average of these forecasts. Several regulators also implement a linear glide path between the short-term central bank inflation forecasts and the longer-term forecast.

We have considered the merits of the RBA glide path approach and two market-based approaches for forecasting inflation, ie, breakeven and inflation swaps. While none of the three approaches is perfect, we

consider that the assumptions behind the RBA glide path form a reasonable basis for forecasting inflation, and that the RBA glide path generates forecasts that are best possible in the circumstances. We do not assign weight to the market-based approaches due to bias concerns.

In addition, we consider that the term of the inflation forecast should match the length of the regulatory period. This ensures that the indexation allowance that is deducted from PoM's aggregate revenue requirement can be expected to have the same net present value as the roll forward of its capital base. Furthermore, this matches the practice of most regulators in Australia and New Zealand.

Adopting the RBA glide path approach to forecasting inflation over the 2023-28 pricing period involves the following steps:

- for the first two financial years (FY2024-FY2025) use RBA forecasts as set out in the May 2023 Statement of Monetary Policy;<sup>28</sup>
- for FY2028 forecast inflation would be the mid-point of the RBA inflation target of 2.5 per cent; and
- for FY2026 and FY2027 are to be estimated using a straight line interpolation between the forecast inflation for FY2025 and the FY2028.

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<sup>28</sup> RBA, *Statement on Monetary Policy – May 2023*, 4 May 2023: Table 5.1, p 70.

# 1. Introduction

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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); and
- the methodology for forecast inflation consistent with clause 8.2.2 of the Pricing Order made under section 49A of the *Port Management Act 1995* (Vic) (PMA).

The WACC estimate in this report serves as an update to the estimate set out in our previous report for HSF.<sup>29</sup>

The rate of return is an input to the accrual building block model (ABBM) that PoM uses to derive its annual revenue requirement. The WACC estimates from this report will inform PoM's rate of return for the 1 July 2023 to 30 June 2028 pricing period (2023-28 pricing period), 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:<sup>30</sup>

... 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:<sup>31</sup>

... 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.

Using methods that we consider well-accepted, we estimate a benchmark pre-tax nominal WACC as at 31 March 2023 of:<sup>32</sup>

- 9.49 per cent using on our preferred broad comparator sample that does not apply a country filter;
  - > this estimate is 50 basis points (bp) higher than the 8.99 per cent preferred estimate from PoM's 2022-23 TCS, which is primarily caused by the 88 bp increase in the risk free rate; and
- 9.34 per cent using an alternative narrow comparator sample that omits firms with a country of risk outside the FTSE Developed and Advanced emerging countries;
  - > this estimate is 35 bp higher than the 8.99 per cent preferred estimate from PoM's 2022-23 TCS.

We have derived the individual WACC parameters after reviewing precedent from regulators in Australia and New Zealand. 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.<sup>33</sup>

In addition, we have reviewed the ESC's recent commentary on PoM's previous WACC estimation approaches, including:

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<sup>29</sup> HoustonKemp, *Estimation of the weighted average cost of capital for the Port of Melbourne*, 11 May 2022.

<sup>30</sup> Victoria Government Gazette, *Port Management Act 1995* (Vic.) Pricing Order, No. S 201, 24 June 2016, para 4.1.1(a).

<sup>31</sup> Victoria Government Gazette, *Port Management Act 1995* (Vic.) Pricing Order, No. S 201, 24 June 2016, paras 4.3.1-4.3.2.

<sup>32</sup> See: Port of Melbourne, *2022-23 Tariff Compliance Statement*, General statement, 31 May 2022, p 11.

<sup>33</sup> *Perth Airport Pty Ltd v Qantas Airways Ltd* [No 3] [2022] WASC 51 [282].

- the ESC's Statement of Regulatory Approach 3.0 (SoRA);<sup>34</sup>
- the ESC's interim commentary on PoM's TCS for 2022 to 2023 (Interim Commentary);<sup>35</sup>
- the ESC's five-yearly inquiry into PoM's compliance with the Pricing Order (Inquiry);<sup>36</sup> and
- the advice from the ESC's consultants, Cambridge Economic Policy Associates (CEPA).<sup>37</sup>

The approach we adopt is also consistent with PoM's undertaking to the ESC Minister (the Undertaking).<sup>38</sup>

## 1.1 Summary of changes in methodology

Table 1.1 summarises the methodological changes that we have made compared to our previous report. The table shows that we have retained most elements of our previous methodology except that:

- we have switched to an alternative RBA risk free rate series for estimating the risk free rate on equity and when interpolating RBA cost of debt estimates to obtain daily data;
- we have changed our approach for estimating the MRP; and
- we present two sets of beta and gearing estimates, corresponding to comparator samples with and without the country filter.

Table 1.1: Changes in methodology compared to our previous report

Parameter	Methodological changes	Impact
Return on debt	Switched to an alternative RBA risk free rate series when interpolating RBA estimates to obtain daily data, since the previous RBA series is no longer published	Analysis suggests no impact on return on debt estimate
Return on equity		
- risk free rate	Switched to an alternative RBA series after the RBA stopped publishing the series that we previously used	Analysis suggests no impact on risk free rate estimate
- MRP	<ul style="list-style-type: none"> <li>• HER MRP: removed NERA dataset to match regulatory precedent and made computational changes to be consistent with AER's Ibbotson HER spreadsheet</li> <li>• DDM MRP: retain AER's preferred three-stage DDM but removed AER's two-stage DDM; reduced long-run growth assumption from 4.6 per cent to 3.85 per cent in AER's DDM; made computational changes to methodology used to adjust stock returns for franking credits in order to be consistent with AER's Ibbotson HER spreadsheet</li> </ul>	<ul style="list-style-type: none"> <li>• HER MRP: change reduces estimate by 13 bp</li> <li>• DDM MRP: change to franking credit adjustment increases estimate by 5 bp</li> </ul>
- equity beta and asset beta	<ul style="list-style-type: none"> <li>• Present two pre-tax WACC estimates using equity beta and asset beta estimates for comparator samples with and without the country filter</li> <li>• Change the ticker for one comparator (China Merchants Port Group Co Ltd) so that its company index and market index have the same currency</li> </ul>	<ul style="list-style-type: none"> <li>• Asset beta with country filter is lower by 0.01</li> <li>• Change to ticker has no impact on asset beta</li> </ul>
Gearing	Present two pre-tax WACC estimates using gearing estimates for comparator samples with and without the country filter	Gearing with country filter is lower by 0.10
Credit rating	No change	-
Tax rate	No change	-

<sup>34</sup> ESC, *Statement of Regulatory Approach - version 3.0*, Port of Melbourne pricing order, 20 December 2022.

<sup>35</sup> ESC, *Interim commentary – Port of Melbourne Tariff Compliance Statement 2022–23*, 20 December 2022.

<sup>36</sup> ESC, *Inquiry into the Port of Melbourne compliance with the pricing order*, Final report, 31 December 2021.

<sup>37</sup> CEPA, *Port of Melbourne five-year review – WACC*, Final report, 17 December 2021.

<sup>38</sup> Port of Melbourne, *Undertaking to the Essential Services Commission Minister*, April 2022.

Gamma

No change

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## 1.2 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:

[Quote instructions]

## 1.3 Experience and qualifications

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

### Brendan Quach

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 20 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.

### Johnathan Wongsosaputro

Johnathan is an economist with eight 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 Elaine Luc and Mathew Ditchburn. Notwithstanding this assistance, the opinions in this report are our own, and we take full responsibility for them.

## 1.4 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;
- section 8 sets out the methodology for a best estimate in the circumstances of forecast inflation over the 2023-28 pricing period; and
- in section 9, 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 assesses the impact of applying a country filter when identifying the comparator sample;
- appendix A2 sets out the list of firms in our comparator samples;
- appendix A3 sets out our calculations of industry-specific parameters based on the comparator samples;
- appendix A4 sets out our approach for deriving DDM MRP estimates; and
- appendix A5 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’

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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 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 ESC’s Interim Commentary on 20 December 2022 sets out its preliminary views that PoM’s approach generally reflects the ESC’s views from the Inquiry. However, the ESC also states that PoM should consider using country filters when identifying its comparator sample for estimating beta and gearing. The ESC also observes that PoM’s WACC estimate is relatively high compared to recent Australian regulatory determinations.

When estimating market wide parameters, we apply the approaches adopted by Australian regulators and courts. However, when estimating industry specific parameters, 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 note that there have been several updates to Australian regulatory precedent since the Inquiry, including WACC decisions by five Australian regulators. We refer extensively to this recent precedent in our discussion of WACC parameters, but continue to assign weight to the existing methods that other Australian regulators and courts 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:<sup>39</sup>

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

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:

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<sup>39</sup> Port of Melbourne, *Reference Tariff Schedule: effective 1 July 2021*, 2021.

- 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’.

In addition to the regulatory framework set out in the Pricing Order, PoM has also made an Undertaking to the ESC Minister that is legally binding from 20 May 2022 until 30 June 2027.<sup>40</sup> The Undertaking sets out several commitments, including the approaches that PoM will apply when calculating the WACC for the ABBM.<sup>41</sup>

## 2.2 ESC’s interpretation of a ‘well accepted’ approach

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

- its SoRA;
- the Interim Commentary; and
- the Inquiry.

### 2.2.1 Statement of Regulatory Approach

The ESC published the SoRA in December 2022 that provides guidance on how PoM may demonstrate compliance with the Pricing Order.<sup>42</sup>

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:<sup>43</sup>

- 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:<sup>44</sup>

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. A ‘well accepted approach’ is one that is widely

<sup>40</sup> Port of Melbourne, *Undertaking to the Essential Services Commission Minister*, April 2022, para 8. Also see: ESC, *Statement of Regulatory Approach - version 3.0*, Port of Melbourne pricing order, 20 December 2022, pp 3-4.

<sup>41</sup> Port of Melbourne, *Undertaking to the Essential Services Commission Minister*, April 2022, paras 17-27.

<sup>42</sup> ESC, *Statement of Regulatory Approach - version 3.0*, Port of Melbourne pricing order, 20 December 2022, p 4.

<sup>43</sup> ESC, *Statement of Regulatory Approach - version 3.0*, Port of Melbourne pricing order, 20 December 2022, pp 29-30.

<sup>44</sup> ESC, *Statement of Regulatory Approach - version 3.0*, Port of Melbourne pricing order, 20 December 2022, p 27.

accepted as appropriate for use when determining the weighted average cost of capital for a firm for the purposes of calculating a revenue requirement.

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:<sup>45</sup>

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.

The SoRA further describes the ESC's guidance on several aspects of possible approaches for estimating the benchmark return on capital, including:<sup>46</sup>

- risk characteristics of the services provided by PoM that are relevant for identifying comparators;
- the framework for selecting comparators; and
- estimation techniques.

### 2.2.2 ESC's interim commentary on Port of Melbourne's Tariff Compliance Statement 2022-23

PoM adopted a pre-tax WACC estimate of 8.99 per cent in its 2022-23 TCS, which it submitted to the ESC on 31 May 2022.<sup>47</sup> The 2022-23 TCS demonstrates how PoM's tariffs for prescribed services over the 2022-23 financial year comply with the Pricing Order.

In response, the ESC published the Interim Commentary on 20 December 2022 that sets out its preliminary views on PoM's compliance with the Pricing Order when setting its tariffs for 2022-23.<sup>48</sup>

The ESC's preliminary views are that:<sup>49</sup>

1. PoM's approach generally reflects the ESC's views from the Inquiry;
2. PoM should consider using country filters when identifying its comparator sample for estimating beta and gearing, which would have reduced the pre-tax WACC estimate from 8.99 per cent to 8.82 per cent; and
3. PoM's WACC estimate is relatively high compared to recent Australian regulatory determinations.

### 2.2.3 ESC 2021 inquiry into PoM's compliance with the Pricing Order

In the Inquiry, the ESC compared its benchmark WACC estimates against PoM's estimates. In deriving its benchmark WACC estimates, the ESC stated:<sup>50</sup>

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).

<sup>45</sup> ESC, *Statement of Regulatory Approach - version 3.0*, Port of Melbourne pricing order, 20 December 2022, pp 27-28.

<sup>46</sup> ESC, *Statement of Regulatory Approach - version 3.0*, Port of Melbourne pricing order, 20 December 2022, pp 27-33.

<sup>47</sup> Port of Melbourne, *2022-23 Tariff Compliance Statement*, General statement, 31 May 2022, p 11.

<sup>48</sup> ESC, *Interim commentary – Port of Melbourne Tariff Compliance Statement 2022–23*, 20 December 2022, p iv.

<sup>49</sup> ESC, *Interim commentary – Port of Melbourne Tariff Compliance Statement 2022–23*, 20 December 2022, pp v-vi, 9-14.

<sup>50</sup> ESC, *Inquiry into the Port of Melbourne compliance with the pricing order*, Final report, 31 December 2021, p 38.

The ESC also assessed whether an approach was ‘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;<sup>51</sup> 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.<sup>52</sup>

Similarly, CEPA considered that:

- an approach must have wide acceptance in order to be ‘well accepted’;<sup>53</sup>
- 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;<sup>54</sup> and
- an approach adopted by an Australian regulator may not be well accepted if it is ‘markedly different’ from all other Australian regulatory approaches.<sup>55</sup>

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.

<sup>51</sup> ESC, *Inquiry into the Port of Melbourne compliance with the pricing order*, Final report, 31 December 2021, pp 54, 56.

<sup>52</sup> ESC, *Inquiry into the Port of Melbourne compliance with the pricing order*, Final report, 31 December 2021, p 81.

<sup>53</sup> CEPA, *Port of Melbourne five-year review – WACC*, Final report, 17 December 2021, p 6.

<sup>54</sup> CEPA, *Port of Melbourne five-year review – WACC*, Final report, 17 December 2021, pp 6-7, 10.

<sup>55</sup> CEPA, *Port of Melbourne five-year review – WACC*, Final report, 17 December 2021, p 41.

	PoM's approach	CEPA's review
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].

## 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:<sup>56</sup>

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

<sup>56</sup> ESC, Statement of Regulatory Approach - version 3.0, Port of Melbourne pricing order, 20 December 2022, p 28.

- 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 Western Australian Economic Regulation Authority's reasons for maintaining the ten-year debt term is that it supports the stability of regulatory arrangements, given that the benchmark term of debt is difficult to adjust within the regulatory rate of return instrument.<sup>57</sup>

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.

### 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/or
- 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.<sup>58</sup>

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.<sup>59</sup> 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 our previous report

There have been several updates to Australian regulatory precedent since our previous report, namely:<sup>60</sup>

- the ACCC has published its 2022 decision on Australia Post's price notification;
- the Australian Economic Regulator (AER) has published its 2022 rate of return instrument (RoRI);
- the Western Australian ERA has published its 2022 gas RoRI;

<sup>57</sup> ERA, *2022 final gas rate of return instrument*, 16 December 2022, para 409.

<sup>58</sup> *Perth Airport Pty Ltd v Qantas Airways Ltd [No 3] [2022] WASC 51 [322], [327]*.

<sup>59</sup> *Perth Airport Pty Ltd v Qantas Airways Ltd [No 3] [2022] WASC 51 [266], [286]*.

<sup>60</sup> ACCC, *Decision on Australia Post's 2022 price notification*, December 2022. AER, *Rate of Return Instrument | Explanatory statement*, February 2023. ERA, *Explanatory statement for the 2022 final gas rate of return instrument*, 16 December 2022. ICRC, *Regulated water and sewerage services 2023-28*, Final report, May 2023. OTTER, *Investigation into TasWater's prices and services for the period 1 July 2022 to 30 June 2026*, Final report, May 2022.

- the ACT Independent Competition and Regulatory Commission (ICRC) has published its final report regarding Icon Water's regulated water and sewerage services prices for the 2023-28 regulatory period; and
- the Office of the Tasmanian Economic Regulator (OTTER) has published its final report that investigates TasWater's prices and services.

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

Nevertheless, 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:<sup>61</sup>

- IPART's 2018 WACC review;
- the Essential Services Commission of South Australia's (ESCOSA's) 2020 regulatory determination for SA Water; and
- the Queensland Competition Authority's (QCA's) rate of return review setting out its approach for determining the WACC for future regulatory determinations; and
- the WASC's 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
  - > relied substantially on the NZCC's approach for deriving a comparator sample that is then used to estimate industry specific WACC parameters.

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.<sup>62</sup>

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<sup>61</sup> IPART, *Review of our WACC method*, Final Report, February 2018. ESCOSA, *SA Water regulatory determination 2020*, Final determination: statement of reasons, June 2020. QCA, *Rate of return review*, Final report, November 2021. *Perth Airport Pty Ltd v Qantas Airways Ltd [No 3] [2022] WASC 51* paras 187, 190-191, 266-267, 327-330, 335.

<sup>62</sup> Utilities Commission of the Northern Territory, *2019 system control charges review*, Final decision, 30 April 2019, p 13.



### 3. Comparator sample

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In our previous report, we identified a comparator sample by:<sup>63</sup>

- using Bloomberg's EQS to identify companies with relevant industry classifications;
- applying filters that remove companies with low market capitalisations and illiquid stocks; and
- manually removing companies that do not own and operate container port and channel infrastructure.

However, the Interim Commentary states the ESC's view that filtering the comparator sample for Financial Times Stock Exchange (FTSE) developed and advanced emerging countries is well accepted, and that PoM should consider using these filters in its subsequent WACC estimates.<sup>64</sup>

In our view, the issue of whether a country filter should be applied involves a trade-off between bias and variance. This trade off arises because the 'true' asset beta and gearing of the benchmark efficient firm are unobserved and must be estimated, commonly through taking some average of the parameters calculated from a sample of comparator firms.

Our empirical analysis suggests that there are several drawbacks to introducing a country filter, namely that it results in a small comparator sample that:

- generates more volatile estimates across regulatory periods since fluctuations in the estimates for individual companies will be less likely to offset one another overall; and
- increases the influence of outlier firms on the final parameter estimate.

In addition, we consider that an important consideration for assessing this trade-off is whether the industry exhibits systematic risks that are uniform or diverse. When evaluating the trade-offs between using a smaller sample with comparators that are more similar to the benchmark efficient port against a larger sample with comparators that are less similar to the benchmark efficient port, we consider that the diversity of characteristics across different ports results in varied systematic risks, such that the trade-offs favour the latter approach.

It is also unclear to us that including comparator firms operating in developing countries necessarily introduces bias to the parameter estimates, since sovereign risks may be captured in market returns such that estimated betas are unaffected by these risks. Thus, we consider that identifying a comparator sample without a country filter is a well-accepted approach in the context of a firm such as PoM, which operates in an industry with diverse systematic risks.

Nevertheless, we also note there is some regulatory precedent that supports adopting a small sample for diverse industries such as rail and toll roads, for which the QCA's preferred comparator sample includes:

- only six railroad companies in USA and Canada; and
- only four toll road companies in Australia, Italy and Germany.

However, we note that the QCA expanded its asset beta comparator samples by referring to asset beta estimates from multiple industries in several of its decisions, such as:

- using regulated energy and water businesses as comparators for Aurizon rail;<sup>65</sup>

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<sup>63</sup> HoustonKemp, *Estimation of the weighted average cost of capital for the Port of Melbourne*, 11 May 2022, pp 11-14.

<sup>64</sup> ESC, *Interim commentary – Port of Melbourne Tariff Compliance Statement 2022–23*, 20 December 2022, pp 12-13.

<sup>65</sup> QCA, *Aurizon Network's 2017 draft access undertaking*, Appendices, December 2018, p 117.

- referring to a sample of regulated utilities and a sample of toll roads as comparators for Queensland Rail;<sup>66</sup> and
- calculating asset betas for several industries identified as potential comparators for DBCT, namely, coal mining, rail, container ports, toll roads, regulated energy, and regulated water, although it referred primarily to estimates from regulated energy and water firms before applying an uplift based on regulatory judgement.<sup>67</sup>

Given the regulatory precedent, we agree with the ESC that identifying a comparator sample of ports with a country filter is also well-accepted.

Having concluded that including and excluding a country filter when identifying comparator firms are both well accepted, we consider it appropriate for us to publish two sets of WACC parameter estimates, with and without the country filter.

While expressing our preference for excluding a country filter when identifying comparator firms, we consider that it is also open for PoM to adopt our alternative asset beta and gearing estimates based on the sample that includes a country filter.

We identify two samples of firms that own and operate container port and channel infrastructure, and whose revenues are primarily derived from container port operations, ie:

- our preferred sample of 21 unique firms which omits the country filter; and
- our alternative sample of five firms applying a country filter.

### 3.1 Use of a country filter for identifying comparator ports

The Essential Services Commission's (ESC's) interim commentary on Port of Melbourne's (PoM's) 2022-23 tariff compliance statement (TCS) states its preliminary view that applying a country filter when identifying comparator ports is a well accepted approach.<sup>68</sup>

This is consistent with the ESC's findings from its earlier five-yearly inquiry into PoM's compliance with the Pricing order (Inquiry), in which the ESC:<sup>69</sup>

- observes that Australian regulators often apply a country filter when identifying comparators;
- considers that increasing the sample size does not constitute a robust justification for including out-of-sector comparators; and
- observes that several Australian regulators use comparator samples with only four or five companies.

Consequently, the ESC's preliminary view is that PoM should consider filtering its comparator sample to include only companies from FTSE developed and advanced emerging countries when deriving its subsequent WACC estimates.<sup>70</sup> The ESC calculates that the application of a country filter would have reduced PoM's WACC estimate in its 2022-23 TCS from 8.99 per cent to 8.82 per cent, which the ESC considers to be a material difference.<sup>71</sup>

In our view, the issue of whether a country filter should be applied involves a trade-off between bias and variance. This trade off arises because the 'true' asset beta and gearing of the benchmark efficient firm are

<sup>66</sup> QCA, *Queensland Rail 2020 draft access undertaking*, Decision, February 2020, pp 36-38.

<sup>67</sup> QCA, *DBCT Management's 2015 draft access undertaking*, Final decision, November 2016, pp 87, 93.

<sup>68</sup> ESC, *Interim commentary – Port of Melbourne Tariff Compliance Statement 2022–23*, 20 December 2022, pp 12-13.

<sup>69</sup> ESC, *Inquiry into the Port of Melbourne compliance with the pricing order*, Final report, 31 December 2021, pp 64-65.

<sup>70</sup> ESC, *Interim commentary – Port of Melbourne Tariff Compliance Statement 2022–23*, 20 December 2022, pp 12-13.

<sup>71</sup> ESC, *Interim commentary – Port of Melbourne Tariff Compliance Statement 2022–23*, 20 December 2022, p 13.

unobserved and must be estimated, commonly through taking some average of the parameters calculated from a sample of comparator firms.

In practice, the asset beta and gearing for an individual comparator firm in the sample often will be subject to idiosyncratic variations at different points in time, which may not reflect the systematic risks of the benchmark efficient firm that apply at that point in time.

As such, the sample of comparators should be chosen to balance the objectives of ensuring that the parameter estimate derived from the comparator sample matches that of the benchmark efficient firm:

- on average in the long run, ie, reducing bias relative to the 'true' estimate; and
- over shorter time periods, ie, reducing variance relative to the 'true' estimate.

A smaller sample of comparator firms that closely match the systematic risks of the benchmark efficient firm is likely to generate asset beta and gearing estimates that reflect the 'true' parameter estimates on average in the long run, ie, lower bias. However, this small sample is likely to generate estimates that are volatile and that may deviate from the true parameter estimates over shorter time periods due to idiosyncratic external shocks that affect individual comparators at various points in time, ie, higher variance.

Conversely, a larger comparator sample may include firms with systematic risks that are less comparable to the benchmark efficient port, ie, bias may be introduced. However, this larger sample is likely to generate estimates that are more stable and are more likely to be closer to the 'true' parameter estimates over shorter time periods since idiosyncratic external shocks that affect individual comparators are more likely to offset one another, ie, lower variance.

### 3.1.1 Filters are used to ensure that the task of identifying the comparator sample remains tractable

There are a wide range of characteristics that may affect the systematic risks of a potential comparator, such as:<sup>72</sup>

- customer characteristics;
- revenue protection mechanisms;
- growth options;
- the nature of the product or service;
- pricing structure;
- duration of contract prices with suppliers and customers;
- presence of regulation;
- degree of monopoly power;
- presence of growth options;
- operating leverage; and
- market weight of the industry on the market proxy.

<sup>72</sup> See: QCA, *Rate of return review*, Final report, November 2021, p 74. NZCC, *Input methodologies review decisions | Topic paper 4: cost of capital issues*, 20 December 2016, para 445.2, footnote 344.

These characteristics should be assessed collectively when assessing the systematic risks of a potential comparator, since firms with different firm-specific characteristics can have similar levels of systematic risk.<sup>73</sup> This observation is consistent with the QCA's views:<sup>74</sup>

**Ultimately, it is important to assess the relevant characteristics collectively rather than individually when assessing systematic risk. It is possible for firms to have different firm-specific characteristics but similar levels of systematic risk. For some businesses, particular characteristics will be more important than others in affecting the systematic risk that they face. (emphasis added)**

However, depending on the systematic risks of the regulated firm, it may be difficult to identify the most appropriate set of comparator firms.

In particular, if the regulated firm possesses a set of risk characteristics that are difficult to observe from third party data vendors such as Bloomberg, then it often is necessary to conduct a manual assessment of the characteristics of each potential comparator. This assessment may include detailed reviews of company websites, annual reports, investor presentations and news articles before applying a subjective judgement regarding whether each potential comparator should be included in the comparator sample.

Assessing the risk characteristics of each potential comparator in such detail is likely to be an intractable task. As such, it is common for regulators to apply various filters in order to reduce the number of potential comparators before conducting a manual assessment of the remaining firms that have not been filtered out. That is, the filters serve as a substitute for carrying out the time-consuming task of carrying out a manual check of the characteristics of every potential comparator.

Examples of filters that have been considered by Australian regulators include:<sup>75</sup>

- market capitalisation filters;
- liquidity filters;
- country filters;
- industry and sector filters; and
- proportion of government ownership.<sup>76</sup>

By applying such filters, Australian regulators implicitly assume that the filters serve as an adequate proxy for the systematic risks faced by the benchmark efficient entity. For example, the use of a country filter reflects the assumption that firms in the excluded countries possess systematic risks that are materially different from that of the benchmark efficient entity.

### 3.1.2 The optimal set of filters may differ across industries

It may not be feasible to apply all the filters if the sample of potential comparator firms is not particularly large. In such circumstances, it is necessary to evaluate the costs and benefits of applying each filter.

We consider that the assessment of the advantages and disadvantages associated with different filters, ie, the trade-off between bias and variance, is likely to vary across industries. Put another way, the marginal benefit and marginal cost arising from applying a specific filter may differ for different industries, such that it may be optimal to use one of set of filters for regulated firms in a particular industry while using a different set of filters for regulated firms in other industries.

<sup>73</sup> QCA, *Rate of return review*, Final report, November 2021, pp 68-70.

<sup>74</sup> QCA, *Rate of return review*, Final report, November 2021, p 70.

<sup>75</sup> See: ESC, *Inquiry into the Port of Melbourne compliance with the pricing order*, Final report, 31 December 2021, pp 64-66.

<sup>76</sup> QCA, *Rate of return review*, Final report, November 2021, p 74.

In addition, we consider that an important consideration for assessing this trade-off is whether the industry exhibits systematic risks that are uniform or diverse.

For industries that feature a large number of firms for which the systematic risks are fairly uniform, it is easier to identify potential comparators with systematic risks that closely match that of the benchmark efficient firm. In such circumstances, expanding the sample by relaxing or omitting various filters such as country filters may result in the inclusion of firms that are less comparable to the benchmark efficient firm, which may introduce bias while having immaterial impact on the variance of estimates.

The opposite applies for industries that feature firms for which systematic risks are fairly diverse, where it is difficult to identify comparators with systematic risks that closely match that of the benchmark efficient firm. In such circumstances, expanding the sample by relaxing or omitting filters such as country filters is less likely to introduce substantial additional bias, and is more likely to reduce the variance of estimates.

Consistent with the above discussion, our empirical analysis in appendix A1 below suggests that there are several drawbacks to introducing a country filter, namely that it results in a small comparator sample that:

- generates more volatile estimates across regulatory periods since fluctuations in the estimates for individual companies will be less likely to offset one another overall; and
- increases the influence of outlier firms on the final parameter estimate.

Similarly, the QCA refers to the unique characteristics of its regulated firms as justification for using a different approach for identifying comparators compared to the approach used by the AER:<sup>77</sup>

The point of using a pure-play method is to establish comparators with a similar level of systematic risk in order to determine the cost of capital to the firm. Ideally these firms would be identical to the benchmark firm for which we are trying to determine the cost of capital. **Unfortunately, due to the unique nature of the firms that are subject to our regulatory regime, there are very few, if any, listed firms that fulfill this condition. As a result, we must look to identify other firms that share similar risk characteristics as the benchmark firm. These comparators will not be alike in some ways, and any analysis should take such differences into account when assessing risk.**

**These issues will not be as relevant for regulators setting the cost of capital where listed pure play comparators do exist. Presumably, in the case of the AER, if it considers that it already has a sample of firms that meets its 'pure play' definition, then we would share the view that populating that sample with firms with a different level of risk would introduce bias into the sample.** (emphasis added)

The above quote refers to the QCA's assessment that restricting comparator samples to include only firms in the same industry will not necessarily generate a better estimate of beta. However, a similar principle applies when assessing the range of countries that should be included in the comparator sample, since omitting a country filter is an alternative method for expanding the comparator sample.

This line of reasoning is consistent with the WASC's judgment for Perth Airport, where the Court rejected the arguments raised by Qantas' expert regarding the importance of restricting the comparator sample to airports with similar country risks, as well as other characteristics such as demand and revenue risk and operating leverage.<sup>78</sup>

Instead, the WASC considers that:<sup>79</sup>

<sup>77</sup> QCA, *Rate of return review*, Final report, November 2021, p 69.

<sup>78</sup> *Perth Airport Pty Ltd v Qantas Airways Ltd [No 3]* [2022] WASC 51 paras 235-236.

<sup>79</sup> The Court also rejects the use of sovereign credit ratings for identifying countries with similar risks to Australia. See: *Perth Airport Pty Ltd v Qantas Airways Ltd [No 3]* [2022] WASC 51 paras 262-265.

- the NZCC's sample of comparator airports that does not apply a country filter constitutes better comparators compared to an alternative sample that only includes Sydney Airport, Auckland Airport and four European airports; and
- the view that it is necessary to limit the sample to comparators with similar country risks is unpersuasive.

### 3.1.3 Regulatory precedent for a diverse industry such as airports supports omitting a country filter

As part of the Inquiry, the ESC observes that several Australian regulators use a comparator sample with only four or five companies.<sup>80</sup> Similarly, the ESC's preliminary view in the Interim Commentary is that the WASC's judgment for Perth Airport cannot be used to justify omitting a country filter in the context of the Pricing Order.<sup>81</sup>

Our survey of regulatory precedent in A1.2 below identifies that the only precedent that support not applying a country filter are the decisions made by the NZCC and WASC in the airport industry. All other regulatory precedent includes variations of country filters.

Drawing from the QCA's reasoning described above, we consider that the regulatory precedent set out in decisions that pertain to utilities such as energy and water networks are less relevant for assessing industry specific WACC parameters for PoM, ie, asset beta, gearing and credit rating.

Instead, we consider that the decisions made by the NZCC and WASC for the airport industry are particularly relevant for identifying a suitable comparator sample for PoM. Specifically, airports and ports both operate in industries with firms that exhibit diverse systematic risks, such that different companies in these industries may respond differently to external shocks.

This diversity arises because the systematic risks faced by airports and ports can differ materially depending on a wide range of factors such as:

- the types of products being transported, as well as the proportion of revenues generated from each product category;
- the size of the airport or port, which may limit the types of aeroplanes and ships that can be accommodated; and
- the status of the airport as a 'hub' or 'spoke'.

This contrasts with utilities, for which most firms in the same industry tend to transport largely similar products and for which differing firm sizes are less likely to translate to materially different systematic risks.

As a result, beta estimates within the airport and port industries are more likely to vary substantially across firms. This means that the marginal benefits of reducing the variances of the asset beta and gearing estimates through obtaining a larger sample that does not apply a country filter are likely to outweigh the marginal costs of potentially introducing additional bias from including firms operating in countries with different economic, political or social conditions to Australia.<sup>82</sup>

Such diversity in systematic risks across firms within the port and airport industries distinguishes the decisions made by the NZCC and WASC from that of decisions made for utility industries.

Specifically, utility networks are more likely to exhibit similar systematic risks across firms, such that the marginal benefits of expanding the sample to include comparators from developing countries may not exceed the marginal costs of including firms that operate in countries with different conditions to Australia.

<sup>80</sup> ESC, *Inquiry into the Port of Melbourne compliance with the pricing order*, Final report, 31 December 2021, p 65.

<sup>81</sup> ESC, *Interim commentary – Port of Melbourne Tariff Compliance Statement 2022–23*, 20 December 2022, p 12.

<sup>82</sup> The ESC cites this factor as its reason for excluding firms from developing countries and China. See: ESC, *Interim commentary – Port of Melbourne Tariff Compliance Statement 2022–23*, 20 December 2022, p 12.

This may explain the regulatory precedent in which the AER has adopted a small sample of nine firms when estimating the benchmark asset beta for regulated electricity networks and gas pipelines.

Thus, when evaluating the trade-offs between using a smaller sample with comparators that are more similar to the benchmark efficient port or airport against a larger sample with comparators that are less similar to the benchmark efficient port, we consider that the diversity of characteristics across different ports or airports results in varied systematic risks, such that the trade-offs favour the latter approach.

### 3.1.4 There are several advantages to omitting a country filter

It is also unclear to us that including comparator firms operating in developing countries necessarily introduces bias to the parameter estimates.

Although the Interim Commentary states the ESC's view that developing countries and China have different economic, political, and social conditions compared to Australia, the QCA explains that the sovereign risks associated with developing countries may not affect the beta estimates of the comparator firms operating in those countries.

This is because the relative systematic risk of firms within developing countries may be unchanged, ie, that the sovereign risks may be captured in market returns such that estimated betas are unaffected by these risks:<sup>83</sup>

Generally, we consider that firms originating from developed countries are preferable to those from developing or emerging economies, as the former are more likely to operate within a more stable political and business environment and are subject to a well-developed system of property rights and legal protections. **However, if after reviewing firms operating in developed countries, we are still concerned with the size of our industry sample, we will turn to investigate firms operating in developing countries to potentially generate a larger sample.<sup>220</sup> In investigating firms operating in developing countries, we will have particular regard to country-specific factors that may make inclusion of certain firms unsuitable...**

Where possible, we will try and include relevant, listed companies from a range of different countries to limit the concentration of firms coming from any one country. However, this approach may not be possible if firms in other countries are less relevant—that is, if they are exposed to substantially different risks—relative to the benchmark we are trying to assess...

<sup>220</sup> **While firms operating in developing countries might face a greater level of sovereign risk, this may not necessarily be reflected in beta estimates of those firms, as the relative systematic risk of firms within the country may be unchanged.** (emphasis added)

Furthermore, as set out in our survey of regulatory precedent in appendix A1.2 below, the QCA and NZCC identify several benefits of adopting a large sample, namely that:<sup>84</sup>

- including firms from a wider cross-section of countries reduces the impact that individual country-specific effects will have on beta estimates;
- using a larger sample reduces the need to make subjective decisions regarding whether specific companies should be included or excluded; and
- a larger sample provides regulatory predictability and reduces the impact of anomalous beta estimates.

<sup>83</sup> QCA, *Rate of return review*, Final report, November 2021, pp 73-74.

<sup>84</sup> QCA, *Rate of return review*, Final report, November 2021, pp 71-72. NZCC, *Input methodologies review decisions | Topic paper 4: cost of capital issues*, 20 December 2016, para 277.1.

Based on the above reasoning, we consider that identifying a comparator sample without a country filter is a well-accepted approach in the context of a firm such as PoM, which operates in an industry with diverse systematic risks.

While there are only two instances of regulatory precedent where a country filter is not applied for identifying the comparator sample, we note that the comparator sample is used to estimate industry-specific parameters instead of market-wide parameters.

As set out in our previous report, we consider that a verbatim application of the approaches that Australian regulators use to estimate industry specific parameters may 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.<sup>85</sup>

Thus, we consider it well-accepted to adopt the approaches that the NZCC and WASC have applied, ie, identifying a comparator sample without a country filter, given that these decisions were made in the context of an industry that similarly features firms with a diverse range of systematic risks. This is the case even though most of the other precedent does not feature this approach.

Nevertheless, we also note there is some regulatory precedent that supports adopting a small sample for industries such as rail and toll roads, for which the QCA's preferred comparator samples includes:<sup>86</sup>

- only six railroad companies in USA and Canada; and
- only four toll road companies in Australia, Italy and Germany.

However, we note that the QCA expanded its asset beta comparator samples by referring to asset beta estimates from multiple industries in several of its decisions, such as:

- using regulated energy and water businesses as comparators for Aurizon rail;<sup>87</sup>
- referring to a sample of regulated utilities and a sample of toll roads as comparators for Queensland Rail;<sup>88</sup> and
- calculating asset betas for several industries identified as potential comparators for DBCT, namely, coal mining, rail, container ports, toll roads, regulated energy, and regulated water, although it referred primarily to estimates from regulated energy and water firms before applying an uplift based on regulatory judgement.<sup>89</sup>

As such, we agree with the ESC that identifying a comparator sample of ports with a country filter is also well-accepted.

Having concluded that including and excluding a country filter when identifying comparator firms are both well accepted, we consider it appropriate for us to publish two sets of WACC parameter estimates, with and without the country filter.

While expressing our preference for excluding a country filter when identifying comparator firms, we consider that it is also open for PoM to adopt our alternative asset beta and gearing estimates based on the sample that includes a country filter.

Finally, we note that the ESC's Statement of Regulatory Approach states that PoM should apply market capitalisation filters and industry filters consistently without varying them from one year to the next. We

<sup>85</sup> See: HoustonKemp, *Estimation of the weighted average cost of capital for the Port of Melbourne*, 11 May 2022, p 8.

<sup>86</sup> QCA, *Rate of return review*, Final report, November 2021, p 107.

<sup>87</sup> QCA, *Aurizon Network's 2017 draft access undertaking*, Appendices, December 2018, p 117.

<sup>88</sup> QCA, *Queensland Rail 2020 draft access undertaking*, Decision, February 2020, pp 36-38.

<sup>89</sup> QCA, *DBCT Management's 2015 draft access undertaking*, Final decision, November 2016, pp 87, 93.



consider that this consistency of approach is necessary to ensure that the analysis produces reliable and robust estimates of beta.<sup>90</sup>

As such, if PoM decides to adopt the asset beta and gearing estimates derived from the comparator sample that includes a country filter, then we consider that PoM also should apply the filter consistently in future years.

## 3.2 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:<sup>91</sup>

- 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 292 unique tickers.

### 3.2.1 Filters for narrowing the comparator sample

Consistent with our previous report, 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 2023; and
- a liquidity filter that omits comparators:<sup>92</sup>
  - > 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.

As described in section 3.1.4 above, we generate two comparator samples, namely:

- our preferred sample that does not apply a country filter; and
- an alternative sample with a country filter that excludes firms with country of risk outside the FTSE Developed and Advanced emerging countries.<sup>93</sup>

In our previous report, as a cross-check to our results, we considered an alternative comparator set based on 30 firms that own and operate container port and channel infrastructure, but that also derive substantial revenues from activities unrelated to container port operations.

In the Interim Commentary, the ESC stated that PoM should consider applying a country filter to its comparator set.<sup>94</sup> As such, we have replaced the alternative sample with one that applies a country filter to the preferred sample.

### 3.2.2 Manually identifying appropriate comparators

We manually identify appropriate comparators by:

- reviewing Bloomberg descriptions of each company;

<sup>90</sup> ESC, *Statement of Regulatory Approach - version 3.0*, Port of Melbourne pricing order, 20 December 2022, p 32.

<sup>91</sup> We restrict our EQS search to only show the primary security of a company.

<sup>92</sup> 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 2019 to 2023 but less than 1 per cent from 2014 to 2023 will be omitted when estimating gearing and asset beta for the former period but will not be omitted from the latter period.

<sup>93</sup> FTSE, *FTSE equity country classification September 2022*, Annual announcement, 29 September 2022, p 5.

<sup>94</sup> ESC, *Interim commentary – Port of Melbourne Tariff Compliance Statement 2022–23*, 20 December 2022, pp 11-13.

- 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;<sup>95</sup> and
- 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.<sup>96</sup>

Our final preferred sample is unchanged from the one set out in our previous report, except that we have removed three ports with illiquid data or small market capitalisations.<sup>97</sup> This results in a sample that contains 21 unique firms in total, all of which derive their revenues primarily from container port operations. The sample features 21 firms for deriving our five-year estimates and 18 firms for deriving our ten-year estimates.

Consistent with the ESC's Interim Commentary, our alternative sample now applies a country filter to the above preferred sample, filtering the preferred sample for FTSE developed and advanced emerging countries. This yields five unique firms in total, all of which are used for deriving our five-year estimates and four of which are used for deriving our ten-year estimates.

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<sup>95</sup> ESC, *Statement of Regulatory Approach - version 3.0*, Port of Melbourne pricing order, 20 December 2022, p 28.

<sup>96</sup> ESC, *Inquiry into the Port of Melbourne compliance with the pricing order*, Final report, 31 December 2021, p 65.

<sup>97</sup> The five-year and 10-year data for Liaoning Port Co Ltd (2880 HK Equity) and Yingkou Port Liability Co Ltd (600317 CH Equity) are illiquid, while Dinh Vu Port Investment & Development JSC (DVP VN Equity) has a market capitalisation less than USD 100 million and its 10-year data is illiquid.

## 4. Cost of debt

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The building block regulatory framework involves setting a mechanical approach for deriving regulated revenues and prices over a defined regulatory period. Once the methodology has been determined for the regulatory period, there is limited scope to change it until the review for the next regulatory period.

Consistent with this, while regulators may update various building block parameters within a regulatory period, the methodology for these updates tends to be set out in the regulatory determination at the beginning of the regulatory period. This allows such parameters to be updated mechanically without introducing scope for discretion.

One parameter that Australasian regulators commonly update annually within a regulatory period is the cost of debt.<sup>98</sup> PoM is proposing to include an annually updating cost of debt over the 2023-28 pricing period. The annually updated cost of debt will be calculated at the end of the pricing period used to calculate the annual aggregate revenue requirement.

The Interim Commentary found that consistent with the Inquiry, PoM's approach for estimating the cost of debt is well-accepted.<sup>99</sup> We have retained all 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 4.88 per cent as at 31 March 2023, which reflects:

- a BBB credit rating;
- a 10-year term of debt;
- a 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.

At the end of the 2023-28 pricing period, PoM will update the cost of debt estimate annually by:

- calculating annual cost of debt updates using estimates from averaging periods that may change from year to year, provided the averaging period is nominated in advance; or
- deciding in advance to continue using its current averaging period, ie, 20 trading days to 31 March of each year, consistent with clause 27(b)(iii) of the Undertaking.

When calculating the trailing average cost of debt, the on-day cost of debt estimates for 2024-25 onwards inclusive of debt raising costs will also include:

- 5.18 per cent for the 2022-23 prevailing cost of debt; and
- 6.53 per cent for the 2023-24 prevailing cost of debt.

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<sup>98</sup> Examples of decisions in which regulators include a within-period annual update to the cost of debt are: Australian Energy Regulator, Rate of Return Instrument, February 2023. ERA, Explanatory statement for the 2022 final gas rate of return instrument, 16 December 2023. ERA, Determination on the 2022 weighted average cost of capital for the freight and urban railway networks, and for Pilbara railways, 3 August 2022, table 1. 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 82-83. IPART, Spreadsheet-WACC-model-August-2022.xlsx, Spreadsheet, August 2022. QCA, Rate of return review, Final report, November 2021, pp iii-iv. ICRC, Review of methodologies for the weighted average cost of capital, Final report, April 2021, pp 1-2, 25-27.

<sup>99</sup> ESC, *Interim commentary – Port of Melbourne Tariff Compliance Statement 2022–23*, 20 December 2022, p 10.

## 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 2022-23 TCS proposed to retain a BBB credit rating based on the analysis from our previous report.<sup>100</sup> The ESC's interim commentary accepted this approach as part of its finding that PoM's cost of debt approach is well-accepted.<sup>101</sup>

There have been two changes in the credit ratings adopted by Australian regulators since our previous report, namely:

- the ACCC's 2022 decision on Australia Post's price notification reduces the benchmark rating from AA to A on the basis that S&P's has downgraded Australia Post's credit rating from AA- to A+;<sup>102</sup> and
- OTTER's final report on TasWater's prices and services raises the benchmark credit rating from BBB to BBB+ after reviewing the AER's 2022 draft RoRI and the ERA's 2022 gas RoRI.<sup>103</sup>

Aside from the above two decisions, there has been no material change in the credit ratings adopted by Australian regulators since our previous report. In particular:

- the AER's 2022 RoRI maintains the BBB+ benchmark credit rating from its 2018 RoRI based on service providers' median credit ratings over the most recent five and ten years, as well as its analysis of the average credit rating of debt instruments issued by service providers;<sup>104</sup>
- the ERA's 2022 gas RoRI retains the BBB+ benchmark credit rating from its 2018 Gas Guidelines based on the median credit rating of its Australian energy network sample and the ERA's view that the benchmark credit rating is relatively stable over time;<sup>105</sup> and
- the ICRC's final report on Icon Water's regulated water and sewerage prices continues to apply a BBB benchmark rating based on the credit ratings adopted by other Australian utility regulators, as well as the ICRC's view that maintaining a BBB benchmark credit rating will provide stability over time.<sup>106</sup>

We also note the precedent that was relevant to our previous report, namely that:

- IPART's 2018 WACC method retains the benchmark BBB credit rating on the basis that a better quality credit rating would require a higher proportion of relatively expensive equity financing while a sub-investment credit rating would increase the debt margin;<sup>107</sup>

<sup>100</sup> Port of Melbourne, *2022-23 Tariff Compliance Statement*, General statement, 31 May 2022, p 77.

<sup>101</sup> ESC, *Interim commentary – Port of Melbourne Tariff Compliance Statement 2022–23*, 20 December 2022, p 10.

<sup>102</sup> The ACCC uses the AA and A credit ratings when estimating Australia Post's cost of debt because Bloomberg does not publish curves for bonds rated AA- or A+ only. See: ACCC, *Decision on Australia Post's 2022 price notification*, December 2022, p v. ACCC, *Decision on Australian Postal Corporation 2019 price notification*, December 2019, p 38.

<sup>103</sup> OTTER, *Investigation into TasWater's prices and services for the period 1 July 2022 to 30 June 2026*, Final report, May 2022, pp 83-84.

<sup>104</sup> AER, *Rate of Return Instrument | Explanatory statement*, February 2023, pp 222-224.

<sup>105</sup> ERA, *Explanatory statement for the 2022 final gas rate of return instrument*, 16 December 2022, paras 432-445.

<sup>106</sup> ICRC, *Regulated water and sewerage services 2023-28*, Final report, May 2023, p 84-85.

<sup>107</sup> IPART, *Review of our WACC method*, Final Report, February 2018, pp 45-46.

- ESCOSA's 2020 regulatory determination for SA Water maintains the benchmark BBB credit rating, which ESCOSA considers consistent with its 60 per cent benchmark gearing assumption and for which data is publicly available;<sup>108</sup>
- the QCA's rate of return review states its view that the current regulatory credit rating provides an appropriate starting point that requires persuasive evidence to justify shifting away from it;<sup>109</sup> and
- the WASC's judgment for Perth Airport accepts a BBB+ credit rating that is one notch below the A-median credit rating for the Court's preferred comparator sample.<sup>110</sup>

We therefore consider that regulatory precedent supports maintaining the same BBB credit rating that PoM proposed in its 2022-23 TCS, and which the Interim Commentary accepted as consistent with a well-accepted approach for deriving the benchmark cost of debt.

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.<sup>111</sup> Our assessment is also consistent with the ERA's view that the benchmark credit rating is relatively stable over time and the ICRC's view that maintaining the same benchmark credit rating will promote stability.<sup>112</sup>

In addition, we note 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- and A ratings applied to Australia Post in 2019 and 2022 respectively, since government owned Australia Post's 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.

<sup>108</sup> ESCOSA, *SA Water regulatory determination 2020*, Final determination: statement of reasons, June 2020, pp 215-216.

<sup>109</sup> QCA, *Rate of return review*, Final report, November 2021, pp 37-38.

<sup>110</sup> *Perth Airport Pty Ltd v Qantas Airways Ltd [No 3] [2022] WASC 51* paras 287-291, 314, 335, 339.

<sup>111</sup> QCA, *Rate of return review*, Final report, November 2021, pp 37-38.

<sup>112</sup> ERA, *Explanatory statement for the 2022 final gas rate of return instrument*, 16 December 2022, paras 432-445. ICRC, *Regulated water and sewerage services 2023-28*, Final report, May 2023, p 85.

Table 4.1: Comparator credit ratings

Ticker	Name	Credit ratings <sup>^</sup>	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	25.50% 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 as at June 2019
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
<b>Median</b>		<b>BBB/BBB+ to A-</b>		

Source: Bloomberg; HoustonKemp analysis. <sup>^</sup>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 2022*, Voluntary announcement, 28 October 2022, p 5. Shanghai International Port Group Co Ltd, <https://en.portshanghai.com.cn/MajorShareholders/index.jhtml#channel791>, accessed 31 March 2023. Quayside Investment Trust, *Annual report 2022*, 3 September 2022, p 18.

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 2022-23 TCS, and which the Interim Commentary accepted as consistent with a well-accepted approach for deriving the benchmark cost of debt.

## 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 2022-23 TCS adopted a 10-year term of debt based on the analysis from our previous report.<sup>113</sup> The ESC's interim commentary accepted this approach as part of its finding that PoM's cost of debt approach is well-accepted.<sup>114</sup>

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

- the ACCC's 2022 decision on Australia Post's price notification calculates the cost of debt using 10-year bond yields;<sup>115</sup>

<sup>113</sup> Port of Melbourne, *2022-23 Tariff Compliance Statement*, General statement, 31 May 2022, p 77.

<sup>114</sup> ESC, *Interim commentary – Port of Melbourne Tariff Compliance Statement 2022–23*, 20 December 2022, p 10.

<sup>115</sup> ACCC, *Decision on Australia Post's 2022 price notification*, December 2022, p v. ACCC, *Decision on Australian Postal Corporation 2019 price notification*, December 2019, p v.

- the AER's 2022 RoRI maintains the benchmark 10-year debt term that is consistent with the long term debt issued by regulated businesses;<sup>116</sup>
  - > the AER finds that the debt instruments issued by service providers have a weighted average term to maturity at issuance between eight years and 11 years, which the AER considers insufficient to conclude that the 10-year benchmark debt term is no longer appropriate;
- the ERA's 2022 gas RoRI retains the benchmark 10-year debt term from its 2018 Gas Guidelines after noting that a 10-year debt term reflects standard Australian regulatory practice and that the debt portfolios of regulated pipelines are consistent with targeting 10-year debt maturities;<sup>117</sup>
- the ICRC's draft and final reports on Icon Water's regulated water and sewerage prices adopt a 10-year debt term consistent with its existing WACC methodology, with the ICRC observing that long-lived assets tend to be financed using long-term debt;<sup>118</sup> and
- OTTER's final report on TasWater's prices and services uses a 10-year debt term.<sup>119</sup>

We also note the precedent that was relevant to our previous report, namely that:

- IPART's 2018 WACC method uses a 10-year debt term that is consistent with the practices of domestic businesses and that reduces refinancing risks by matching the debt term to the long asset lives of regulated firms;<sup>120</sup>
- ESCOSA's 2020 regulatory determination for SA Water adopts a 10-year debt term that reflects the long lives of regulated infrastructure assets while matching the common benchmarks used by investment practitioners, academics, regulators and government agencies;<sup>121</sup>
- the QCA's rate of return review in November 2021 retains the 10-year benchmark debt term;<sup>122</sup> and
- the WASC's judgment for Perth Airport accepts IPART's ten-year term of debt, which the Court considers broadly consistent with Australian regulatory precedent.<sup>123</sup>

We therefore consider it a well-accepted approach to maintain the same 10-year debt term that PoM proposed in its 2022-23 TCS, and which the Interim Commentary accepted as consistent with a well-accepted approach for deriving the benchmark cost of debt.

### 4.3 Debt management strategy

PoM's 2022-23 TCS adopted a trailing average of the cost of debt with a transition beginning in 2017/18 based on the analysis from our previous report.<sup>124</sup> The ESC's interim commentary accepted this approach as part of its finding that PoM's cost of debt approach is well-accepted.<sup>125</sup>

There has been no major shift in the benchmark debt management strategies adopted by Australian regulators since our previous report. In particular:

<sup>116</sup> AER, *Rate of Return Instrument | Explanatory statement*, February 2023, pp 195-197.

<sup>117</sup> ERA, *Explanatory statement for the 2022 final gas rate of return instrument*, 16 December 2022, paras 398-413.

<sup>118</sup> ICRC, *Regulated water and sewerage services 2023-28*, Final report, May 2023, pp 83-84. ICRC, *Regulated water and sewerage services 2023-28*, Draft report, October 2022, p 81. ICRC, *Review of methodologies for the weighted average cost of capital*, Final report, April 2021, pp 24-25.

<sup>119</sup> OTTER, *Investigation into TasWater's prices and services for the period 1 July 2022 to 30 June 2026*, Final report, May 2022, pp 84-88.

<sup>120</sup> IPART, *Review of our WACC method*, Final Report, February 2018, pp 41-44.

<sup>121</sup> ESCOSA, *SA Water regulatory determination 2020*, Final determination: statement of reasons, June 2020, pp 216.

<sup>122</sup> QCA, *Rate of return review*, Final report, November 2021, p 33.

<sup>123</sup> *Perth Airport Pty Ltd v Qantas Airways Ltd [No 3] [2022] WASC 51 [333]*.

<sup>124</sup> Port of Melbourne, *2022-23 Tariff Compliance Statement*, General statement, 31 May 2022, p 77.

<sup>125</sup> ESC, *Interim commentary – Port of Melbourne Tariff Compliance Statement 2022–23*, 20 December 2022, p 10.

- the ACCC's 2022 decision on Australia Post's price notification continues to use the prevailing cost of debt estimate averaged over 20 days, which is consistent with its 2019 decision;<sup>126</sup>
- the AER's 2022 RoRI retains the annually updated 10-year trailing average approach from its 2018 RoRI, including the transition from its previous 'on-the-day' approach that used the prevailing cost of debt estimate;<sup>127</sup>
  - > the AER considered shifting to a weighted trailing average where more weight would be assigned to the costs of debt in years with higher capital expenditure, but decided that the benefits of doing so were not sufficiently clear or necessary, and that the issue might be revisited in the review of the 2026 RoRI;
- the ERA's 2022 gas RoRI continues to adopt a 'hybrid trailing average' approach that fixes the five-year swap rate at the beginning of the regulatory period and adds the 10-year trailing average debt risk premium that is updated annually;<sup>128</sup>
- the ICRC's final report on Icon Water's regulated water and sewerage prices maintains the annually updated 10-year trailing average approach with a transition, on the basis that the trailing average approach generates a relatively stable estimate over time and reduces the potential for mismatches between the allowed and actual return on debt for the benchmark efficient firm;<sup>129</sup> and
- OTTER's final report on TasWater's prices and services adopts a combination of the weighted average and 'on-the-day' approaches for calculating the cost of debt that is not updated annually, resulting in an estimate that assigns higher weight to more recent estimates.<sup>130</sup>

We also note the precedent that was relevant to our previous report, namely that:

- IPART's 2018 WACC method adopts an annually updated trailing average approach for calculating the cost of debt, where 50 per cent weight is assigned to a 10-year trailing average 'historic' cost of debt and 50 per cent weight is assigned to a 5-year trailing average 'current' cost of debt;<sup>131</sup>
  - > IPART will decide on a case-by-case basis whether the annual updates to the trailing average cost of debt will flow through to prices in the subsequent year or will be passed through using a true-up in the subsequent regulatory period;
- ESCOSA's 2020 regulatory determination for SA Water uses a 10-year trailing average cost of debt that reflects the actual debt management approach of an efficient benchmark entity and matches the approach used by other Australian regulators, but which will not be updated annually since such updates are precluded by SA Water's pricing order;<sup>132</sup>
- the QCA's rate of return review applies an annually updated 10-year trailing average cost of debt, which the QCA considers to be consistent with regulatory practice in Australia, and that will minimise mismatches between regulatory debt allowances and actual debt servicing costs, while minimising refinancing transaction costs and;<sup>133</sup> and
- the WASC's judgment for Perth Airport accepts IPART's approach that assigns equal weight to a 10-year trailing average 'historic' cost of debt and 50 per cent weight is assigned to a 5-year trailing average 'current' cost of debt, which the WASC considers broadly consistent with Australian regulatory precedent.<sup>134</sup>

<sup>126</sup> ACCC, *Decision on Australia Post's 2022 price notification*, December 2022, p v. ACCC, *Decision on Australian Postal Corporation 2019 price notification*, December 2019, p v. ACCC, *Decision on Australian Postal Corporation 2019 price notification*, December 2019, p 38.

<sup>127</sup> AER, *Rate of Return Instrument | Explanatory statement*, February 2023, pp 233-238.

<sup>128</sup> ERA, *Explanatory statement for the 2022 final gas rate of return instrument*, 16 December 2022, paras 326-329, 471.

<sup>129</sup> ICRC, *Regulated water and sewerage services 2023-28*, Final report, May 2023, pp 83-84.

<sup>130</sup> OTTER, *Investigation into TasWater's prices and services for the period 1 July 2022 to 30 June 2026*, Final report, May 2022, pp 84-88.

<sup>131</sup> IPART, *Review of our WACC method*, Final Report, February 2018, pp 25-33.

<sup>132</sup> ESCOSA, *SA Water regulatory determination 2020*, Final determination: statement of reasons, June 2020, pp 208, 216.

<sup>133</sup> QCA, *Rate of return review*, Final report, November 2021, pp 39-42.

<sup>134</sup> *Perth Airport Pty Ltd v Qantas Airways Ltd [No 3] [2022] WASC 51* paras 298-299, 333-336.



Based on the precedent described above, we continue to consider 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.<sup>135</sup> The WASC's judgment for Perth Airport also adopts IPART's method for estimating the debt risk premium without a transition.<sup>136</sup>

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.

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 2022 RoRI, which states that historical yield estimates will not be revised after it has been finalised for a regulatory year.<sup>137</sup>

#### 4.4 Debt raising costs

PoM's 2022-23 TCS assumes debt raising costs of 10 bp in its 2022-23 TCS,<sup>138</sup> which is consistent with the analysis from our previous report. The Interim Commentary accepted this approach as part of its finding that PoM's cost of debt approach is well-accepted.<sup>139</sup>

Most Australian regulatory decisions published since our previous report do not include major changes to their estimated debt raising cost allowances. In particular:

- the ACCC's 2022 decision on Australia Post's price notification does not set out an estimate for debt raising costs;<sup>140</sup>
- the AER's 2022 RoRI has not considered how debt raising costs should be calculated, since the AER compensates for these costs as part of the regulated operating expenditure instead of the rate of return;<sup>141</sup>
  - > the AER notes that it continues to collect data on debt raising costs through debt regulatory information notices (RINs), which reflects a change in its preferred approach compared to its current methodology that sets debt raising costs using historical criteria; and
- OTTER's final report on TasWater's prices and services affirms its draft decision to adopt a debt raising cost allowance of 8 bp.<sup>142</sup>

However, the ERA has increased its debt raising cost allowance while the ICRC has decreased its debt raising cost allowance. Specifically:

<sup>135</sup> 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, *Explanatory statement for the 2022 final gas rate of return instrument*, 16 December 2022, para 329. 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*, Final report, May 2022, p 86.

<sup>136</sup> *Perth Airport Pty Ltd v Qantas Airways Ltd [No 3] [2022] WASC 51 [335]*.

<sup>137</sup> AER, *Rate of return instrument*, February 2023, para 26(d).

<sup>138</sup> Port of Melbourne, *2022-23 Tariff Compliance Statement*, General statement, 31 May 2022, p 77.

<sup>139</sup> ESC, *Interim commentary – Port of Melbourne Tariff Compliance Statement 2022–23*, 20 December 2022, p 10.

<sup>140</sup> ACCC, *Decision on Australian Postal Corporation 2019 price notification*, December 2019, p v.

<sup>141</sup> AER, *Rate of Return Instrument | Explanatory statement*, February 2023, p 47.

<sup>142</sup> OTTER, *Investigation into TasWater's prices and services for the period 1 July 2022 to 30 June 2026*, Final report, May 2022, pp 76, 82-83.

- the ERA's 2022 gas RoRI increases the debt raising cost allowance from 10 bp to 16.5 bp based on updated data from its consultant, Chairmont, as well as higher arranger fees based on Bloomberg data;<sup>143</sup>
  - > the ERA has also increased the debt hedging cost allowance from 11.4 bp to 12.3 bp, but this allowance only applies to the 'hybrid' debt management strategy that the ERA adopts, and does not apply to the trailing average debt management strategy that we consider well accepted; and
- the ICRC's final report on Icon Water's regulated water and sewerage prices reviews precedent from other Australian regulators before accepting Icon Water's proposal to apply a debt raising cost allowance of 10.8 bp, compared to the 12.5 bp debt raising cost allowance from the ICRC's 2018 decision.<sup>144</sup>

We also note the precedent that was relevant to our previous report, namely that:

- IPART's 2018 WACC method includes a debt raising cost allowance of 12.5 bp;<sup>145</sup>
- ESCOSA's 2020 regulatory determination for SA Water adopts a debt raising cost allowance of 12.5 bp based on its review of Australian regulatory precedent;<sup>146</sup>
- the QCA's 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;<sup>147</sup> and
- the WASC's judgment for Perth Airport accepts IPART's method for estimating the cost of debt, which implicitly includes 12.5 bp of debt raising costs.<sup>148</sup>

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, which the Interim Commentary also accepted as consistent with a well-accepted approach for deriving the benchmark cost of debt.

## 4.5 Cost of debt estimate

Consistent with clause 27(b)(iii)-(iv) of the Undertaking and the approach set out in PoM's 2022-23 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 trading days from 6 March 2023 to 31 March 2023.

This is consistent with the ESC's findings in its Inquiry, where the ESC accepted that referring to data from third parties such as Bloomberg and the RBA is consistent with the practices of Australian regulators,<sup>149</sup> and CEPA agreed that such an approach was well-accepted.<sup>150</sup>

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.

<sup>143</sup> ERA, *Explanatory statement for the 2022 final gas rate of return instrument*, 16 December 2022, paras 1,115-1,124, 1,124-1,139.

<sup>144</sup> ICRC, *Regulated water and sewerage services 2023-28*, Final report, May 2023, pp 85-86. ICRC, *Review of methodologies for the weighted average cost of capital*, Final report, April 2021, pp 31-34.

<sup>145</sup> IPART, *Review of our WACC method*, Final Report, February 2018, p 24.

<sup>146</sup> ESCOSA, *SA Water regulatory determination 2020*, Final determination: statement of reasons, June 2020, pp 208-209, 216-217.

<sup>147</sup> QCA, *Rate of return review*, Final report, November 2021, p 51.

<sup>148</sup> *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.

<sup>149</sup> ESC, *Inquiry into the Port of Melbourne compliance with the pricing order*, Final report, 31 December 2021, p 74.

<sup>150</sup> CEPA, *Port of Melbourne five-year review – WACC*, Final report, 17 December 2021, p 77.

Consistent with the methodology from our previous report, we use the AER's approach to obtain a daily series of 10-year BBB RBA yields. This approach involves:<sup>151</sup>

- 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.

We note one minor modification to our cost of debt estimation approach, whereby we interpolate the estimates using an alternative RBA series (FCMYGBAG10D from RBA table F2) because the RBA discontinued publishing the discontinued publishing the yields of individual CGS as of 31 March 2023.<sup>152</sup>

We discuss this modification further in section 5.3 below, including our analysis that suggests this change will not have a material impact on our risk-free rate estimates. By extension, this suggests that the interpolated spread to CGS estimates that we use for deriving the 10-year BBB RBA yields are unlikely to be affected materially by this change.

Using the above approach, we estimate the prevailing cost of debt at 6.43 per cent as at 31 March 2023 for the benchmark efficient port, calculated by assigning equal weight to the RBA and Bloomberg curves, which increases to 6.53 per cent after adding 10 bp of debt raising costs. This results in a 4.88 per cent trailing average return on debt, consisting of:

- debt raising costs: 10 bp; and
- trailing average cost of debt: 4.78 per cent;<sup>153</sup>
  - > 2017-18 prevailing cost of debt (40 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;
  - > 2022-23 prevailing cost of debt (10 per cent weight): 5.08 per cent; and
  - > 2023-24 prevailing cost of debt (10 per cent weight): 6.43 per cent.

## 4.6 Updating the prevailing cost of debt annually within a regulatory period

The Interim Commentary states that the ESC is not required to assess the length of the regulatory period under the pricing order. Nevertheless, the ESC considers that a longer regulatory period promotes a stable rate of return estimate and aggregate revenue requirement, which creates greater certainty for port users and supports their long-term investment decisions.<sup>154</sup> The SoRA also lists several factors that PoM can consider when choosing the length of its regulatory period.<sup>155</sup>

<sup>151</sup> See: AER, *Rate of Return Instrument*, February 2023, paras 13-19.

<sup>152</sup> RBA, <https://www.rba.gov.au/statistics/tables/changes-to-tables.html>, accessed 6 April 2023.

<sup>153</sup> These estimates exclude 10 bp debt raising costs. See: Synergies, *Determining a WACC estimate for Port of Melbourne*, May 2021, p 3.

<sup>154</sup> ESC, *Interim commentary – Port of Melbourne Tariff Compliance Statement 2022–23*, 20 December 2022, p viii.

<sup>155</sup> ESC, *Statement of Regulatory Approach - version 3.0*, Port of Melbourne pricing order, 20 December 2022, pp 38-40.

If PoM switches to a multi-year regulatory period, we consider it well accepted for PoM to update the cost of debt estimate annually. In particular, we observe that:

- the AER, ERA and ICRC update their cost of debt estimates annually;<sup>156</sup>
  - > the ERA's hybrid trailing average cost of debt approach involves annual updates to the debt risk premium without updating the base rate;
- IPART and QCA update their cost of debt estimates annually or apply a true-up in the next regulatory period for annual differences in the cost of debt from the previous period;<sup>157</sup> and
- ESCOSA and OTTER set a fixed cost of debt estimate at the beginning of the regulatory period without annual updates.<sup>158</sup>

When selecting the averaging period for calculating annual cost of debt updates:

- AER, ERA, QCA and ICRC require the regulated business to nominate an averaging period in advance on a confidential basis;<sup>159</sup>
  - > ERA and QCA set out default averaging periods that will apply if the regulated business fails to nominate an averaging period in time;
- IPART nominates an averaging period in advance and informs the regulated firm confidentially.<sup>160</sup>

As such, we consider it well accepted for PoM to:

- calculate annual cost of debt updates using estimates from averaging periods that may change from year to year, provided the averaging period is nominated in advance; or
- decide in advance to continue using its current averaging period, ie, 20 trading days to 31 March of each year, consistent with clause 27(b)(iii) of the Undertaking.

Clause 27 of the undertaking further states that PoM's return on debt allowance for each year will:

- transition to use an arithmetic trailing average cost of debt and will adopt a ten-year debt term;
- calculate the allowed return on debt using the following formulae:
  - > for the period 2022/23 to 2026/27 using the following formula:

$$r_t^d = \frac{10 - (t - 2018)}{10} R_{FY18} + \frac{1}{10} \sum_{j=t-FY18+1}^t R_j$$

- > for the period starting 2027/28 using the following formula:

$$r_t^d = \frac{1}{10} \sum_{j=t-9}^t R_j$$

<sup>156</sup> Australian Energy Regulator, *Rate of Return Instrument*, February 2023, para 24. ERA, *Explanatory statement for the 2022 final gas rate of return instrument*, 16 December 2023, paras 302-303. ERA, *Determination on the 2022 weighted average cost of capital for the freight and urban railway networks, and for Pilbara railways*, 3 August 2022, table 1. 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 82-83. ICRC, *Review of methodologies for the weighted average cost of capital*, Final report, April 2021, pp 1-2, 25-27.

<sup>157</sup> IPART, *Spreadsheet-WACC-model-August-2022.xlsx*, Spreadsheet, August 2022. QCA, *Rate of return review*, Final report, November 2021, pp iii-iv.

<sup>158</sup> ESCOSA, *SA Water regulatory determination 2020*, Final determination: statement of reasons, June 2020, pp 206-207. OTTER, *Investigation into TasWater's prices and services for the period 1 July 2022 to 30 June 2026*, Final report, May 2022, pp 161-172.

<sup>159</sup> AER, *Rate of Return Instrument | Explanatory statement*, February 2023, p 11. ERA, *Explanatory statement for the 2022 final gas rate of return instrument*, 16 December 2022, p 2 and para 201. QCA, *Rate of return review*, Final report, November 2021, pp 42-43. ICRC, *Review of methodologies for the weighted average cost of capital*, Final report, April 2021, p 27.

<sup>160</sup> IPART, *Review of our WACC method*, Final Report, February 2018, pp 37-38.

where:

- $r_t^d$  is the allowed return on debt for financial year  $t$ ;
- 2018 is the financial year 2017/18 and is the first year of the transition period;
- $j$  indexes a series of financial years for summation;
- $R_j$  is the on-the-day cost of debt estimate in any financial year in the series  $j$ , where:
  - $R_{FY18}$  is the on-day cost of debt estimate for 2017/18 and is 5.45 per cent;
  - $R_{FY19}$  is the on-day cost of debt estimate for 2018/19 and is 4.58 per cent;
  - $R_{FY20}$  is the on-day cost of debt estimate for 2019/20 and is 4.21 per cent;
  - $R_{FY21}$  is the on-day cost of debt estimate for 2020/21 and is 3.42 per cent;
  - $R_{FY22}$  is the on-day cost of debt estimate for 2021/22 and is 3.12 per cent;

- > the on-the-day cost of debt will be the arithmetic average of the 20 business days ending 31 March in financial year  $t$ ; and
- > the on-the-day cost of debt will be estimated as the average annualised yield on benchmark debt from the following third party data sources:
  - RBA published estimates of the Australian corporate debt yield;
  - Bloomberg AUD BVAL curve;
  - a benchmark credit rating of BBB+ will be calculated using 1/3 A rated bond yields and 2/3 BBB rated bond yields; and
  - a benchmark credit rating of A- will be calculated using 2/3 A rated bond yields and 1/3 BBB rated bond yields.

Consistent with our cost of debt estimates in section 4.5 above, when calculating the trailing average cost of debt, the on-the-day cost of debt estimates for 2024-25 onwards inclusive of debt raising costs will also include:

- 5.18 per cent for the 2022-23 prevailing cost of debt ( $R_{FY23}$ ); and
- 6.53 per cent for the 2023-24 prevailing cost of debt ( $R_{FY24}$ ).

## 5. Cost of equity and gearing

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We estimate a benchmark risk free rate of 3.45 per cent using the same sources used as in PoM's 2020-21 to 2022-23 TCS, which the ESC considered well-accepted.<sup>161</sup>

We retain our approach to estimating the gearing, equity beta and asset beta as in PoM's 2022-23 TCS. Aside from the application of the country filter, the ESC appears to consider PoM's approach well-accepted.<sup>162</sup> Omitting the country filter, we estimate:

- a benchmark gearing of 0.20, reflecting the average of our comparator sample; and
- an asset beta of 0.71 and a relevered equity beta of 0.89, calculated using only the Sharpe-Lintner CAPM (SL-CAPM) without correcting for low beta bias and without using the Black CAPM or the Fama-French model (FFM).

Consistent with the 2022-23 TCS we have estimated the MRP by assigning 85 per cent weight to historical excess returns (HER) - ie, 6.33 per cent - and 15 per cent weight to the forward-looking returns - 6.20 per cent - which results in an MRP of 6.31 per cent. In particular:

- we assign 100 per cent weight to the Brailsford, Handley, and Maheswaran (BHM) dataset when implementing the HER without using the NERA dataset, noting that only one regulator continues to give weight to the NERA dataset;
- we continue using the median estimate from dividend discount models adopted by IPART, AER, ERA and QCA, which the ESC considers a well-accepted approach to calculating MRP;<sup>163</sup> and
- we do not use the Wright approach in our estimate, which the ESC considered not well-accepted.<sup>164</sup>

Using the above parameters, we estimate a 9.05 per cent cost of equity for the benchmark efficient port.

Our alternative sample that applies a country filter generates a benchmark asset beta of 0.70 and benchmark gearing of 0.10, resulting in an alternative cost of equity of 8.36 per cent.

### 5.1 Overall approach

Consistent with clause 18 of the Undertaking, PoM's 2022-23 TCS adopts the SL-CAPM without assigning weight to the Black CAPM or the FFM.<sup>165</sup> The ESC's interim commentary accepted that this approach was well accepted.<sup>166</sup>

There has been no major shift in the overall return on equity approach adopted by Australian regulators since our previous report. In particular:

- the ACCC's 2022 decision on Australia Post's price notification estimates the cost of equity using an approach that is consistent with the SL-CAPM, even though the ACCC has not referred explicitly to it;<sup>167</sup>

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<sup>161</sup> ESC, *Interim commentary – Port of Melbourne Tariff Compliance Statement 2022–23*, 20 December 2022, p 10.

<sup>162</sup> ESC, *Interim commentary – Port of Melbourne Tariff Compliance Statement 2022–23*, 20 December 2022, pp 10-11.

<sup>163</sup> ESC, *Interim commentary – Port of Melbourne Tariff Compliance Statement 2022–23*, 20 December 2022, p 10.

<sup>164</sup> ESC, *Interim commentary – Port of Melbourne Tariff Compliance Statement 2022–23*, 20 December 2022, p 10.

<sup>165</sup> Port of Melbourne, *2022-23 Tariff Compliance Statement*, General statement, 31 May 2022, pp 77-79.

<sup>166</sup> ESC, *Interim commentary – Port of Melbourne Tariff Compliance Statement 2022–23*, 20 December 2022, p 10.

<sup>167</sup> ACCC, *Decision on Australia Post's 2022 price notification*, December 2022, pp i-iv.

- the AER's 2022 RoRI retains the use of the SL-CAPM as the foundation model, with no role for the Black CAPM and FFM;<sup>168</sup>
- the ERA's 2022 gas RoRI retains the use of the SL-CAPM for estimating the cost of equity, which the ERA also used in its 2018 Gas Guidelines;<sup>169</sup>
- the ICRC's final report on Icon Water's regulated water and sewerage prices estimates the cost of equity using an approach that is consistent with the SL-CAPM, even though the ICRC has not referred explicitly to it;<sup>170</sup>
  - > the ICRC's earlier review of its WACC methodology states that it uses the SL-CAPM to estimate the return on equity;<sup>171</sup> and
- OTTER's final report on TasWater's prices and services calculates the cost of equity using the SL-CAPM, which OTTER notes is consistent with Australian regulatory precedent.<sup>172</sup>

We also note the precedent that was relevant to our previous report, namely that:

- IPART's 2018 WACC method retains the use of the SL-CAPM from its 2013 WACC method;<sup>173</sup>
- ESCOSA's 2020 regulatory determination for SA Water estimates the cost of equity using an approach that is consistent with the SL-CAPM, even though ESCOSA has not referred explicitly to it;<sup>174</sup>
- the QCA's rate of return review in November 2021 adopts the SL-CAPM without adjusting for low beta bias;<sup>175</sup> and
- the WASC's judgment for Perth Airport accepts IPART's method for estimating the cost of equity, which refers to the SL-CAPM.<sup>176</sup>

Having regard to the regulatory precedent, we consider it well accepted to continue adopting the SL-CAPM when calculating the cost of equity for the benchmark efficient port without correcting for low beta bias and without using the Black CAPM or the FFM. This is consistent with the ESC's Interim Commentary.

## 5.2 Gearing

PoM's 2022-23 TCS derives the benchmark gearing using the average of five-year and ten-year gearings from the preferred comparator sample. PoM's gearing estimate relies on our analysis, which refers to the book value of net debt with a lower bound of zero gearing for each company.<sup>177</sup>

There has been no major shift in the approaches adopted by Australian regulators for estimating the benchmark gearing since our previous report. In particular:

- the ACCC's 2022 decision on Australia Post's price notification retains its approach that derives the benchmark gearing ratio based on the gearing observed for comparable listed companies;<sup>178</sup>

<sup>168</sup> AER, *Rate of Return Instrument | Explanatory statement*, February 2023, pp 99-101.

<sup>169</sup> ERA, *Explanatory statement for the 2022 final gas rate of return instrument*, 16 December 2022, paras 577, 600.

<sup>170</sup> ICRC, *Regulated water and sewerage services 2023-28*, Final report, May 2023, pp 78-83.

<sup>171</sup> ICRC, *Review of methodologies for the weighted average cost of capital*, Final report, April 2021, p 16.

<sup>172</sup> OTTER, *Investigation into TasWater's prices and services for the period 1 July 2022 to 30 June 2026*, Final report, May 2022, p 88.

<sup>173</sup> IPART, *Review of our WACC method*, Final Report, February 2018, pp 48-50.

<sup>174</sup> ESCOSA, *SA Water regulatory determination 2020*, Final determination: statement of reasons, June 2020, p 217.

<sup>175</sup> QCA, *Rate of return review*, Final report, November 2021, p 81.

<sup>176</sup> *Perth Airport Pty Ltd v Qantas Airways Ltd [No 3] [2022] WASC 51* paras 283, 339, 604.

<sup>177</sup> Port of Melbourne, *2022-23 Tariff Compliance Statement*, General statement, 31 May 2022, pp 79-80.

<sup>178</sup> ACCC, *Decision on Australia Post's 2022 price notification*, December 2022, p iv. ACCC, *Decision on Australian Postal Corporation 2019 price notification*, December 2019, pp 38-39.

- the AER's 2022 RoRI uses the same benchmark gearing of 60 per cent from its 2018 RoRI after concluding that the lower average market gearing observed from its comparator set is not sufficiently material to justify departing from its previous estimate;<sup>179</sup>
- the ERA's 2022 gas RoRI uses the same benchmark gearing of 55 per cent from its 2018 gas RoRI after estimating that its comparator sample generates a five-year average gearing of 53 per cent and a ten-year gearing of 55 per cent;<sup>180</sup>
- the ICRC's final report on Icon Water's regulated water and sewerage prices maintains a gearing ratio of 60 per cent derived from its review of Australian regulatory precedent;<sup>181</sup> and
- OTTER's final report on TasWater's prices and services retains a gearing ratio of 60 per cent based on precedent from the AER.<sup>182</sup>

We also note the precedent that was relevant to our previous report, namely that:

- IPART's 2018 WACC method states that it will review the benchmark gearing at each price review, in which IPART will calculate the gearing for its comparator sample but will adjust the benchmark gearing only if there is sufficient evidence to do so;<sup>183</sup>
  - > IPART adopts a gearing of 60 per cent for Sydney Water's 2020 price review, which is unchanged from the industry-specific estimate set out in its 2018 WACC method;<sup>184</sup>
- ESCOSA's 2020 regulatory determination for SA Water retains a gearing of 60 per cent from its previous determinations after submissions raised no concerns in relation to its gearing assumption;<sup>185</sup>
- the QCA's rate of return review 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;<sup>186</sup>
  - > the QCA's determination for Seqwater retains the 60 per cent gearing estimate from its previous determination, noting that the benchmark gearing for Seqwater is higher than that of the Gladstone Area Water Board (GAWB) since the latter has a small customer base with a limited number of industrial customers that generate a large proportion of its revenue;<sup>187</sup> and
  - > the QCA's determination for the Gladstone Area Water Board retains the 50 per cent gearing estimate from its previous determination;<sup>188</sup> 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.<sup>189</sup>

Having regard to the regulatory precedent, we consider it well accepted to retain the approach from our previous report, where we:<sup>190</sup>

- calculate the average of five-year and ten-year gearings from our comparator sample;

<sup>179</sup> AER, *Rate of Return Instrument | Explanatory statement*, February 2023, pp 84-95.

<sup>180</sup> ERA, *Explanatory statement for the 2022 final gas rate of return instrument*, 16 December 2022, paras 263-273.

<sup>181</sup> ICRC, *Regulated water and sewerage services 2023-28*, Final report, May 2023, pp 77-78.

<sup>182</sup> OTTER, *Investigation into TasWater's prices and services for the period 1 July 2022 to 30 June 2026*, Final report, May 2022, pp 77-81.

<sup>183</sup> IPART, *Review of our WACC method*, Final Report, February 2018, p 74.

<sup>184</sup> IPART, *Final report - Review of prices for Sydney Water*, June 2020, pp 257-258. Also see: IPART, *WACC biannual update*, Fact sheet, 24 February 2023, p 4.

<sup>185</sup> ESCOSA, *SA Water regulatory determination 2020*, Final determination: statement of reasons, June 2020, pp 215-216.

<sup>186</sup> QCA, *Rate of return review*, Final report, November 2021, p 23.

<sup>187</sup> QCA, *Seqwater Bulk Water Price Review 2022-26*, Final report, March 2022, p 62.

<sup>188</sup> QCA, *Gladstone Area Water Board price monitoring 2020-25 Part A: Overview*, Draft report, February 2020, pp 91-93.

<sup>189</sup> *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].

<sup>190</sup> HoustonKemp, *Estimation of the weighted average cost of capital for the Port of Melbourne*, 11 May 2022, pp 22-24.



- use the book value of net debt as our measure of the debt component of our gearing estimates; and
- retain the NZCC's approach that sets a lower bound of zero gearing for each company, such that companies with negative net debt from large cash holdings will be treated as having zero leverage.

Consistent with clause 23 of the Undertaking, we first refer to the benchmark gearing that currently applies before referring to the average gearing of the comparator sample as cross checks.

As set out in section 3 above, the analysis in our previous report did not apply a country filter when identifying our preferred comparator sample, while the Interim Commentary states the ESC's preliminary view that PoM should consider filtering the comparator sample to include companies from FTSE developed and advanced emerging countries.<sup>191</sup>

As such, we generate two gearing estimates, namely:

- our preferred gearing estimate is 0.20, derived from the broad sample that does not apply a country filter; and
- our alternative gearing estimate is 0.10, derived from the narrow sample that only includes companies from FTSE developed and advanced emerging countries.

Appendix A3.1 sets out the gearing estimates for each firm in the comparator samples.

### 5.3 Risk free rate

PoM's 2022-23 TCS derives the benchmark risk free rate based on the analysis from our previous report.<sup>192</sup> Consistent with clause 20 of the undertaking, we calculated the benchmark risk free rate as a 20-day average of the 10-year Commonwealth Government Securities (CGS) yield. The Interim Commentary finds that this approach is well-accepted.<sup>193</sup>

After our previous report, there has been one change in Australian regulatory precedent on the risk free rate, namely that:

- the ERA's 2022 gas RoRI increases the term of the risk free rate from five years to ten, but otherwise affirms the use of CGS yields averaged over 20 days as a proxy for the risk free rate.<sup>194</sup>

Aside from the above precedent, there has been no other material changes in Australian regulatory precedent on the risk free rate. Specifically:

- the ACCC's 2022 decision on Australia Post's price notification uses a 20-day average of 10-year CGS yields as the risk free rate;<sup>195</sup>
- the AER's 2022 RoRI maintains a ten-year term for the risk free rate, and affirms the use of CGS yields averaged over 20 to 60 days as a proxy for the risk free rate;<sup>196</sup>
  - > the AER considered reducing the term of the risk free rate to five years in its 2022 draft RoRI, but reversed this change in its final RoRI after concluding that 'the bar for change has not been met at this time';<sup>197</sup>

<sup>191</sup> ESC, *Interim commentary – Port of Melbourne Tariff Compliance Statement 2022–23*, 20 December 2022, pp 12-13.

<sup>192</sup> Port of Melbourne, *2022-23 Tariff Compliance Statement*, General statement, 31 May 2022, pp 77-78.

<sup>193</sup> ESC, *Interim commentary – Port of Melbourne Tariff Compliance Statement 2022–23*, 20 December 2022, p 10.

<sup>194</sup> ERA, *Explanatory statement for the 2022 final gas rate of return instrument*, 16 December 2022, paras 200, 667-677.

<sup>195</sup> ACCC, *Decision on Australia Post's 2022 price notification*, December 2022, p i.

<sup>196</sup> AER, *Rate of Return Instrument | Explanatory statement*, February 2023, pp 10-12.

<sup>197</sup> AER, *Rate of Return Instrument | Explanatory statement*, Draft, June 2022, p 10. AER, *Rate of Return Instrument | Explanatory statement*, February 2023, pp 107-123.

- the ICRC's final report on Icon Water's regulated water and sewerage prices uses a 40-day average of 10-year CGS yields as the risk free rate,<sup>198</sup> and
- OTTER's final report on TasWater's prices and services uses a 40-day average of 10-year CGS yields as the risk free rate, rejecting TasWater's proposal to use five-year yields.<sup>199</sup>

We also note the precedent that was relevant to our previous report, namely that:

- IPART's 2018 WACC method calculates two risk free rate estimates, namely:<sup>200</sup>
  - > a current risk free rate estimate derived from a five-year trailing average of 10-year CGS yields, where the estimate for each year in the trailing average is derived from a 40-day averaging period; and
  - > a historical risk free rate estimate derived from a ten-year trailing average of 10-year CGS yields, where the estimate for each year in the trailing average is derived from a 40-day averaging period
- ESCOSA's 2020 regulatory determination for SA Water calculates the risk free rate using the 60-day average of 10-year CGS yields;<sup>201</sup>
- the QCA's rate of return review uses the 10-year CGS yield as the risk free rate;<sup>202</sup> 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.<sup>203</sup>

Having reviewed the above regulatory precedent, we consider it well-accepted to continue estimating the risk free rate using the 20-day average of the 10-year Commonwealth Government Securities (CGS) yield, which the Interim Commentary also concluded was well-accepted.

In our previous report, we adopted 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.<sup>204</sup> This approach is consistent with clause 20(b)(ii) of the Undertaking, and uses data from the RBA's table F16.<sup>205</sup>

However, the RBA discontinued publishing the yields of individual CGS as of 31 March 2023,<sup>206</sup> and the most recent data on CGS yields available to us from table F16 only goes to 21 March 2023. This means that the approach set out in clause 20(b)(ii) of the Undertaking cannot be applied.

As such, we draw on an alternative dataset, ie, the RBA's own daily estimates of 10-year CGS yields from table F2.<sup>207</sup> This series differs from our previous estimates in that it uses the RBA's own interpolation method to generate 10-year CGS yields instead of using the interpolation method set out in the AER's and ERA's instruments and in clause 20(b)(ii) of the Undertaking.

<sup>198</sup> ICRC, *Regulated water and sewerage services 2023-28*, Final report, May 2023, pp 78-79.

<sup>199</sup> OTTER, *Investigation into TasWater's prices and services for the period 1 July 2022 to 30 June 2026*, Final report, May 2022, pp 81-82.

<sup>200</sup> IPART, *Review of our WACC method*, Final Report, February 2018, pp 26-34, 37-38, 41-45, 47.

<sup>201</sup> ESCOSA, *SA Water regulatory determination 2020*, Final determination: statement of reasons, June 2020, pp 217-219.

<sup>202</sup> QCA, *Rate of return review*, Final report, November 2021, p 83.

<sup>203</sup> 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.

<sup>204</sup> AER, *Rate of return instrument*, February 2023, para 16. ERA, *Explanatory statement for the 2022 final gas rate of return instrument*, 16 December 2022, para 676.

<sup>205</sup> RBA, *Indicative Mid Rates of Australian Government Securities – F16*, Spreadsheet.

<sup>206</sup> RBA, <https://www.rba.gov.au/statistics/tables/changes-to-tables.html>, accessed 6 April 2023.

<sup>207</sup> See: RBA, *Capital market yields - government bonds - daily - F2*, Spreadsheet, series FCMYGBAG10D.

IPART uses this alternative series to derive its estimate of the 10-year risk-free rate.<sup>208</sup>

Since the RBA reports CGS yields on a semi-annual basis, we annualise the CGS yields after carrying out the linear interpolation using the formula in clause 20(b)(iii) of the Undertaking.

We estimate a benchmark risk-free rate of 3.45 per cent, averaged over the 20 trading days from 6 March 2023 to 31 March 2023. This is consistent with clause 20(b)(i) of the Undertaking.

Table 5.1 compares the 10-year CGS yields derived from the discontinued series and from the RBA's ongoing series. We observe that:

- both series generate daily 10-year CGS yields that are identical to two decimal places; and
- the benchmark risk-free rate using data from the 20 days up to 31 March 2023 is unchanged at 3.45 per cent if we use the discontinued series up to 21 March 2023.

Table 5.1: 10-year CGS yields from the RBA's discontinued series and alternative ongoing series

Date	Annualised 10-year CGS from RBA's discontinued series	Annualised 10-year CGS from RBA's ongoing series
06 Mar 2023	3.80	3.80
07 Mar 2023	3.72	3.72
08 Mar 2023	3.78	3.78
09 Mar 2023	3.74	3.74
10 Mar 2023	3.61	3.61
13 Mar 2023	3.55	3.55
14 Mar 2023	3.48	3.48
15 Mar 2023	3.46	3.46
16 Mar 2023	3.35	3.35
17 Mar 2023	3.42	3.42
20 Mar 2023	3.27	3.27
21 Mar 2023	3.22	3.22
22 Mar 2023	-	3.39
23 Mar 2023	-	3.32
24 Mar 2023	-	3.24
27 Mar 2023	-	3.22
28 Mar 2023	-	3.32
29 Mar 2023	-	3.31
30 Mar 2023	-	3.38
31 Mar 2023	-	3.32
<b>Average</b>	<b>3.45<sup>A</sup></b>	<b>3.45</b>

Source: RBA, AER, HoustonKemp analysis. <sup>A</sup>Derived using data from the discontinued series for 6 Mar 2023 to 21 Mar 2023 and from the ongoing series for 22 Mar 2023 to 31 Mar 2023.

We note that there are other approaches for estimating the 10-year risk free rate, including:

- using Bloomberg's estimates of the 'generic' 10-year AUD government bond yield; and

<sup>208</sup> See: IPART, *Spreadsheet-WACC-model-February-2023.xlsx*, Spreadsheet, February 2023, sheet 'Daily data'.

- collecting yields of individual Australian government bonds from Bloomberg and then applying the linear interpolation approach set out in the AER's and ERA's 2022 RoRIs.

It currently is unclear how the AER and ERA will modify their 2022 RoRIs in response to the discontinuation of RBA's table F16. As such, we have drawn on RBA's table F2 to estimate the benchmark risk-free rate since there is IPART precedent for using this series, and the data is publicly available.

We will continue to monitor the regulatory developments on the methodology for estimating risk free rates, particularly any modifications to the AER's and ERA's 2022 RoRIs.

## 5.4 Beta

PoM's 2022-23 TCS adopts our asset beta and equity beta estimates, which we derive from our sample of comparator firms. This process is consistent with clause 26 of the Undertaking, and involves:<sup>209</sup>

- estimating raw equity betas using ordinary least squares (OLS) over five- and ten-year averaging periods for a combination of weekly and four-weekly frequencies, consistent with the NZCC's approach that the WASC accepted in its judgment for Perth Airport, such that:<sup>210</sup>
  - > the weekly estimate is derived as the average of estimates derived for each weekly return interval, ie, Monday to Monday, Tuesday to Tuesday, etc; and
  - > the four-weekly estimate is derived as the average of estimates derived for each of the 20 days in the four weeks;
- 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.

The Interim Commentary does not comment on the process that we have used for estimating asset beta and equity beta for the companies in our comparator sample.<sup>211</sup>

We have discussed in section 3 above the recent regulatory developments regarding the methods that regulators have used for identifying comparator samples when estimating the benchmark gearing and beta.

The recent developments in regulatory precedent for generating beta estimates from the respective comparator samples are that:

- the ACCC's 2022 decision on Australia Post's price notification:<sup>212</sup>
  - > uses average weekly equity betas over a five-year period, rejecting Australia Post's proposed approach of calculating weekly and monthly betas over a two-year and four-year period; and
  - > rejects the use of the Blume adjustment when estimating equity betas;
- the AER's 2022 RoRI:<sup>213</sup>
  - > uses weekly betas over multiple estimation periods, with the most weight assigned to the longest estimation period while being informed by the most recent five years; and
  - > does not apply a Blume or Vasicek adjustment;

<sup>209</sup> HoustonKemp, *Estimation of the weighted average cost of capital for the Port of Melbourne*, 11 May 2022, pp 25-27.

<sup>210</sup> 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 paras 201, 272. New Zealand Commerce Commission, *Input methodologies review decisions*, Topic paper 4: Cost of capital issues, 20 December 2016, paras 268-269.

<sup>211</sup> ESC, *Interim commentary – Port of Melbourne Tariff Compliance Statement 2022–23*, 20 December 2022, pp 12-13.

<sup>212</sup> ACCC, *Decision on Australia Post's 2022 price notification*, December 2022, p iii-iv.

<sup>213</sup> AER, *Rate of Return Instrument | Explanatory statement*, February 2023, pp 171-172, 186-191.

- the ERA's 2022 gas RoRI;<sup>214</sup>
  - > estimates weekly betas over five-year and ten-year periods, with five-year estimates being the primary estimates used to determine the benchmark equity beta;
  - > applies country pooling, where separate estimates are generated for each country, before regulatory discretion is used to identify the equity beta point estimate;
- the ICRC's final report on Icon Water's regulated water and sewerage prices derives the equity beta based on precedent from other Australian regulators;<sup>215</sup> and
- OTTER's final report on TasWater's prices and services derives the equity beta based on precedent from other Australian water regulators.<sup>216</sup>

We also note the precedent that was relevant to our previous report, namely that:

- IPART's 2018 WACC method and 2020 equity beta method:<sup>217</sup>
  - > use weekly equity betas for all five weekdays;
  - > apply a Vasicek adjustment without applying a Blume adjustment;
  - > only consider revising an established beta value for a price review if the prior beta estimate is more than one standard deviation from the mean of the current sample and there is persistent evidence of a changed beta over a long period;
- ESCOSA's 2020 regulatory determination for SA Water adopts the same equity beta applied in the previous regulatory period after reviewing precedent from other Australian regulators and after assessing that TasWater has not provided compelling additional evidence to support changing the equity beta;<sup>218</sup>
- the QCA's rate of return review in November 2021:<sup>219</sup>
  - > 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 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.<sup>220</sup>

Having reviewed the above regulatory precedent, we consider it well-accepted to continue estimating PoM's equity beta using the approach set out in our previous report, ie:

- estimating raw equity betas using OLS over five- and ten-year averaging periods for a combination of weekly and four-weekly frequencies, consistent with the NZCC's approach that the WASC accepted in its judgment for Perth Airport;
- 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.

<sup>214</sup> ERA, *Explanatory statement for the 2022 final gas rate of return instrument*, 16 December 2022, paras 979-982, 1,089-1,093.

<sup>215</sup> ICRC, *Regulated water and sewerage services 2023-28*, Final report, May 2023, pp 82-83.

<sup>216</sup> OTTER, *Investigation into TasWater's prices and services for the period 1 July 2022 to 30 June 2026*, Final report, May 2022, pp 93-95.

<sup>217</sup> IPART, *Review of our WACC method*, Final Report, February 2018, pp 65. IPART, *Estimating equity beta for the weighted average cost of capital*, Final report, August 2020, pp 1-2.

<sup>218</sup> ESCOSA, *SA Water regulatory determination 2020*, Final determination: statement of reasons, June 2020, pp 92-95.

<sup>219</sup> QCA, *Rate of return review*, Final report, November 2021, pp 76-77.

<sup>220</sup> 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].

As set out in section 3 above, the analysis in our previous report did not apply a country filter when identifying our preferred comparator sample, while the Interim Commentary states the ESC's preliminary view that PoM should consider filtering the comparator sample to include companies from FTSE developed and advanced emerging countries.<sup>221</sup>

As such, we generate two asset beta estimates, namely:

- our preferred asset beta estimate is 0.71, derived from the broad sample that does not apply a country filter, with a corresponding re-levered equity beta of 0.89; and
- our alternative asset beta estimate is 0.70, derived from the narrow sample that only includes companies from FTSE developed and advanced emerging countries, with a corresponding re-levered equity beta of 0.78.

Table 5.2 summarises the asset beta estimates for our preferred comparator sample that we identify in section 3 above. The average weekly AD and four-weekly AD asset betas for a five-year averaging period are 0.68 and 0.71 respectively, while the corresponding asset betas for the ten-year averaging period are 0.71 and 0.74 respectively.

We then average the four estimates to obtain an asset beta point estimate of 0.71 for the preferred sample, which we re-lever using the benchmark 0.20 gearing to obtain an equity beta estimate of 0.89 (rounded to two decimal places).

Table 5.2 also shows the asset beta estimates for the alternative sample that applies a country filter. We estimate an asset beta point estimate of 0.70 for this alternative sample and a gearing of 0.10, which we re-lever to obtain an equity beta estimate of 0.78 (rounded to two decimal places).

Table 5.2: Beta estimates for the preferred and alternative comparator samples

	5 year averaging period	10 year averaging period	Average
<b>Preferred comparator sample</b>			
Weekly AD asset beta	0.68	0.71	0.69
Four-weekly AD asset beta	0.71	0.74	0.72
Asset beta point estimate	0.69	0.72	0.71
Gearing	0.21	0.20	0.20
Relevered equity beta			0.89
<b>Alternative comparator sample</b>			
Weekly AD asset beta	0.77	0.59	0.68
Four-weekly AD asset beta	0.81	0.62	0.72
Asset beta point estimate	0.79	0.61	0.70
Gearing	0.09	0.10	0.10
Relevered equity beta			0.78

Source: Bloomberg, HoustonKemp analysis

Appendix A3.2 sets out the asset beta estimates for each firm in the comparator samples. We note in appendix A3.2 that we have changed the ticker for one port, China Merchants Port Group Co Ltd so that the equity return series and market return series will have the same currency when estimating asset betas for this port. The asset beta point estimate remains unchanged at 0.71 if we had not made this modification.

<sup>221</sup> ESC, *Interim commentary – Port of Melbourne Tariff Compliance Statement 2022–23*, 20 December 2022, pp 12-13.

## 5.5 Market risk premium

PoM's 2022-23 TCS derived the MRP by assigning:<sup>222</sup>

- 85 per cent weight to the Ibbotson HER MRP, whereby PoM calculates the MRP with reference to the median of the arithmetic mean estimates for five time periods using BHM and NERA data, and a 0.625 utilisation rate (consistent with our gamma estimates in section 6);
  - > we note that CEPA considers it well accepted to use the arithmetic average for deriving the Ibbotson HER MRP;<sup>223</sup>
- 15 per cent weight to DDMs, whereby PoM uses the median of the average result from the DDMs estimated by four regulators, namely IPART, AER, ERA, and QCA; and
- zero weight to the Wright approach.

The Interim Commentary observes that the median DDM is preferable to the mean because of its robustness to extreme observations.<sup>224</sup> As described above, PoM adopted this approach in its 2022-23 TCS, where it used the median of the average result from the DDMs across regulators. We propose to maintain this approach for the 2023-24 TCS.

We do not use the Wright approach in our estimate, which the ESC considered not well-accepted.<sup>225</sup>

Given the lack of clear precedent on the averaging period for estimating the Ibbotson HER MRP estimate, we consider that there currently is insufficient regulatory support for departing our current approach, which uses the median arithmetic average of five sampling periods starting in 1883, 1937, 1958, 1980, and 1988.

However, we modify our approach for estimating the MRP by adjusting the treatment of imputation adjustments in our calculations of the Ibbotson HER MRP and DDM MRP estimates, which we adopt after reviewing the AER's HER MRP spreadsheet.

### 5.5.1 Recent regulatory developments

Since our previous report, several Australian regulators have provided further guidance on their approaches for setting MRP. Specifically:

- the ACCC's 2022 decision on Australia Post's price notification estimates MRP using the Ibbotson HER approach, giving less weight to other methods, resulting in an MRP estimate of 6.1 per cent that is consistent with the AER's 2018 RoRI;<sup>226</sup>
  - > the ACCC considers this approach provides a better estimate of MRP because it is directly observable, easily replicable and transparent;
- in its 2022 RoRI, the AER:<sup>227</sup>
  - > retains its current HER approach to set forward-looking MRP estimates;
  - > has considered incorporating the RBA's return series as part of its HER estimate, but ultimately has decided to retain exclusive use of the BHM series, noting that constructing an alternative accumulation return series requires further work to estimate a matching price return series;
  - > considered estimates from its three-stage DDM but ultimately adopts the HER as its point estimate;

<sup>222</sup> Port of Melbourne, *2022-23 Tariff Compliance Statement*, General statement, 31 May 2022, p 78.

<sup>223</sup> Port of Melbourne, *2022-23 Tariff Compliance Statement*, General statement, 31 May 2022, p 78; CEPA, *Port of Melbourne five-year review – WACC*, Final report, 17 December 2021, pp 33-35.

<sup>224</sup> ESC, *Interim commentary – Port of Melbourne Tariff Compliance Statement 2022–23*, 20 December 2022, p 10.

<sup>225</sup> ESC, *Interim commentary – Port of Melbourne Tariff Compliance Statement 2022–23*, 20 December 2022, p 10.

<sup>226</sup> ACCC, *Decision on Australia Post's 2022 price notification*, December 2022, appendix A pp i-ii.

<sup>227</sup> AER, *Rate of Return Instrument | Explanatory statement*, February 2023, pp 130-170.

- > considers that the three sample periods from 1972, 1980 and 1988 onwards provide useful information in estimating forward-looking MRP, but has decided to retain its use of the period from 1988 onwards since it is most likely to reflect current market structure, conditions and investor expectations;
  - the AER acknowledges that starting the HER series in 1988 results in a short dataset with wide confidence intervals and estimates that would need to be tested for stationarity and ergodicity;<sup>228</sup>
- > 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; and
- > sets the five-year MRP at 6.8 per cent and ten-year MRP at 6.5 per cent using the arithmetic average of HER from 1988 to current;
- the ERA's 2022 gas RoRI states that the ERA will:<sup>229</sup>
  - > use BHM data exclusively to inform its HER estimate, compared to its previous approach that uses both BHM and NERA data;
    - the ERA notes that this simplifies the approach, as the BHM and NERA datasets converge post-1958, which makes the NERA dataset redundant;
  - > shift from deriving the Ibbotson HER estimate using the average of the lowest arithmetic mean and the highest geometric mean over three overlapping periods to a weighted approach applying 60 per cent weight to the average arithmetic mean and 40 per cent weight to the average geometric mean;
  - > derive the HER estimate using four overlapping periods starting from 1958, 1980, 1988 and 2000;
  - > maintain the use of its two stage DDM, placing a lower reliance on the DDM as compared to the HER estimate;
  - > not apply the Wright approach as it has low confidence that any relationship between the MRP and risk free rates can be econometrically identified;
  - > estimate a MRP of 6.1 per cent for the 2022 final gas instrument by assigning some weight to its 6.0 per cent HER estimate and 6.6 per cent DDM estimate;
    - this implies an implicit weight of 80 per cent to the HER estimate and 20 per cent to the DDM estimate;
- the ICRC's final report on Icon Water's regulated water and sewerage prices:<sup>230</sup>
  - > considers a broad range of methods for MRP estimates, including historical estimates and forward-looking estimates based on dividend growth models;
  - > places less weight on the DGM estimates due to concerns about input assumptions and variability of outputs;
  - > gives preference to arithmetic averages for calculating the HER, which means MRP should be higher than the midpoint of other regulators; and
  - > concludes an MRP of 6.3 per cent is appropriate;
- OTTER's final report on TasWater's prices and services:<sup>231</sup>
  - > rejects TasWater's proposed approach of placing equal weighting on HER, DDMs, surveys and estimates from other developed countries, instead maintaining its draft report approach of applying a greater weight to HER and less weight on DDMs, while taking survey results into consideration; and
  - > adopts its benchmark MRP point estimate based on precedent from other Australian regulators.

<sup>228</sup> AER, *Rate of Return Instrument | Explanatory statement*, February 2023, p 139.

<sup>229</sup> ERA, *Explanatory statement for the 2022 final gas rate of return instrument*, 16 December 2022, paras 764-771, 818-819, 876-902.

<sup>230</sup> ICRC, *Regulated water and sewerage services 2023-28*, Final report, May 2023, pp 79-82.

<sup>231</sup> OTTER, *Investigation into TasWater's prices and services for the period 1 July 2022 to 30 June 2026*, Final report, May 2022, pp 90-92.



We also note the precedent that was relevant to our previous report, namely that:

- In its 2018 WACC method, IPART uses both a historic and current MRP to:<sup>232</sup>
  - > calculate the historic MRP as a midpoint of 6 per cent;
    - we note that this estimate corresponds to a gamma of 0.25
  - > determine a point estimate of the current MRP as the weighted average of the median MRP estimate of five DDMs (two-third weight) and the market indicator MRP (one-third weight);
- ESCOSA's 2020 regulatory determination for SA Water:<sup>233</sup>
  - > uses the Ibbotson HER estimate from 1883 to 2017, applying equal weight to the BHM and NERA datasets, as well as to the arithmetic average and geometric average estimates;
  - > applies surveys of investor expectations and market-implied estimates as cross-checks;
  - > finds that evidence of a relationship between risk-free rates and the market risk premium does not currently appear of sufficient weight to support a move away from the current historical average method, ie, applies no weight to the Wright approach;
- the QCA's rate of return review states that the QCA will:<sup>234</sup>
  - > 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 WASC's judgment for Perth Airport adopts IPART's December 2013 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.<sup>235</sup>

We therefore consider that regulatory precedent indicates the following approach is well-accepted:

- continuing to set the MRP by assigning 85 per cent weight to the Ibbotson HER estimate and 15 per cent weight to the DDM estimate;
- not applying the Wright approach.

### 5.5.2 Historical excess returns

In our previous report, we estimated the HER MRP using:

- the midpoint of BHM and NERA estimates, where the BHM and NERA estimates are each derived as the median arithmetic average for five time periods; and
- 0.625 imputation credit utilisation rate, consistent with our gamma estimates in section 6.1 below.

However, our discussion in section 5.5.1 identifies that several regulators have moved to using the BHM dataset exclusively. This includes the AER and ERA, while the ICRC and OTTER both refer to precedent from the AER and ERA when deriving their HER MRP estimates. Only ESCOSA continues to use both BHM and NERA data when estimating its HER MRP estimates.

<sup>232</sup> IPART, *Review of our WACC method*, Final Report, February 2018, pp 51-52, 58-59.

<sup>233</sup> ESCOSA, *SA Water regulatory determination 2020*, Final determination: statement of reasons, June 2020, pp 296-301.

<sup>234</sup> QCA, *Rate of return review*, Final report, November 2021, pp 59-65.

<sup>235</sup> *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.

In line with the approach adopted by the majority of regulators, we rely exclusively on the BHM dataset for our Ibbotson HER MRP estimate without referring to the NERA dataset.<sup>236</sup> We note that this is consistent with clause 21(e)(i) of the Undertaking:

[PoM will] rely equally on NERA-adjusted and Brailsford Handley Maheswaran-adjusted stock market data **unless an alternative weighting is more appropriate having regard to the requirements of the Pricing Order...** (emphasis added)

In addition, we note that recent regulatory developments result in no clear precedent on the averaging period that should be used for the Ibbotson HER MRP estimate, ie:

- the AER only uses the period from 1988 onwards;
- the ERA uses four periods starting in 1958, 1980, 1988 and 2000;
- the QCA only uses the period from 1958 onwards;
- ESCOSA only uses the period from 1883 onwards;
- IPART uses a fixed estimate of 6 per cent;
- the ACCC uses an estimate consistent with the AER's 2018 RoRI; and
- ICRC and OTTER refer to precedent from other Australian regulators.

Given the lack of clear precedent on the averaging period for estimating the Ibbotson HER MRP estimate, we consider that there currently is insufficient regulatory support for departing our current approach, which uses the median arithmetic average of five sampling periods starting in 1883, 1937, 1958, 1980, and 1988. We will consider changing the averaging periods for future Ibbotson HER MRP estimates if future regulatory developments provide sufficient regulatory support for doing so.

Table 5.3 shows our Ibbotson HER MRP estimates. The median of the arithmetic mean estimates across five averaging periods is 6.33 per cent. This is 2 bp lower than the average of the arithmetic mean estimates across BHM data for the five averaging periods.

We note that the Ibbotson HER MRP point estimate applying equal weights to BHM and NERA data is 6.44 per cent, which is 11 bp larger than our point estimate. This is consistent with the ERA's observation that the BHM and NERA datasets are converging over time.<sup>237</sup>

We do not assign weight to the geometric mean estimates.

<sup>236</sup> We consider this is in line with clause 21(1)(e) of the Undertaking, which provides "when implementing the HER approach will rely on approaches to estimating the HER that are adopted by Australian and New Zealand regulators and courts and, in doing so

<sup>237</sup> ERA, *Explanatory statement for the 2022 final gas rate of return instrument*, 16 December 2022, para 771.

Table 5.3: Historical excess returns estimates – BHM dataset

	Arithmetic mean	Geometric mean
1883-2022	6.33%	5.02%
1937-2022	6.09%	4.34%
1958-2022	6.58%	4.41%
1980-2022	6.55%	4.54%
1988-2022	6.21%	4.81%
<b>Mean</b>	<b>6.35%</b>	<b>4.62%</b>
<b>Median</b>	<b>6.33%</b>	<b>4.54%</b>

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

We note that we have made minor computational changes to our Ibbotson HER calculations to be consistent with the AER's Ibbotson HER spreadsheet. Our previous calculations would have resulted in an Ibbotson HER estimate of 6.34 per cent using BHM data, ie, 1 bp higher than our preferred estimate.

Appendix A5 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:<sup>238</sup>

- IPART current MRP estimate: 7.15 per cent;
- AER three-stage DDM: 5.41 per cent;
- ERA two-stage Gordon DDM: 6.66 per cent;
- QCA Cornell DDM: 5.74 per cent.

We adopt a DDM MRP point estimate of 6.20 per cent, calculated as the median of the above four estimates. This is lower than the average DDM MRP of 6.24 per cent. We note that we have removed the AER's two-stage DDM from our estimates since the 2022 RoRI states the AER's preference for its three-stage DDM.<sup>239</sup>

In generating these estimates, we have used an average franking rebate yield of 1.52 per cent, consistent with the Australian Tax Office's (ATO's) most recent estimate as at 31 March 2023.<sup>240</sup> We note that this departs from the approach in our previous report, which uses different calculations to generate DDM MRP estimates based on the assumption that the proportion of fully franked dividends was 0.75.<sup>241</sup>

We adopt this change because the AER's Ibbotson HER spreadsheet sets out how the AER adjusts its estimates of stock returns for franking credits. Our previous approach reflected our best attempt to replicate the methodology adopted by the AER and ERA, given the lack of guidance as to how the AER and ERA used ATO imputation credit yields to adjust their MRP estimates.<sup>242</sup>

We note that our previous approach generates a median DDM MRP estimate of 6.15 per cent, ie, 5 bp lower than the estimate from our updated methodology.

<sup>238</sup> We note that the date of IPART's DDM estimate from 31 January 2023 differs from the estimation dates of the other WACC parameters, which we estimate as at 31 March 2023. However, this difference is unlikely to affect our median DDM MRP point estimate, which effectively takes the midpoint of the QCA and ERA DDM MRP estimates.

<sup>239</sup> AER, *Rate of Return Instrument | Explanatory statement*, February 2023, pp 132-133, 149-154.

<sup>240</sup> ATO, <https://www.ato.gov.au/rates/company-tax---imputation--average-franking-credit---rebate-yields/>, accessed 6 April 2023.

<sup>241</sup> HoustonKemp, *Estimation of the weighted average cost of capital for the Port of Melbourne*, 11 May 2022, p 31.

<sup>242</sup> See discussion in: HoustonKemp, *Estimation of the weighted average cost of capital for the Port of Melbourne*, 11 May 2022, p 61.

We also assume an imputation credit utilisation rate of 0.625, consistent with our gamma estimates in section 6.1 and with our previous report.

The remainder of this section provides brief summaries about our approach for estimating each DDM. In appendix A4 we set out additional details about the models and our cross-checks against each regulator's previous DDM estimates.

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

Consistent with our previous report, we do not derive our own estimates of IPART's DDMs, and instead adopt IPART's current MRP estimate as at 31 January 2023. 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.<sup>243</sup>

IPART's current MRP is 7.7 per cent as at 31 January 2023.<sup>244</sup> This estimate is consistent with IPART's 0.25 gamma estimate, and includes a gamma adjustment from its 2013 WACC method.<sup>245</sup> We adjust IPART's estimate to be consistent with our 0.5 gamma estimate and our 3.45 per cent risk free rate estimate, resulting in a point estimate of 7.15 per cent as at 31 January 2023.

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 2023. However, this difference is unlikely to affect our median DDM MRP point estimate, which effectively takes the midpoint of the ERA and QCA DDM MRP estimates.

Appendix A4.1.1 provides further details about our method for adjusting IPART's current MRP.

#### AER three-stage DDM

The AER publishes annual 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. The three-stage DDM includes an additional transition stage from years three to nine, where dividend growth converges linearly towards 3.85 per cent long-term growth.<sup>246</sup>

As described above, the 2022 RoRI states the AER's preference for its three-stage DDM.

In addition, the 2022 RoRI changes the AER's approach to calculating the long-term GDP growth rate. Instead of assuming a constant 4.6 per cent long-term GDP growth rate, the AER's preference is to use 10-year real GDP forecasts and 10-year expected inflation from the most recent Consensus Economics data, updated each quarter.<sup>247</sup> The most recent estimate of expected growth rate in dividends is 3.85 per cent using the updated methodology.<sup>248</sup>

The AER's rate of return annual update for December 2021 includes sensitivity estimates for:<sup>249</sup>

<sup>243</sup> IPART, *Review of our WACC method*, Final Report, February 2018, pp 52, 59.

<sup>244</sup> IPART, *WACC Biannual Update*, Fact sheet, 24 February 2023, p 3.

<sup>245</sup> 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.

<sup>246</sup> AER, *Rate of Return Guideline (Appendices)*, Explanatory Statement, December 2013, pp 114-118.

<sup>247</sup> AER, *Rate of Return Instrument | Explanatory statement*, February 2023, p 148.

<sup>248</sup> AER, *Rate of Return Instrument | Explanatory statement*, February 2023, p 132.

<sup>249</sup> AER, *Rate of return Annual Update*, December 2021, p 17.

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

However, the AER has not published an annual update for December 2022, and it is unclear which sensitivity estimates it will use for its DDM MRP estimates.

For the 20 trading days to 31 March 2023, we estimate an average MRP of 5.33 per cent for the three-stage DDM, assuming an average franking rebate yield of 1.52 per cent and an imputation credit utilisation rate of 0.625. We also use the AER's 3.85 per cent long-term dividend growth assumption. We estimate the MRP using the AER's baseline assumptions for 20 trading days without assigning weight to the alternative sensitivity formulations.

We note that our MRP estimate for the AER's two-stage DDM is 5.81 per cent, although we do not use this estimate.

Appendix A4.3.2 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 three-stage DDM estimate averaged over November 2022 and December 2022 is within approximately 0.1 per cent of the AER's.

We note that the AER's 3.85 per cent long run expected growth rate in dividends corresponds to an estimate for its December 2022 calculations, and that the estimate may have changed materially after the 2022 RoRI was published. However, the AER's DDM MRP estimate currently is the lowest of the four DDM estimates that we refer to, such that the median DDM MRP estimate will not be affected by it.

#### 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.<sup>250</sup>

In its final RoRI, the ERA noted that DDM estimates can vary substantially from month to month.<sup>251</sup> As such, the ERA estimates the DDM monthly for the six months prior to setting the RoRI, using the mean of the six estimates as its final DDM point estimate.<sup>252</sup>

For the 20 trading days to 31 March 2023, we estimate an average MRP of 6.66 per cent, assuming an average franking rebate yield of 1.52 per cent and an imputation credit utilisation rate of 0.625.

We note that our 6.66 per cent estimate is 6 bp higher than the ERA's DDM MRP point estimate of 6.6 per cent in its 2022 gas RoRI, which was calculated using the mean of six months of DDM estimates up to September 2022.<sup>253</sup>

Appendix A4.4 provides further details about the ERA's Gordon DDM, and compares our model estimates against the ERA's. For the six months from April 2022 to September 2022, our Gordon DDM estimate is within approximately 0.1 per cent of the ERA's.

<sup>250</sup> ERA, *Explanatory statement for the 2022 final gas rate of return instrument*, 16 December 2022, para 856.

<sup>251</sup> ERA, *Explanatory statement for the 2022 final gas rate of return instrument*, 16 December 2022, para 857.

<sup>252</sup> ERA, *Explanatory statement for the 2022 final gas rate of return instrument*, 16 December 2022, para 858.

<sup>253</sup> ERA, *Explanatory statement for the 2022 final gas rate of return instrument*, 16 December 2022, para 859.

## 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.<sup>254</sup>

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 10<sup>th</sup> year and 20<sup>th</sup> year respectively.<sup>255</sup>

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.<sup>256</sup> 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 A4.5.

We consulted extensively with the QCA when constructing our model for our previous report. The QCA 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.<sup>257</sup> The QCA uses its new DDM implementation in its final decision for Seqwater.<sup>258</sup>

Table 5.4 presents our MRP estimates using the QCA DDM for the 20 trading days to 31 March 2023, assuming an average franking rebate yield of 1.52 per cent and an imputation credit utilisation rate of 0.625. We estimate a median MRP of 5.74 per cent.

Table 5.4: QCA DDM estimates

Long-term growth	10-year convergence	20-year convergence
4.0%	5.58%	5.11%
4.6%	6.08%	5.53%
5.1%	6.50%	5.89%

Source: Bloomberg, QCA, HoustonKemp analysis

Appendix A4.5 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 approximately 0.1 per cent of the QCA's estimate for Seqwater.

## DDM MRP point estimate

We adopt a DDM MRP point estimate of 6.20 per cent, calculated as the median of the estimates from each regulator. This is consistent with the ESC's view in the Interim Commentary that the median DDM MRP is preferable to the mean:<sup>259</sup>

The Port utilises the median dividend discount model estimate from across regulators instead of the mean, the latter was considered not to be a well accepted approach in our 2016–21 inquiry.

<sup>254</sup> QCA, *Cost of capital: market parameters*, Final decision, August 2014, pp 72-73.

<sup>255</sup> QCA, *Cost of capital: market parameters*, Final decision, August 2014, pp 67-68, 72.

<sup>256</sup> QCA, *Cost of capital: market parameters*, Final decision, August 2014, p 72.

<sup>257</sup> QCA, *Cost of capital: market parameters*, Final decision, August 2014, pp 71-72.

<sup>258</sup> See: QCA, *Seqwater Bulk Water Price Review 2022–26*, Final report, March 2022, p 69.

<sup>259</sup> ESC, *Interim commentary – Port of Melbourne Tariff Compliance Statement 2022–23*, 20 December 2022, p 10.

**The Port agrees with our view that the median is preferable to the mean because of its robustness to extreme observations.** (emphasis added)

#### 5.5.4 Wright approach

We explain in section 5.5.1 that Australian regulators currently do not apply the Wright approach. Consistent with clause 21(b) of the Undertaking, PoM's 2022-23 TCS does not use 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 in the past.<sup>260</sup>

Having regard to the regulatory precedent and the ESC's Interim Commentary, we do not use the Wright approach when estimating the benchmark MRP.<sup>261</sup>

#### 5.5.5 MRP point estimate

Our MRP point estimate is 6.31 per cent. Consistent with our discussion in section 5.5.1, we retain the approach from PoM's 2022-23 TCS, which applies:

- 85 per cent weight to the mean HER estimate: 6.33 per cent; and
- 15 per cent weight to the median DDM estimate: 6.20 per cent.

<sup>260</sup> See: ERA, *Explanatory statement for the 2022 final gas rate of return instrument*, 16 December 2022, para 742.

<sup>261</sup> ESC, *Interim commentary – Port of Melbourne Tariff Compliance Statement 2022–23*, 20 December 2022, p 10.

## 6. Tax rate and gamma

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PoM adopted a gamma of 0.50 for its 2022-23 TCS.<sup>262</sup> 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. The ESC also considers that PoM's approach to estimating gamma is well accepted because PoM employs the utilisation approach based on an equity ownership methodology for estimating gamma, and does not use the market valuation or finance practitioner approaches.<sup>263</sup>

We adopt a corporate tax rate of 30 per cent, consistent with Australian legislation.<sup>264</sup>

### 6.1 Gamma

Consistent with clause 22 of the Undertaking, PoM's 2022-23 TCS calculates the gamma using a utilisation approach, where the gamma is estimated as the product of a utilisation rate and a distribution rate.<sup>265</sup> The ESC's interim commentary noted that PoM has not used either the market valuation or finance practitioner approaches, which are not well accepted.<sup>266</sup>

There has been no material change in Australian regulatory precedent adopted by Australian regulators since our previous report. Specifically:

- the ACCC's 2022 decision on Australia Post's price notification sets the gamma estimate equal to 0.585 based on the AER's application of the utilisation approach;<sup>267</sup>
- the AER's 2022 RoRI retains its use of the utilisation approach, with a distribution rate of 0.88 and a utilisation rate of 0.65 resulting in a gamma estimate of 0.57, finding that this approach has been tested in a number of court cases and found to be open for use by the Full Federal Court;<sup>268</sup>
- the ERA's 2022 gas RoRI retains its use of the utilisation approach, with a distribution rate of 0.90 and a utilisation rate of 0.60 resulting in a gamma estimate of 0.5 (rounded to one decimal place), consistent with its 2018 RoRI, finding this approach was based on Contemporary Australian Competition Tribunal and Federal Court judicial reviews, consideration of available data, expert reports and analysis;<sup>269</sup>
- the ICRC's final report on Icon Water's regulated water and sewerage prices rejected Icon Water's proposal of a market valuation approach and retained the utilisation approach applied in its 2018 price investigation, to maintain consistency with other regulators, arriving at a gamma estimate of 0.5;<sup>270</sup> and
- OTTER's final 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.<sup>271</sup>

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<sup>262</sup> Port of Melbourne, *2022-23 Tariff Compliance Statement*, General statement, 31 May 2022, p 80.

<sup>263</sup> ESC, *Interim commentary – Port of Melbourne Tariff Compliance Statement 2022–23*, 20 December 2022, p 11.

<sup>264</sup> ATO, <https://www.ato.gov.au/Rates/Company-tax/>, accessed 17 March 2022.

<sup>265</sup> Port of Melbourne, *2022-23 Tariff Compliance Statement*, General statement, 31 May 2022, p 80.

<sup>266</sup> ESC, *Interim commentary – Port of Melbourne Tariff Compliance Statement 2022–23*, 20 December 2022, p 11.

<sup>267</sup> ACCC, *Decision on Australia Post's 2022 price notification*, December 2022, appendix A, p ii.

<sup>268</sup> AER, *Rate of Return Instrument | Explanatory statement*, February 2023, pp 12, 240-243.

<sup>269</sup> ERA, *Explanatory statement for the 2022 final gas rate of return instrument*, 16 December 2022, paras 1283-1289, 1299 and 1313-1314.

<sup>270</sup> ICRC, *Regulated water and sewerage services 2023-28*, Final report, May 2023, pp 87-89.

<sup>271</sup> OTTER, *Investigation into TasWater's prices and services for the period 1 July 2022 to 30 June 2026*, Final report, May 2022, p 90.



We also note the precedent that was relevant to our previous report, namely that:

- ESCOSA's 2020 regulatory determination for SA Water was not transparent in its methodology for calculating gamma, but arrived at a gamma estimate of 0.5, which is equal to PoM's proposed gamma estimate;<sup>272</sup>
- the QCA's rate of return review adopts the utilisation approach for consistency with Australian regulatory practice, retaining a 0.484 gamma estimate, corresponding to a distribution rate of 0.88 and a utilisation rate of 0.55;<sup>273</sup> and
- the WASC's judgment for Perth Airport applies the utilisation approach and 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.<sup>274</sup>

We note that IPART's 2018 WACC method uses the market valuation approach and arrives at a gamma estimate of 0.25, which is consistent with its approach applied since December 2011.<sup>275</sup> IPART acknowledged that this rate was significantly lower than the gamma estimate employed by other regulators such as the AER in the South Australia Power Networks decision, but considered there was insufficient evidence to adopt a different value of gamma at the time.<sup>276</sup>

Having regard to the regulatory precedent and the ESC's interim commentary, which notes that the market valuation approach is not well accepted, we consider it well-accepted to retain the use of the equity ownership approach to estimate gamma.

Consistent with the approach described in our previous report,<sup>277</sup> we adopt a gamma estimate of 0.5, which comprises a distribution rate of 0.80 and a utilisation rate of 0.625.

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<sup>272</sup> ESCOSA, *SA Water regulatory determination 2020*, Final determination: statement of reasons, June 2020, p 248.

<sup>273</sup> QCA, *Rate of return review*, Final report, November 2021, pp 87-88.

<sup>274</sup> *Perth Airport Pty Ltd v Qantas Airways Ltd [No 3] [2022] WASC 51 [151], [187], [190]-[191]*.

<sup>275</sup> IPART, *Review of our WACC method*, Final Report, February 2018, pp 81-82.

<sup>276</sup> IPART, *Review of our WACC method*, Final Report, February 2018, pp 82-83.

<sup>277</sup> HoustonKemp, *Estimation of the weighted average cost of capital for the Port of Melbourne*, 11 May 2022, pp 36-37.

## 7. Weighted average cost of capital

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Based on the discussion in the previous sections, we estimate a pre-tax nominal WACC estimate of 9.49 per cent using approaches that we consider to be well accepted. This estimate is derived from a comparator sample that does not apply a country filter. Our alternative pre-tax nominal WACC estimate derived from a comparator sample that applies a country filter is 9.34 per cent.

While the ESC considers that PoM's approach to estimating its WACC generally reflects the ESC's views from the Inquiry,<sup>278</sup> the ESC states in the Interim Commentary that PoM's WACC estimate is relatively high compared to recent Australian regulatory determinations.<sup>279</sup>

As discussed in our previous report, we consider this line of reasoning to be flawed because:<sup>280</sup>

- 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.

This is consistent with clause 4.1.1 of the Pricing Order, which 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'.

We also note that the WACC estimates derived by the ESC do not account for the recent material changes to the risk-free rate. We note that our pre-tax nominal WACC estimate of 9.49 per cent is 50 bp higher than the 8.99 per cent estimate from PoM's 2022-23 TCS. This is primarily caused by the 88 bp increase in the risk free rate from 2.57 per cent to 3.45 per cent. Had the risk free rate remained unchanged at 2.57 per cent, our pre-tax nominal WACC estimate for 2023-24 would instead have been 8.67 per cent, which is 32 bp lower than the corresponding 8.99 per cent estimate from PoM's 2022-23 TCS.

### 7.1 Estimate of pre-tax nominal WACC

Table 7.1 presents our estimates of the individual WACC parameters for PoM's 2023-24 TCS and compares them to the estimates from PoM's 2022-23 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 9.49 per cent is 50 bp higher than the 8.99 per cent estimate from PoM's 2022-23 TCS. This increase is caused primarily by the 88 bp increase in the risk free rate from 2.57 per cent to 3.45 per cent. As table 7.1 shows, had the risk free rate remained unchanged at 2.57 per cent, our pre-tax nominal WACC estimate for 2022-23 would instead have been 8.67 per cent, which is 32 bp lower than the corresponding 8.99 per cent estimate from PoM's 2022-23 TCS.

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<sup>278</sup> ESC, *Interim commentary – Port of Melbourne Tariff Compliance Statement 2022–23*, 20 December 2022, pp v-vi.

<sup>279</sup> ESC, *Interim commentary – Port of Melbourne Tariff Compliance Statement 2022–23*, 20 December 2022, pp 13-14.

<sup>280</sup> HoustonKemp, *Estimation of the weighted average cost of capital for the Port of Melbourne*, 11 May 2022, pp 39-40.

Table 7.1: Weighted average cost of capital estimates

Parameter	2022-23 TCS	HoustonKemp 2023-24	HoustonKemp 2023-24, risk free rate unchanged	Formula
(a) Return on debt (including debt raising costs)	4.78%	4.88%	4.88%	Rounded to two decimal places.
(b) Return on equity	8.54%	9.05%	8.17%	(b1) + (b2) × (b3)
(b1) - risk free rate	2.57%	3.45%	2.57%	Rounded to two decimal places.
(b2) - MRP	6.63%	6.31%	6.31%	Rounded to two decimal places.
(b3) - equity beta	0.90	0.89	0.89	(b3b) ÷ (1 - (c))
(b3b) - asset beta	0.72	0.71	0.71	Rounded to two decimal places.
(c) Gearing	20%	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	0.80	0.80	0.80	
<b>Pre-tax nominal WACC</b>	<b>8.99%</b>	<b>9.49%</b>	<b>8.67%</b>	$(c) \times (a) + \frac{(1 - (c)) \times (b)}{1 - (d) \times (1 - (e))}$

Source: 2022-23 TCS; 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.

Table 7.2 sets out alternative pre-tax WACC estimates based on a comparator sample that applies a country filter. The alternative pre-tax WACC estimate is 9.34 per cent, which is 15 bp lower than our preferred pre-tax WACC estimate based on a comparator sample that does not apply a country filter.

Table 7.2: Weighted average cost of capital estimates – country filter applied

Parameter	HoustonKemp 2023-24	HoustonKemp 2023-24, country filter applied	Formula
(a) Return on debt (including debt raising costs)	4.88%	4.88%	Rounded to two decimal places.
(b) Return on equity	9.05%	8.36%	(b1) + (b2) × (b3)
(b1) - risk free rate	3.45%	3.45%	Rounded to two decimal places.
(b2) - MRP	6.31%	6.31%	Rounded to two decimal places.
(b3) - equity beta	0.89	0.78	(b3b) ÷ (1 - (c))
(b3b) - asset beta	0.71	0.70	Rounded to two decimal places.
(c) Gearing	20%	10%	Rounded to nearest percentage point.
(d) Tax rate	30%	30%	
(e) Gamma	0.50	0.50	(e1) × (e2)
(e1) - utilisation rate	0.625	0.625	
(e2) - distribution rate	0.80	0.80	
<b>Pre-tax nominal WACC</b>	<b>9.49%</b>	<b>9.34%</b>	$(c) \times (a) + \frac{(1 - (c)) \times (b)}{1 - (d) \times (1 - (e))}$

Source: 2022-23 TCS; 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

In the Interim Commentary, the ESC states that PoM's WACC estimate is relatively high compared to recent Australian regulatory determinations.<sup>281</sup>

As discussed in our previous report, we consider this line of reasoning to be flawed because:<sup>282</sup>

- 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.

This is consistent with clause 4.1.1 of the Pricing Order, which 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'.

We also note that the WACC estimates derived by the ESC do not account for the recent material changes to the risk-free rate. We reproduce the ESC's analysis in table 7.3 below, excluding Dalrymple DBCT (which was determined in 2015) and including Perth Airport.

As shown in table 7.3, our WACC estimate of 9.67 per cent corresponds has been calculated over a period when the risk free rate is materially higher than that observed for most of the regulatory decisions cited by the ESC, aside from the three ERA rail decisions. We also observe that our WACC estimate of 9.67 per cent is within the range of the ERA's WACC for its rail decisions, which were estimated using a similar risk free rate as at August 2022.

Table 7.3: Port of Melbourne WACC estimates relative to comparators

Companies	Nominal pre-tax WACC (%)	Risk free rate (%)	Difference in risk free rate to PoM (%)	Date of estimate
Port of Melbourne	9.49	3.45	-	January 2023
Queensland Rail	5.46 (vanilla WACC) and 6.10 (pre-tax WACC)	1.18	2.27	February 2020
Aurizon UT5	6.30 (vanilla WACC)	1.9	1.55	December 2019
PTA	7.00	3.62	-0.17	August 2022
Arc Infrastructure	9.43	3.62	-0.17	August 2022
Pilbara Railways	12.03	3.62	-0.17	August 2022
ARTC HVAU	6.43	1.52	1.93	June 2021
Perth Airport	9.6	3.3	0.15	30 June 2018

Source: Port of Melbourne, 2023-24 TCS; QCA, Queensland Rail 2020 draft access undertaking, February 2020, p 33; QCA, Aurizon Network's Revised UT5 draft amending access undertaking, December 2019, p 3; Aurizon Network, Revised UT5 DAAU, December 2019, p 288; ERA, Determination on the 2022 weighted average cost of capital for the freight and urban railway networks, and for Pilbara railways, August 2022, p 4; ARTC, Hunter Valley Coal Network Access Undertaking, Version 8, 2 June 2021, p 38; Perth Airport Pty Ltd v Qantas Airways Ltd [No 3] [2022] WASC 51 [339]. HoustonKemp analysis.

Notes: ESC reported a WACC of 6.87 per cent for Queensland Rail in the Interim Commentary - we were unable to replicate this value. Risk free rate for ARTC HVAU taken from monthly average in June 2021, when the decision was released. There is insufficient information in Aurizon's UT5 access undertaking to derive a pre-tax WACC.

Notwithstanding the above observations from table 7.3, we continue to consider that this analysis cannot be used to determine whether PoM's overall WACC estimate is a commensurate return, since it compares

<sup>281</sup> ESC, Interim commentary – Port of Melbourne Tariff Compliance Statement 2022–23, 20 December 2022, pp 13-14.

<sup>282</sup> HoustonKemp, Estimation of the weighted average cost of capital for the Port of Melbourne, 11 May 2022, pp 39-40.

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. Forecasting inflation

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The Pricing Order provides PoM with an ex post real return on capital using an ‘indexed capital base’ approach, where clause 4.1.1(d) requires PoM to deduct its indexation allowance when determining its aggregate revenue requirement, while clauses 4.2.1 and 4.6.1 require PoM to roll forward its capital base using the percentage change in CPI for the relevant financial year.

Thus, PoM is compensated for inflation through the indexation of its capital base, such that its inflation allowance is recovered over the life of its assets. This generates a smoother revenue path and maintains a real capital base that is closer to its replacement value compared to an alternative that compensates for inflation upfront. It also is consistent with standard regulatory practice in Australia and New Zealand.

Several Australian regulators calculate the indexation allowance for regulated businesses using estimates of inflation expectations instead of attempting to forecast actual inflation. This means that these regulators define the ‘best’ estimate as one that matches investors’ expectations at the time when the estimate is made, which also will not predict inflation outcomes that investors did not expect. This is consistent with clause 8.2.2(b) of the Pricing Order, which refers to the ‘best’ forecast or estimate possible ‘in the circumstances’.

Regulatory precedent supports using RBA forecasts for forecasting inflation. Six Australian regulators and the NZCC adopt some variation of this approach, which pairs short-term central bank inflation forecasts with a longer-term forecast equal to the midpoint of central bank inflation targets and then takes the geometric average of these forecasts. Several regulators also implement a linear glide path between the short-term central bank inflation forecasts and the longer-term forecast.

We have considered the merits of the RBA glide path approach and two market-based approaches for forecasting inflation, ie, breakeven and inflation swaps. While none of the three approaches is perfect, we consider that the assumptions behind the RBA glide path form a reasonable basis for forecasting inflation, and that the RBA glide path generates forecasts that are best possible in the circumstances. We do not assign weight to the market-based approaches due to bias concerns.

In addition, we consider that the term of the inflation forecast should match the length of the regulatory period. This ensures that the indexation allowance that is deducted from PoM’s aggregate revenue requirement can be expected to have the same net present value as the roll forward of its capital base. Furthermore, this matches the practice of most regulators in Australia and New Zealand.

Accordingly, forecast inflation over the 2023-28 pricing period should be calculated using the following steps:

- for the first two financial years (FY2024-FY2025) use RBA forecasts as set out in the May 2023 Statement of Monetary Policy;<sup>283</sup>
- for FY2028 forecast inflation would be the mid-point of the RBA inflation target of 2.5 per cent; and
- for FY2026 and FY2027 are to be estimated using a straight line interpolation between the forecast inflation for FY2025 and the FY2028.

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<sup>283</sup> RBA, *Statement on Monetary Policy – May 2023*, 4 May 2023: Table 5.1, p 70.

## 8.1 The Pricing Order uses an 'indexed capital base' approach to compensate for inflation

The Pricing Order compensates PoM for inflation using an 'indexed capital base' approach, whereby the annual inflation allowance is capitalised by applying a real rate of return and then indexing the capital base for inflation. This means that PoM recovers its inflation allowance gradually through regulatory depreciation over the life of its assets.

As set out in the Pricing Order, this involves:<sup>284</sup>

- carrying out a negative revenue adjustment based on actual or forecast CPI that removes the indexation allowance when determining the aggregate revenue requirement;
  - > mathematically, this is equivalent to converting the nominal rate of return allowance to a real rate of return allowance; and
- rolling forward the capital base using actual or forecast inflation.

This contrasts with an alternative 'unindexed capital base' approach, where the inflation allowance is expensed by applying a nominal rate of return that includes an implicit allowance for inflation, thereby allowing the regulated business to recover its inflation allowance upfront.<sup>285</sup>

The indexed capital base approach has two key implications for PoM's annual revenue allowances, namely:

- it generates a smoother revenue path that is less volatile to asset replacement; and
- it maintains a real capital base that is closer to its replacement value.

Box 8.1 sets out the clauses in the Pricing Order that require inflation forecasts to be generated.

### Box 8.1: Inflation in the Pricing Order

The Pricing Order requires PoM to generate inflation forecasts for:

- the indexation allowance that is deducted when determining the aggregate revenue requirement (**clause 4.1.1(d), 4.6.1**);
- rolling forward its capital base using the percentage change or forecast percentage change in the CPI for the financial year (**clauses 4.2.1(b), 4.6.1(a)**);
- indexing its efficient capital expenditure for the relevant financial year by one half of the percentage charge or forecast percentage change in the CPI for the financial year (**clauses 4.2.1(c), 4.6.1(b)**); and
- calculating the TAL using the percentage change in CPI between the March quarter in the preceding financial year and two years preceding the financial year, including using a reasonable forecast when calculating the TAL in a rebalancing application submitted prior to the March CPI release date (**clauses 3.2.6, 3.2.15, 14**).

<sup>284</sup> Pricing Order, cl 4.1.1(d), 4.2.1(b), 4.6.1(a).

<sup>285</sup> All regulators in Australia and New Zealand apply an indexed capital base approach, with one exception where the NZCC applies an unindexed capital base approach for Transpower due to Transpower's high investment needs over the short and medium term. The NZCC currently is considering whether shifting to an indexed RAB approach will lead to a better recovery profile for Transpower's investment. See: New Zealand Commerce Commission, *Part 4 Input Methodologies Review 2023*, Process and Issues paper, 20 May 2022, paras 8.12-8.13.

In addition, PoM's operating expenditure allowance includes an amount equal to the Port Licence Fee, which escalates by the change in Melbourne CPI.<sup>286</sup>

Clause 8.2.2 of the Pricing Order requires PoM to use forecasts or estimates that are arrived at on a reasonable basis and that represent the best forecast or estimate possible in the circumstances.

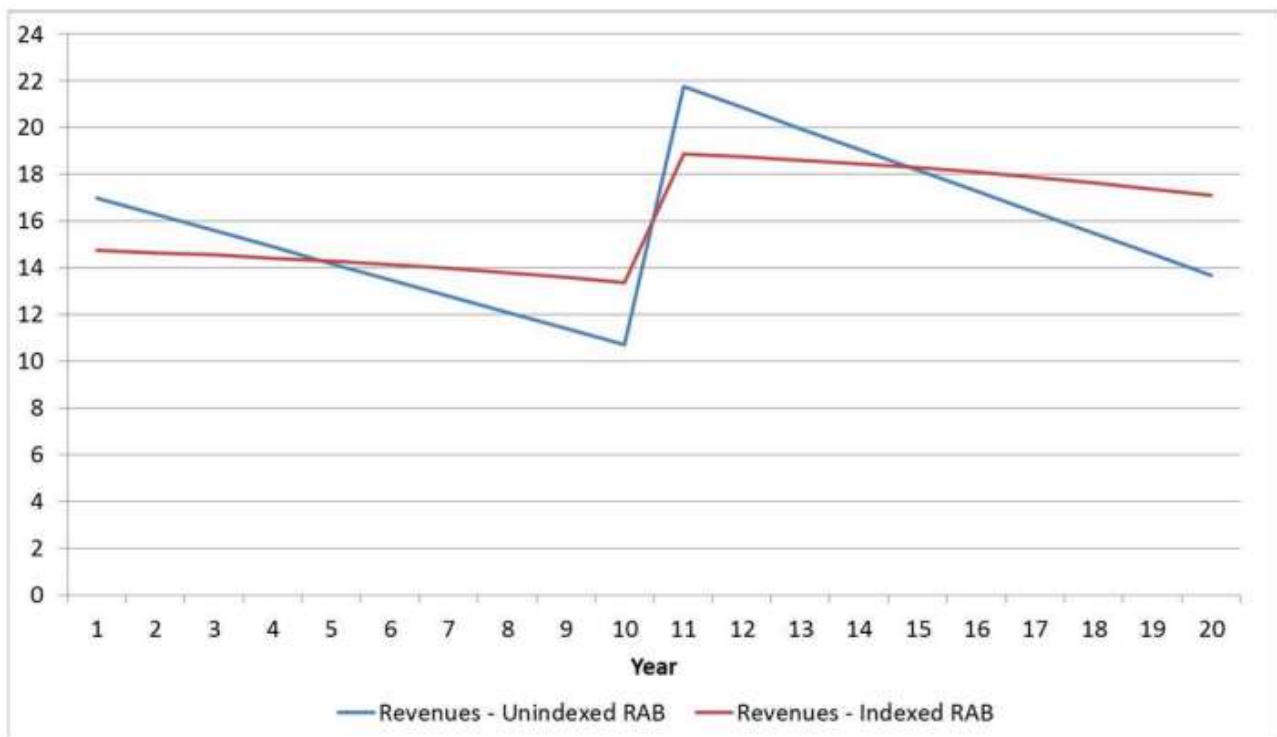
Assuming that inflation forecasts match actual inflation, the indexed capital base and unindexed capital base approaches will generate revenue streams with identical net present values.

However, the indexed capital base approach generates a smoother revenue path compared to the unindexed capital base approach, which generates revenue shocks when assets are replaced and which results in more volatile changes to the capital base.<sup>287</sup>

Figure 8.1 reproduces a simple example derived by the AER. The figure shows that:

- the indexed capital base approach generates a flatter revenue profile compared to the unindexed capital base approach, which sets revenues that are higher in the earlier part of an asset's life and lower later in the asset's life; and
- the indexed capital base approach generates a revenue profile that is less volatile to asset replacement.

Figure 8.1: Example revenue paths with replacement under different approaches for inflation



The example uses: an asset value of \$100 with an expected life of 10 years and constant real replacement cost; 7 per cent nominal rate of return; 2.5 per cent expected inflation; and zero operating expenditures and taxes. Source: AER, *Why do we index the regulatory asset base?*, figure 3.

<sup>286</sup> Pricing Order, cl 4.1.1(c), 4.5.1. *Port Management Act 1995* (VIC) ss 441-44J.

<sup>287</sup> See: AER, *Why do we index the regulatory asset base?*, p 1. New Zealand Commerce Commission, *Part 4 Input Methodologies Review 2023*, Process and Issues paper, 20 May 2022, para 8.13.



## 8.2 Methods for forecasting inflation

Australian regulators currently apply three main approaches for generating inflation forecasts, namely:

- the '**RBA geometric mean**' approach, which pairs short-term inflation forecasts published by the RBA with a longer-term forecast based on the RBA's inflation target band, and then taking the geometric average of these forecasts;
  - > several regulators also implement a linear glide path between the short-term central bank inflation forecasts and the longer-term forecast, which we refer to as the '**RBA glide path**' approach;
- the market-implied '**breakeven inflation**' approach, which applies the Fisher equation to the difference in the yields of nominal government bonds and inflation-indexed government bonds, and is mathematically equivalent to a geometric average of the forward breakeven inflation forecasts; and
- the market-implied '**inflation swaps**' approach, which uses the yields observed from inflation swaps.

Australian regulators have also considered inflation forecasts derived from surveys, but no Australian regulator adopts these forecasts currently.

In our opinion, the best forecast of future inflation in the circumstances is to use the RBA glide path for a five-year term.

### 8.2.1 The RBA glide path is the best forecast of inflation in the circumstances

The Pricing Order does not require PoM to use 'well accepted' approaches for forecasting inflation. Instead, the Pricing Order requires PoM to use forecasts that are arrived at on a reasonable basis and which are the best possible in the circumstances.<sup>288</sup>

This suggests that inflation forecasts that do not predict ex post inflation outcomes arising from events that investors did not expect can still reflect the best forecast possible 'in the circumstances' at the time of the forecast. This is consistent with Australian regulatory precedent.

After considering both the relative merits of different forecasting approaches and the regulatory precedent, we consider that the RBA glide path approach is both reasonable and generates the best possible inflation forecasts in the circumstances.

Meaning of the 'best' inflation forecast

When deriving their inflation forecasts, several Australian regulators draw a distinction between estimating 'expected inflation' versus forecasting 'actual inflation'. In particular, several Australian regulators refer to deriving a 'best estimate' of expected inflation instead of attempting to forecast actual inflation.<sup>289</sup>

This distinction suggests that these regulators define the 'best estimate' of forecast inflation as one that matches investors' expectations at the time when the estimate is made, as opposed to one that predicts ex post inflation outcomes accurately.

As the QCA explains:<sup>290</sup>

Expected inflation is a forward-looking concept and is not about actual inflation outcomes. If the actual inflation outcome diverges from an expected inflation estimate, this does not mean that the estimate was incorrect. Divergences will occur due to unexpected inflation outcomes, for which we are seeking to provide compensation under our regulatory framework.

<sup>288</sup> Pricing Order, cl 8.2.2.

<sup>289</sup> AER, *Regulatory treatment of inflation*, Final position, December 2020, pp 17-18. ERA, *Explanatory statement for the 2022 final gas rate of return instrument*, 16 December 2022, para 1,264. QCA, *Inflation forecasting*, Final position paper, October 2021, p 17.

<sup>290</sup> QCA, *Inflation forecasting*, Final position paper, October 2021, p 17.

Similarly, the AER clarifies that the 'best estimate' of inflation should not incorporate differences between expected inflation and actual inflation:<sup>291</sup>

We remain of the view that the term 'best estimate' is intended to require the inflation estimate to be an accurate and unbiased estimate of expected inflation.

Unbiased in this context means the estimate is not systematically too high nor too low. In other words, any error between the estimate and true expected inflation is equally likely to be positive or negative. For this reason, it should reflect expected inflation only and should not reflect any risk premiums or other factors that would cause the estimate to not equal expected inflation...

**Sometimes the actual nominal return will be above the nominal return set in the determination and sometimes it will be below it due to variations between expected inflation and actual inflation.** However, this does not result in incorrect compensation as:

- real returns on assets and real prices are not affected, and
- nominal outcomes are reflected in the market data we observe when setting the rate of return, especially in the equity beta and market risk premium. (emphasis added)

Under this framework, the 'best estimate' of forecast inflation will not predict inflation outcomes that investors did not expect, although historical ex post inflation outcomes remain relevant since investors are likely to consider past inflation outcomes as a relevant factor when forming expectations about future inflation.<sup>292</sup>

Furthermore, we note that the regulatory precedent is consistent with clause 8.2.2(b) of the Pricing Order, which refers to the best forecast or estimate possible 'in the circumstances'. Inflation forecasts that do not predict ex post inflation outcomes arising from events that investors did not expect can still reflect the best forecast possible 'in the circumstances' at the time of the forecast.

Figure 8.2 compares the five-year inflation forecasts generated by each of the above three approaches, as well as the annualised series of actual five-year CPI inflation, measured over the next five years at each point in time.

The actual five-year CPI inflation series ends in September 2017, at which point the series annualises actual CPI inflation over the five-year period from September 2017 to September 2022. The series shows a declining trend from 2007 to early-2015, after which the series reverses to a rising trend.

We observe that all three five-year inflation forecasts:

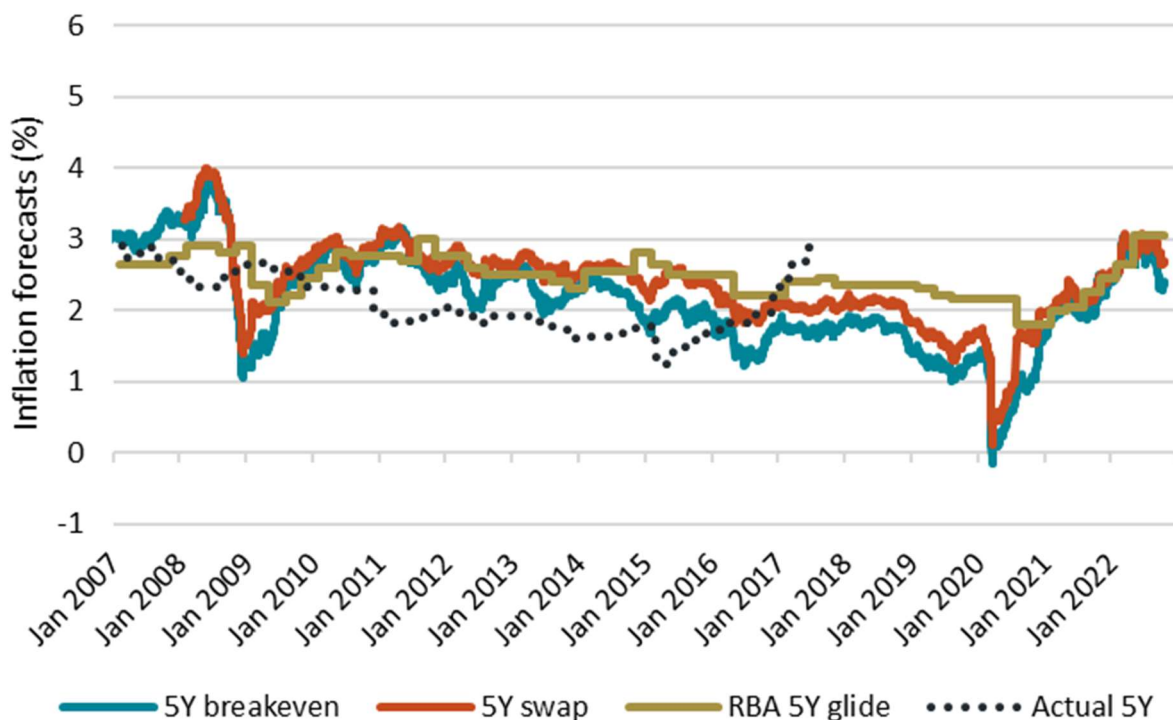
- overestimate actual inflation between 2010 and 2016; and
- underestimate actual inflation in mid-2017.

In addition, the forecasts from all three approaches have converged materially in response to the recent increase in inflation.

<sup>291</sup> AER, *Regulatory treatment of inflation*, Final position, December 2020, p 18.

<sup>292</sup> QCA, *Inflation forecasting*, Final position paper, October 2021, p 27.

Figure 8.2: Five-year Inflation forecasts



Source: Bloomberg, RBA, HoustonKemp analysis.

These observations show that all three forecasting approaches did not predict in advance the sustained period of low inflation post-GFC, or the rising inflation that has occurred over the last two years. However, as discussed above, this does not necessarily invalidate the three forecasting approaches above, since the approaches may still reflect the best forecast or estimate possible in the circumstances.

Australian regulators refer to several criteria when selecting the methodology for deriving inflation forecasts. For example:

- the AER prefers an estimate that is: relatively congruent with the market expected inflation rate; robust; transparent and replicable; and simple;<sup>293</sup>
- the QCA considers whether the estimate is: accurate and robust; credible and authoritative; and simple, transparent and predictable;<sup>294</sup>
- IPART assesses whether the method: matches economic theory; is derived using reliable data; generates accurate historic forecasts; and is simple, transparent and replicable.<sup>295</sup>

The ERA and ESCOSA do not set out explicit criteria when selecting their preferred methodology for deriving inflation forecasts, but examine the advantages and disadvantages of each approach individually instead.<sup>296</sup>

<sup>293</sup> AER, *Regulatory treatment of inflation*, Final position, December 2020, p 16.

<sup>294</sup> QCA, *Inflation forecasting*, Final position paper, October 2021, p 27.

<sup>295</sup> IPART, *Review of our WACC method*, Final Report, February 2018, p 79.

<sup>296</sup> ERA, *Explanatory statement for the 2022 draft gas rate of return instrument*, 17 June 2022, paras 1,250-1,257. ERA, *Explanatory statement for the 2022 gas rate of return instrument*, 16 December 2023, paras 1,266-1,271. ESCOSA, *SA Water regulatory determination 2020*, Final determination: statement of reasons, June 2020, pp 278-291.

Similarly, the ESC refers to advice from Frontier Economics that assesses the strengths and weaknesses of each approach.<sup>297</sup>

ICRC and OTTER discuss their preferred inflation forecasting approaches without evaluating other approaches.<sup>298</sup>

In the remainder of this section, we set out each regulator's approach for deriving inflation forecasts before assessing the merits of each approach. We do not set out explicit criteria for selecting the appropriate inflation forecasting methodology, and instead examine the advantages and disadvantages of each approach individually.

Regulatory precedent supports adopting the RBA glide path approach for forecasting inflation

As table 8.1 sets out, regulators in Australia and New Zealand apply variations of the RBA glide path and the breakeven approach when generating inflation forecasts, ie:

- seven regulators adopt the RBA geometric mean:
  - > the AER, ICRC and NZCC use RBA (RBNZ in the case of the NZCC) short-term forecasts followed by a linear glide path towards the midpoint inflation target at the end of the regulatory period;
  - > IPART uses the RBA forecast for the first year followed by 2.5 per cent for the remainder of the regulatory period;
  - > ESCOSA uses the RBA short-term forecasts followed by a glide path until year seven and 2.5 per cent for years eight to ten;
  - > QCA and OTTER use other variations based on RBA forecasts;
- one regulator, the ERA, applies breakeven inflation using a five-year term for energy networks and 10-year term for rail network businesses; and
- one regulator, the ESC, takes the average of 10-year breakeven inflation and 10-year RBA forecasts without a glide path.

Table 8.1 also shows that the QCA applies forecasts from inflation swaps for Seqwater because the Minister's referral notice stipulates this methodology for forecasting inflation. However, this contradicts the QCA's preferred inflation forecasting approach, which applies a rules-based variation of the RBA glide path.<sup>299</sup>

Thus, there is little precedent for the inflation swaps approach, although we note that this approach has a desirable property in that it reflects the benchmark costs that regulated businesses will incur when hedging their rate of return on capital against inflation.

We understand that all Australian regulators roll forward the capital base using actual year-on-year CPI inflation. This mechanism may not be set out in public reports, but our experience working with the regulatory models used by all regulators suggests this to be the case.<sup>300</sup>

<sup>297</sup> ESC, *Melbourne Water Final Decision | 2021 water price review*, 16 June 2021, pp 48-49. Frontier Economics, *Forecast inflation*, 31 May 2021, p 9.

<sup>298</sup> ICRC, *Review of methodologies for the weighted average cost of capital*, Final report, April 2021, pp 35-43. OTTER, *Investigation into TasWater's prices and services for the period 1 July 2022 to 30 June 2026*, Final report, May 2022, p 61.

<sup>299</sup> QCA, *Inflation forecasting*, Final position paper, October 2021, pp ii-iii, 41, 48.

<sup>300</sup> This mechanism can be verified publicly for models adopted by the AER, ERA, ICRC and OTTER. There is no corresponding publicly available material for QCA, IPART, ESCOSA, ESC and NZCC. See: *AER - Final decision - Jemena distribution determination - 2021-26 - Roll forward model - April 2021*, Spreadsheet, April 2021, sheet 'RAB roll forward' rows 663-693. Western Power, *Target revenue model*, Spreadsheet, 9 September 2022, sheet 'D\_Input' rows 21-24. ICRC, *Regulated water and sewerage services 2023-28*, Final report, May 2023, pp 66-72. OTTER, *Investigation into TasWater's prices and services for the period 1 July 2022 to 30 June 2026*, Final report, May 2022, table 2.3.

Table 8.1: Regulatory precedent on inflation compensation and inflation forecasting

Regulator	Forecasting approach
AER	Single geometric average of RBA glide path for length of regulatory period
NSW IPART	Single geometric average of RBA 1-year forecast and 2.5% for remaining length of regulatory period <sup>a</sup>
WA ERA	Single inflation-to-maturity estimate derived from breakeven approach with a term equal to length of regulatory period for energy networks; 10-year breakeven for rail
QCA	Single geometric average of rules-based RBA glide path for length of regulatory period** Seqwater's forecasts are set based on individual-year forward inflation rates derived from inflation swaps, as stipulated by the Minister's referral notice for Seqwater
ESCOSA	Single geometric average of 10-year estimate with RBA glide path converging at 2.5% in year 7 ESCOSA uses the RBA's trimmed mean inflation forecasts for the first two years
Vic ESC	Single estimate derived from midpoint of 10-year breakeven inflation and 10-year RBA short and long term forecasts without glide path
ACT ICRC	Single geometric average of RBA glide path for length of regulatory period
TAS OTTER	Single geometric average of RBA forecasts <sup>#</sup>
NZCC	Single geometric average of RBNZ glide path for length of regulatory period <sup>a</sup>

<sup>a</sup>IPART and NZCC will publish revised WACC methods in 2023, which may include changes to their inflation estimation approaches. <sup>\*</sup>The NZCC uses an unindexed RAB approach for Transpower, since it has a large investment program that the NZCC considers is better matched by allowing it to recover higher upfront revenues. <sup>#</sup>It is unclear how OTTER derives its forecasts from RBA data. <sup>\*\*</sup>The QCA's rules-based glide path differs depending on the RBA's forecast in the second year: if the forecast in the second year is less than or equal to 2 per cent, then the glide path converges to 2.25 per cent in the fifth year; if the forecast in the second year is greater than or equal to 3 per cent, then the glide path converges to 2.75 per cent in the fifth year; otherwise the glide path converges to 2.5 per cent in the fifth year.

Source: AER, *Regulatory treatment of inflation*, Final position, December 2020, pp 6, 75-81. AER, *AER - Final decision - Jemena distribution determination - 2021-26 - Roll forward model - April 2021*, Spreadsheet, April 2021, sheet 'RAB roll forward' rows 663-693. ERA, *Explanatory statement for the 2022 final gas rate of return instrument*, 16 December 2022, paras 1,263-1,265, 1,275. ERA, *2018 and 2019 weighted average cost of capital | For the Freight and Urban Networks, and the Pilbara Railways*, Final determination, 22 August 2019, paras 376-380. IPART, *Review of our WACC method*, Final Report, February 2018, pp 76, 80. QCA, *Inflation forecasting*, Final position paper, October 2021, pp ii-iii, 41, 48. QCA, *Seqwater Bulk Water Price Review 2022-26*, Final report, March 2022, pp 56-58. ESCOSA, *SA Water regulatory determination 2020*, Final determination: statement of reasons, June 2020, pp 209-213. ESC, *South Gippsland Water final decision | 2020 Water Price Review*, 10 June 2020, p 9. ESC, *Goulburn-Murray Water final decision | 2020 Water Price Review*, 3 June 202, p 20. ESC, *Melbourne Water Final Decision | 2021 water price review*, 16 June 2021, pp 48-49. ICRC, *Review of methodologies for the weighted average cost of capital*, Final report, April 2021, pp 35-36. ICRC, *Regulated water and sewerage services 2023-28*, Final report, May 2023, p 86-87. OTTER, *Investigation into TasWater's prices and services for the period 1 July 2022 to 30 June 2026*, Final report, May 2022, pp IV, 15-16, 60-61, table 2.3. NZCC, *Gas DPP3 final - Consumer Price Index model - 31 May 2022*, Spreadsheet, 31 May 2022. NZCC, *Default price-quality paths for gas pipeline businesses from 1 October 2022*, Final reasons paper, 31 May 2022, pp C14-C15.

#### Advantages and disadvantages of each inflation forecasting approach

The RBA glide path approach reflects three assumptions regarding inflation expectations over the short term, medium-term and long-term, which we consider to be a reasonable basis for forecasting inflation. These three assumptions and the relevant observations include:<sup>301</sup>

- **assumption 1:** the RBA's short term forecasts provide the best basis for estimating expected inflation in the short term;
  - > the RBA is a highly respected and credible authoritative source that has technical expertise for forecasting inflation, and has fundamental influence on inflation expectations;<sup>302</sup>

<sup>301</sup> AER, *Regulatory treatment of inflation*, Final position, December 2020, pp 49, 54-57.

<sup>302</sup> AER, *Regulatory treatment of inflation*, Final position, December 2020, p 29. QCA, *Inflation forecasting*, Final position paper, October 2021, pp 27, 33.

- > the ACCC finds that empirical studies demonstrate the RBA forecasts of CPI inflation are relatively accurate and have considerable explanatory power;<sup>303</sup>
- > the QCA finds that empirical studies suggest the RBA's short-term forecasts are superior to forecasts from surveys, inflation swaps and the breakeven approach;<sup>304</sup>
- **assumption 2:** the mid-point of the RBA's inflation target band, ie, 2.5 per cent, provides an appropriate anchor for estimates of expected inflation in the long term:
  - > the arithmetic average of inflation rates for the 1994 to 2021 calendar years is 2.48 per cent, which is close to the 2.5 per cent mid-point of the RBA's inflation target band;<sup>305</sup>
  - > the ACCC finds that empirical studies show long term inflation expectations may be informed by and anchored within the RBA's inflation target band;<sup>306</sup> and
  - > the QCA's research shows that an RBA-based approach that assumes inflation is 2.5 per cent three to five years ahead has better long-term forecasting performance than forecasts from inflation swaps and breakeven inflation;<sup>307</sup>
- **assumption 3:** it may take a number of years for inflation to return to the mid-point of the RBA's inflation target band after a substantial shock, with a linear glide path being adopted such that inflation is expected to reach the mid-point of the RBA's target band five years into the future:
  - > research by the RBA and AER show that expected inflation will be close to the RBA mid-point by the fifth year ahead;<sup>308</sup>
  - > the QCA finds that empirical studies show that the impact of inflation shocks tend to dissipate over time;<sup>309</sup> and
  - > the glide path provides an implicit self-adjusting mechanism in which glide-path adjustments are immaterial when the RBA's forecasts are close to 2.5 per cent.<sup>310</sup>

The RBA glide path approach also involves several shortcomings compared to market-based approaches such as breakeven inflation and inflation swaps. In particular:

- economic theory suggests that market-based approaches should generate superior estimates;<sup>311</sup>
- the RBA only updates its forecasts quarterly while the mid-point of the RBA's inflation target band remains static, which may not reflect changing inflation expectations;<sup>312</sup>
- investor expectations of inflation may not reach the mid-point quickly, since there have been extended periods where inflation has been below the midpoint of the inflation range;<sup>313</sup>

<sup>303</sup> ACCC, *Best estimates of expected inflation: a comparative assessment of four methods*, ACCC/AER Working Paper Series, Working Paper No. 11, February 2017, para 39(a).

<sup>304</sup> QCA, *Inflation forecasting*, Final position paper, October 2021, pp 27-28.

<sup>305</sup> HoustonKemp analysis. See: ABS, *6401.0 Consumer Price Index, Australia | TABLES 1 and 2. CPI: All Groups, Index Numbers and Percentage Changes*, Spreadsheet, 26 October 2022, series 'A2325846C'.

<sup>306</sup> ACCC, *Best estimates of expected inflation: a comparative assessment of four methods*, ACCC/AER Working Paper Series, Working Paper No. 11, February 2017, para 39(b).

<sup>307</sup> The QCA compares the bias and root mean squared error (RMSE) of the three approaches. See: QCA, *Inflation forecasting*, Final position paper, October 2021, pp 27-33.

<sup>308</sup> AER, *Regulatory treatment of inflation*, Final position, December 2020, p 50. RBA, *Affine Endeavour: Estimating a Joint Model of the Nominal and Real Term Structures of Interest Rates in Australia*, Research Discussion Paper RDP 2018-02, February 2018. QCA, *Inflation forecasting*, Final position paper, October 2021, pp 35, 51-52.

<sup>309</sup> QCA, *Inflation forecasting*, Final position paper, October 2021, p 52.

<sup>310</sup> AER, *Regulatory treatment of inflation*, Final position, December 2020, p 54.

<sup>311</sup> IPART, *Review of our WACC method*, Draft report, October 2017, pp 75-76.

<sup>312</sup> ERA, *Explanatory statement for the 2022 draft gas rate of return instrument*, 17 June 2022, para 1,255. ACCC, *Best estimates of expected inflation: a comparative assessment of four methods*, ACCC/AER Working Paper Series, Working Paper No. 11, February 2017, para 40(b).

<sup>313</sup> ERA, *Explanatory statement for the 2022 draft gas rate of return instrument*, 17 June 2022, para 1,255.

- the RBA's forecasts may not align with market forecasts that are implicit in other WACC parameters, which may increase the risk that the real WACC is distorted too high or too low;<sup>314</sup> and
- there is a risk that inflation expectations may deviate systematically from the RBA's inflation target band if monetary policy loses or is perceived to have lost its effectiveness in influencing economic activity.<sup>315</sup>

Conversely, there are concerns that forecasts generated from breakeven inflation and inflation swaps may be biased, ie:

- inflation-indexed bonds and swaps may be illiquid, which may result in a lack of frequent trading and observed yields that do not reflect efficient pricing:<sup>316</sup>
  - > IPART considers that there is sufficient bond market liquidity to estimate breakeven inflation for a forecast three to five years ahead if judgement is applied;<sup>317</sup>
  - > such illiquidity also may result in a liquidity risk premium that affects the breakeven inflation approach at different points in the economic cycle;<sup>318</sup>
    - an inflation risk premium also may arise since taxes are levied on nominal yields instead of real yields;<sup>319</sup>
- investors may demand an inflation premium to compensate for the uncertainty associated with future inflation rates, which may vary over time and lead to biased forecasts:<sup>320</sup>
  - > the ERA considers that such biases may be small;<sup>321</sup>
  - > changes to investor risk aversion may affect the relative demand and yields on nominal and indexed CGS, which may be unrelated to inflation expectations;<sup>322</sup>
  - > an inflation premium also may arise due to hedging costs, where counterparties may hedge their exposure through positions in other markets;<sup>323</sup>
- breakeven inflation estimates may be affected by measurement errors since there are fewer issuances of inflation-indexed CGS, such that linear interpolation may result in estimates that are less accurate;<sup>324</sup>
- inflation-indexed bonds and swaps have indexation lags, meaning that their yields incorporate some historical inflation instead of reflecting forward-looking expectations;<sup>325</sup>

<sup>314</sup> ERA, *Explanatory statement for the 2022 draft gas rate of return instrument*, 17 June 2022, para 1,256.

<sup>315</sup> ACCC, *Best estimates of expected inflation: a comparative assessment of four methods*, ACCC/AER Working Paper Series, Working Paper No. 11, February 2017, para 40(a).

<sup>316</sup> ERA, *Explanatory statement for the 2022 draft gas rate of return instrument*, 17 June 2022, para 1,257. QCA, *Inflation forecasting*, Final position paper, October 2021, pp 56, 59-60. ACCC, *Best estimates of expected inflation: a comparative assessment of four methods*, ACCC/AER Working Paper Series, Working Paper No. 11, February 2017, para 155.

<sup>317</sup> IPART, *Review of our WACC method*, Draft report, October 2017, p 76.

<sup>318</sup> IPART, *Review of our WACC method*, Draft report, October 2017, p 80. ESCOSA, SA Water regulatory determination 2020, Final determination: statement of reasons, June 2020, pp 284-285.

<sup>319</sup> ACCC, *Best estimates of expected inflation: a comparative assessment of four methods*, ACCC/AER Working Paper Series, Working Paper No. 11, February 2017, table 2.

<sup>320</sup> ERA, *Explanatory statement for the 2022 draft gas rate of return instrument*, 17 June 2022, para 1,257. QCA, *Inflation forecasting*, Final position paper, October 2021, pp 56, 61. ESCOSA, SA Water regulatory determination 2020, Final determination: statement of reasons, June 2020, p 284.

<sup>321</sup> ERA, *Explanatory statement for the 2022 draft gas rate of return instrument*, 17 June 2022, para 1,257.

<sup>322</sup> ACCC, *Best estimates of expected inflation: a comparative assessment of four methods*, ACCC/AER Working Paper Series, Working Paper No. 11, February 2017, para 70(c).

<sup>323</sup> ACCC, *Best estimates of expected inflation: a comparative assessment of four methods*, ACCC/AER Working Paper Series, Working Paper No. 11, February 2017, table 8.

<sup>324</sup> QCA, *Inflation forecasting*, Final position paper, October 2021, pp 58-59. ACCC, *Best estimates of expected inflation: a comparative assessment of four methods*, ACCC/AER Working Paper Series, Working Paper No. 11, February 2017, paras 56-57.

<sup>325</sup> QCA, *Inflation forecasting*, Final position paper, October 2021, pp 59, 61.

- volatile yields may result in a convexity bias that differs for nominal and indexed CGS, and which may change over time;<sup>326</sup>
- inflation swaps may be affected by a counterparty default risk premium;<sup>327</sup> and
- the RBA reported in May 2020 that short-term and long-term market-based measures of inflation expectations were difficult to interpret because the functioning of financial markets that price long term inflation 'has been significantly impaired recently'.<sup>328</sup>

The advantages and disadvantages of each inflation forecasting approach set out above shows that none of the three approaches that regulators in Australia use for obtaining inflation forecasts is perfect.

Nevertheless, having considered both the relative merits of each approach and the regulatory precedent, we consider that the RBA glide path approach generates forecasts that are arrived at on a reasonable basis and which are the best possible in the circumstances. We consider that additional empirical analysis will need to be carried out to address concerns of bias before the breakeven inflation and inflation swaps approaches can be used.

Our preferred approach differs from the ESC's, which uses the midpoint of breakeven inflation and RBA forecasts without a glide path. The ESC adopted its approach based on advice from Frontier Economics, which suggests that combining forecasts from different approaches can improve the accuracy of forecasts.<sup>329</sup> Frontier presents the midpoint of the two approaches as a default setting, but leaves it open for the ESC to vary the weights assigned to each approach in accordance with the perceived reliability of each approach.<sup>330</sup>

Thus, our preferred approach differs from the ESC's in two ways, namely:

- we do not assign weight to the breakeven approach; and
- we apply a glide path to the RBA forecasts.

As discussed above, we do not assign weight to the breakeven approach due to bias concerns. We consider that more analysis should be conducted to address these concerns before adopting this approach. In the absence of such additional analysis, it is unclear that the accuracy of the inflation forecast will be improved due to the potential of introducing bias into the forecast.

In addition, we consider it appropriate to apply a glide path to the RBA forecasts for the reasons set out under assumption 3 above. For example, empirical studies show that the impact of inflation shocks tend to dissipate over time, such that expected inflation will be close to the RBA mid-point by the fifth year ahead, and that the glide path provides an implicit self-adjusting mechanism.<sup>331</sup>

Furthermore, Frontier Economics observes that nearly all Australian regulators have shifted away from adopting RBA forecasts without a glide path, due to the recognised shortcomings of the approach.<sup>332</sup>

For these reasons, we consider that the RBA glide path approach is a reasonable basis for generating inflation forecasts that also represent the best forecast or estimate possible in the circumstances.

<sup>326</sup> ACCC, *Best estimates of expected inflation: a comparative assessment of four methods*, ACCC/AER Working Paper Series, Working Paper No. 11, February 2017, table 2.

<sup>327</sup> ACCC, *Best estimates of expected inflation: a comparative assessment of four methods*, ACCC/AER Working Paper Series, Working Paper No. 11, February 2017, table 8.

<sup>328</sup> RBA, *Statement on Monetary Policy*, May 2020, p 82. ESCOSA, SA Water regulatory determination 2020, Final determination: statement of reasons, June 2020, p 289.

<sup>329</sup> Frontier Economics, *Forecast inflation*, 31 May 2021, p 8.

<sup>330</sup> Frontier Economics, *Forecast inflation*, 31 May 2021, p 7.

<sup>331</sup> QCA, *Inflation forecasting*, Final position paper, October 2021, pp 35, 51-52. AER, *Regulatory treatment of inflation*, Final position, December 2020, pp 50, 54. RBA, *Affine Endeavour: Estimating a Joint Model of the Nominal and Real Term Structures of Interest Rates in Australia*, Research Discussion Paper RDP 2018-02, February 2018.

<sup>332</sup> Frontier Economics, *Forecast inflation*, 31 May 2021, p 8.



## 8.2.2 The term for the inflation forecast should match the length of the regulatory period

As table 8.1 shows, when generating inflation forecasts, Australian regulators adopt a term that either:

- matches the length of the regulatory period:
  - > AER, IPART, ICRC, QCA, ERA and NZCC use this approach; or
- matches the term of the rate of return, ie, 10 years;
  - > ESCOSA, ESC and ERA (for rail network business) use a 10-year term.

We consider that the term of the inflation forecast should match the length of the regulatory period. This is because the ABBM is designed to provide PoM with an ex post real return on capital by capitalising the inflation allowance into the capital base. This involves a two-step process, namely:

- deducting an indexation allowance when determining the aggregate revenue requirement (**clause 4.1.1(d), 4.6.1**); and
- rolling forward its capital base using the percentage change or forecast percentage change in the CPI for the financial year (**clauses 4.2.1(b), 4.6.1(a)**).

As such, the term of the inflation forecast that is used for deriving the indexation allowance also should match the term of the regulatory period since PoM is required to roll forward its capital base by actual inflation over the length of the regulatory period. This ensures that the two steps used to capitalise PoM's inflation allowance into its capital base will have the same net present value in expectation, in that the inflation forecast matches actual inflation over the regulatory period, in expectation.

For example, if PoM adopts a five-year regulatory period, then it will roll forward its capital base at the end of each regulatory period using actual inflation from the previous five years. Thus, the indexation allowance that is deducted from PoM's aggregate revenue requirement also should be based on an inflation forecast for the five years in the regulatory period.

In this way, the net present value of the indexation allowance that is deducted from the aggregate revenue requirement over the regulatory period is expected to be the same as the net present value of the capital base roll forward at the end of the regulatory period.

In contrast, if the indexation allowance is calculated based on a ten-year inflation forecast, then the indexation allowance that is deducted from the aggregate revenue requirement will not have the same expected net present value as the roll forward of the capital base. Such a discrepancy arises because the ten-year inflation forecast will not be equal to expected inflation over the five-year regulatory period.

This line of reasoning matches the reasoning adopted by several Australian regulators. For example, the ERA explains:<sup>333</sup>

For inflation, the ERA considers that the term of expected inflation should be five years, consistent with the length of the access arrangement. This allows the post-tax revenue model to take the best estimate of the five-year inflation forecast out (of the nominal WACC) and add back the actual inflation over the five-year access period (through the indexation of the RAB). Aligning the inflation term to the regulatory cycle best approximates the NPV=0 principle.

The AER and QCA refer to a similar line of reasoning when adopting an inflation forecast term that matches the length of the regulatory period.<sup>334</sup>

<sup>333</sup> ERA, *Explanatory statement for the 2022 gas rate of return instrument*, 16 December 2023, para 659.

<sup>334</sup> See: AER, *Regulatory treatment of inflation*, Final position, December 2020, p 38. QCA, *Inflation forecasting*, Final position paper, October 2021, pp 48-49.

We note that ESCOSA rejected Frontier Economics' suggestion to estimate inflation expectations over the length of the regulatory period. ESCOSA's reasoning is that it sets its risk free rate based on the nominal yield of the 10-year CGS that includes unobserved inflation expectations for a 10-year horizon. ESCOSA considers that switching the term of the inflation forecast also implies a change to the term of the risk free rate.<sup>335</sup>

However, we note that several other Australian regulators do not constrain the term of the risk free rate to be equal to the term of the inflation forecast, including IPART, QCA and ICRC. Similarly, the AER also states that, as a general principle, the terms of equity, debt and inflation do not have to be the same.<sup>336</sup> This suggests that ESCOSA's concern may be unfounded since the term of the risk free rate does not have to be adjusted in response to a change in the term of the inflation forecast.

For the above reasons, we consider that PoM should adopt an inflation forecast term that matches the length of its multi-year regulatory period.

Our view differs from that of the ESC, which adopts a 10-year term when forecasting inflation as part of its decisions for Victorian water businesses.<sup>339</sup> We note that Frontier Economics' report for the ESC does not include advice regarding the appropriate term for forecasting inflation. Instead, Frontier Economics states that the ESC instructed it to implement the RBA geometric mean approach to produce inflation forecasts over a 10-year horizon.<sup>340</sup>

As such, in the absence of additional reasoning that supports the ESC's adoption of a 10-year inflation forecast term, we maintain our view that the term of the inflation forecast should match the length of the regulatory period.

Finally, as set out in box 8.1, PoM's ABBM includes a Port Licence Fee that is pegged to CPI inflation in Melbourne instead of the CPI for Australia. The Port Licence Fee is recovered through the annual opex allowance, and does not affect the real rate of return allowance derived in the ABBM. As such, we consider that PoM should use its best forecasts of the Port Licence Fee as inputs to the ABBM, which may involve using a forecast of Melbourne CPI inflation.

This is consistent with the QCA's methodology, which uses national CPI for capital revenue purposes and location-specific cost escalators in circumstances where the underlying cost drivers differ materially from the national CPI inflation measure.<sup>343</sup>

<sup>335</sup> ESCOSA, SA Water regulatory determination 2020, Final determination: statement of reasons, June 2020, p 225.

<sup>336</sup> AER, *Rate of Return Instrument | Explanatory statement*, February 2023, p 41.

<sup>339</sup> ESC, *2023 water price review*, Guidance paper, 26 October 2021 (August 2022 amendment), pp 40-41. ESC, Melbourne Water Final Decision | 2021 water price review, 16 June 2021, pp 48-49.

<sup>340</sup> Frontier Economics, *Forecast inflation*, 31 May 2021, p 4.

<sup>343</sup> QCA, *Inflation forecasting*, Final position paper, October 2021, p 45.

## 9. Declaration

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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

15 May 2023



Johnathan Wongsosaputro

15 May 2023

## A1. Analysis of the impact of a country filter

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In this appendix, we assess the impact of applying the ESC's preferred country filter when identifying the comparator sample for estimating the benchmark asset beta and gearing. Specifically, we:

- assess the potential increase in variance of beta estimates from using a smaller sample (ie, with country filter), whereby we use bootstrapping analysis, ie, random sampling of historical data with replacement, to approximate the distribution of asset betas for the large and small samples; and
- survey the relevant regulatory precedent on comparator selection.

### A1.1 Approximate distribution of asset betas

In this section, we refer to the comparator sample that includes all countries as the 'large sample', while referring to the comparator sample that filters for firms from developed or advanced emerging countries as the 'small sample'.

We use bootstrapping, ie, random sampling with replacement, to approximate the distribution of asset betas for the large and small samples, drawing on data up to 31 January 2023. These bootstrapping results suggest that:

- the large sample generates benchmark asset beta estimates that are more stable, with thinner tails on both ends of the distribution compared to the small sample; and
- the average bootstrap benchmark gearing for the large sample is higher than that of the small sample, and the bootstrap distribution for the large sample is approximately symmetric while the small sample shows a positive skew, ie, there is a small probability of the small sample generating a high benchmark gearing.

Our bootstrap calculations omit 10-year estimates for Santos.

In the remainder of this section we:

- describe our bootstrapping approach; and
- summarise the results.

#### A1.1.1 Bootstrapping approach

Bootstrapping is a statistical approach that involves randomly sampling the dataset with replacement. This results in multiple new datasets that consist of the original data, but with observations that appear multiple times.<sup>348</sup> In turn, the randomly generated sample can be used to approximate the distribution of the population from which the original dataset was drawn.

We apply the bootstrapping approach by:

- generating 10,000 sets of bootstrap samples, where each set includes:
  - > a bootstrap large sample consisting of 21 firms drawn from the large sample, with replacement;<sup>349</sup> and

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<sup>348</sup> Wooldridge, JM, *Introductory Econometrics: A modern approach*, 7th edition, Cengage Learning, Boston, MA, 2020, p 219.

<sup>349</sup> Three of the 24 comparator firms in our preferred sample as at March 2022 have been removed, leaving a sample of 21 comparators. The three removed firms are: Dinh Vu Port Investment & Development JSC (DVP VN Equity) – low market cap and illiquid; Liaoning Port Co Ltd (2880 HK Equity) – illiquid due to high bid-ask spread; and Yingkou Port Liability Co Ltd (600317 CH Equity) – illiquid due to low trading days after being acquired by Liaoning Port Co Ltd on 29 January 2021.

- > a bootstrap small sample consisting of five firms drawn from the small sample, with replacement;
- calculating the average asset beta and gearing for each bootstrap sample using the same approach that was used for the original dataset, ie:
  - > we calculate the average asset beta for each bootstrap sample by first calculating the average five-year weekly, five-year four-weekly, ten-year weekly and ten-year four-weekly asset betas for the bootstrap sample, and then taking the average of the four averages;
  - > we calculate the average gearing for each bootstrap sample by first calculating the average five-year and ten-year gearing for the bootstrap sample, and then taking the average of the two averages; and
  - > the above calculations are not equivalent to calculating the average estimate in a single step, since some firms in the sample do not have ten-year estimates.

The above steps result in 10,000 asset beta and gearing bootstrap estimates, which we use to approximate the distribution of the benchmark asset beta and gearing.

We note that the bootstrapping approach assumes that:

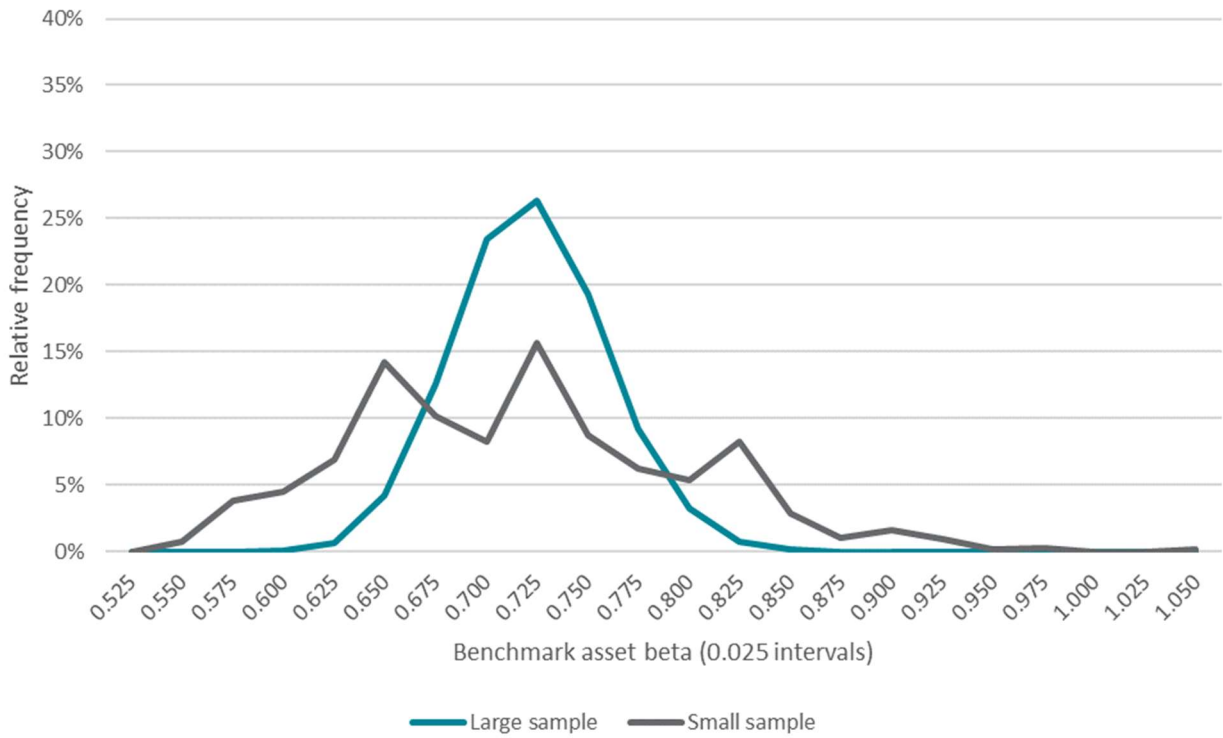
- historical asset beta and gearing estimates are reasonable proxies of future estimates; and
- the comparators that currently are in the large and small samples are representative of the population of comparator ports in future samples.

#### A1.1.2 Results

Figure A.1 shows the bootstrap distribution of benchmark asset beta, where relative frequencies are shown for intervals in 0.025 increments. We observe that:

- consistent with the original dataset, the average bootstrap benchmark asset beta is not materially different across the large and small samples; and
- the large sample generates benchmark asset beta estimates that are more stable, with thinner tails on both ends of the distribution compared to the small sample.

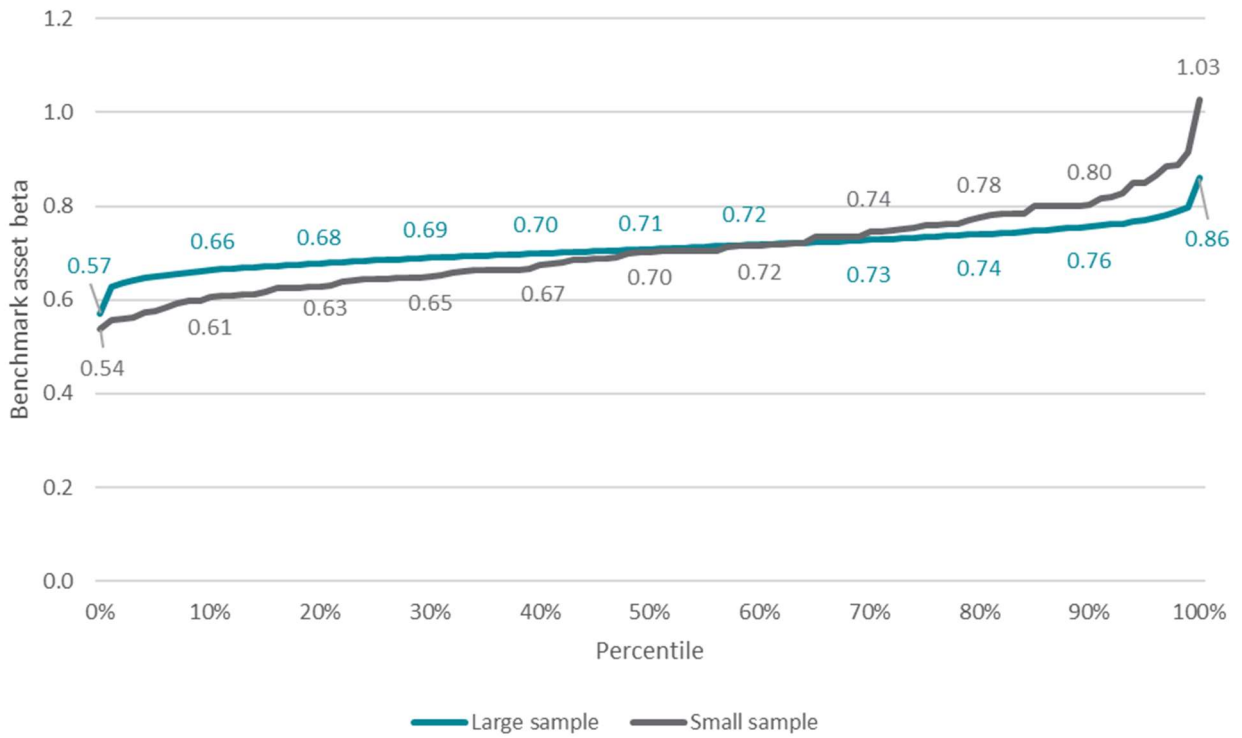
Figure A.1: Bootstrap distribution of benchmark asset beta



Source: Bloomberg, HoustonKemp analysis. The calculations omit 10-year estimates for Santos.

Similar observations can be made from Figure A.2, which presents the bootstrap cumulative distribution of benchmark asset betas, as well as the bootstrap estimates for every 10<sup>th</sup> percentile.

Figure A.2: Bootstrap cumulative distribution of benchmark asset beta

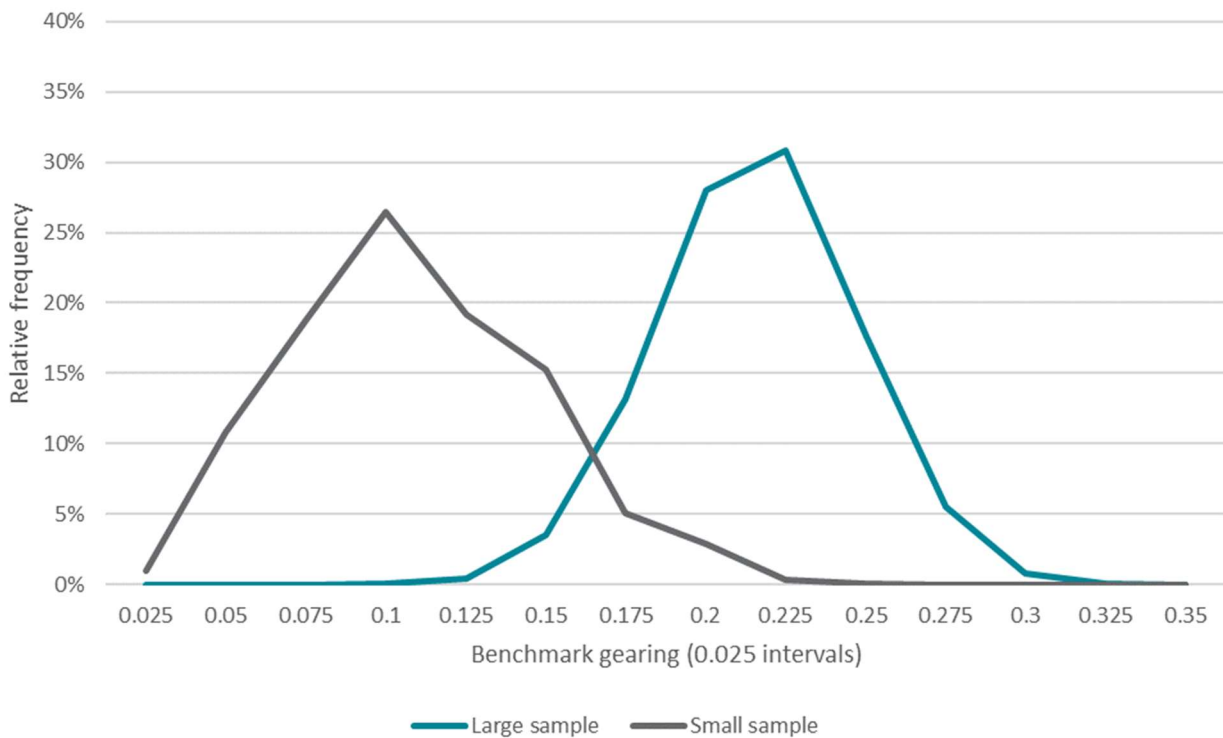


Source: Bloomberg, HoustonKemp analysis.

Figure A.3 shows the bootstrap distribution of benchmark gearing, where relative frequencies are shown for intervals in 0.025 increments. We observe that:

- the average bootstrap benchmark gearing for the large sample is higher than that of the small sample; and
- the bootstrap distribution for the large sample is approximately symmetric, while that of the small sample shows a positive skew, ie, there is a small probability of the small sample generating a large benchmark gearing.

Figure A.3: Bootstrap distribution of benchmark gearing

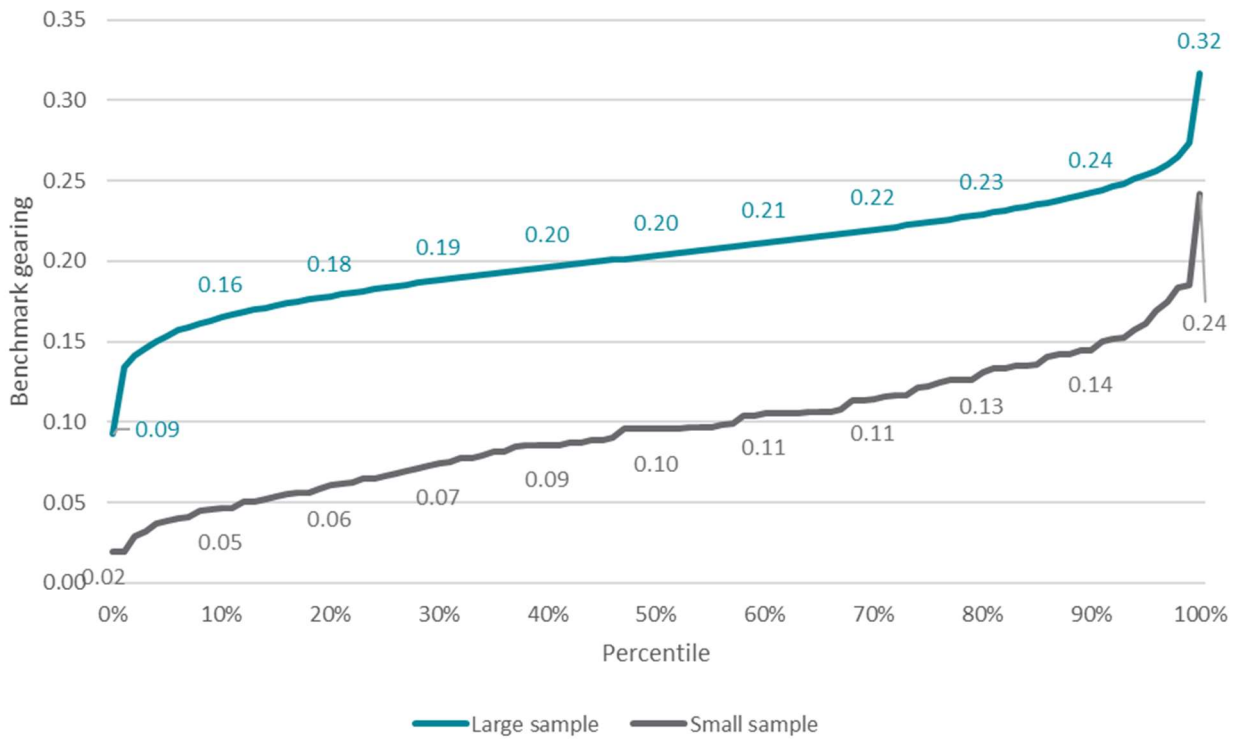


Source: Bloomberg, HoustonKemp analysis.



Similar observations can be made from Figure A 4, which presents the bootstrap cumulative distribution of benchmark gearing, as well as the bootstrap estimates for every 10<sup>th</sup> percentile.

Figure A 4: Bootstrap cumulative distribution of benchmark gearing



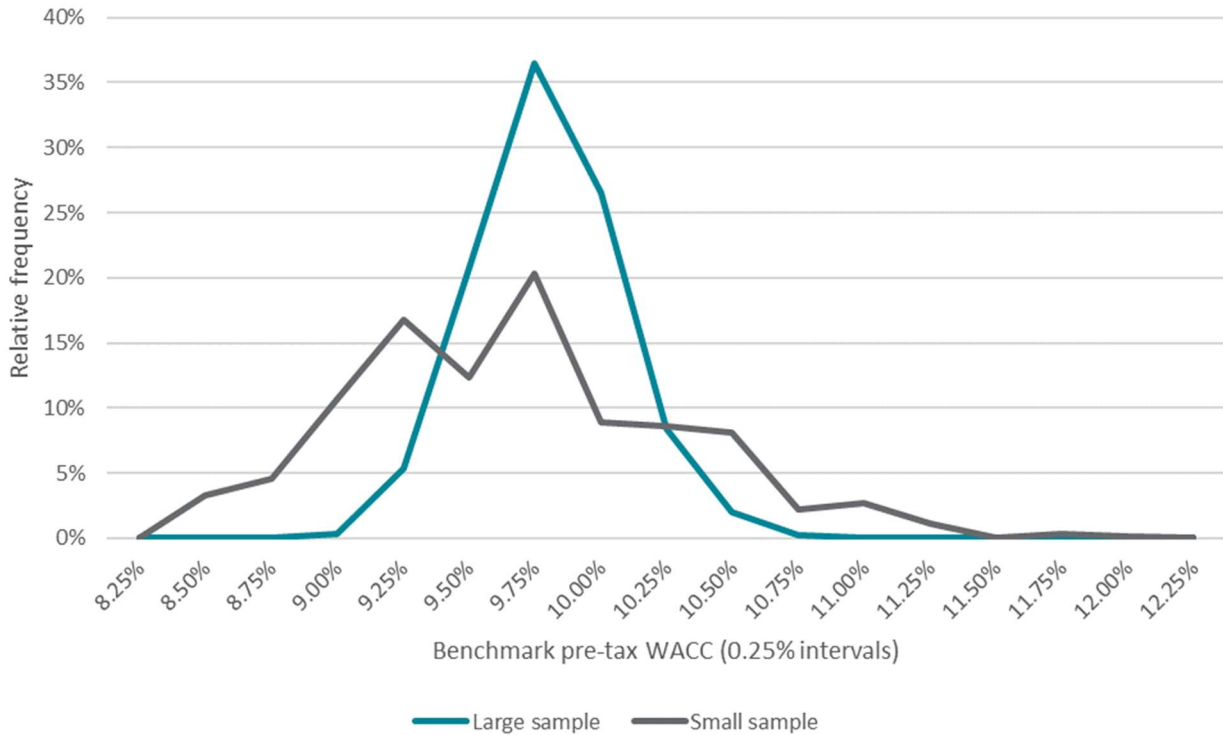
Source: Bloomberg, HoustonKemp analysis.



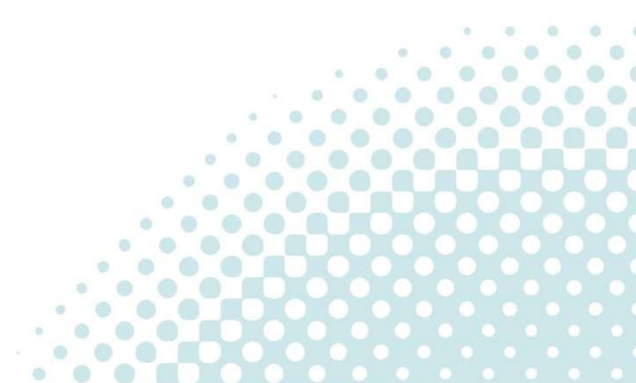
Figure A 5 shows the bootstrap distribution of benchmark pre-tax WACC, where relative frequencies are shown for intervals in 0.25% increments. We observe that:

- consistent with the original dataset, the average bootstrap benchmark pre-tax WACC is not materially different across the large and small samples; and
- the large sample generates benchmark pre-tax WACC estimates that are more stable, with thinner tails on both ends of the distribution compared to the small sample.

Figure A 5: Bootstrap distribution of benchmark pre-tax WACC

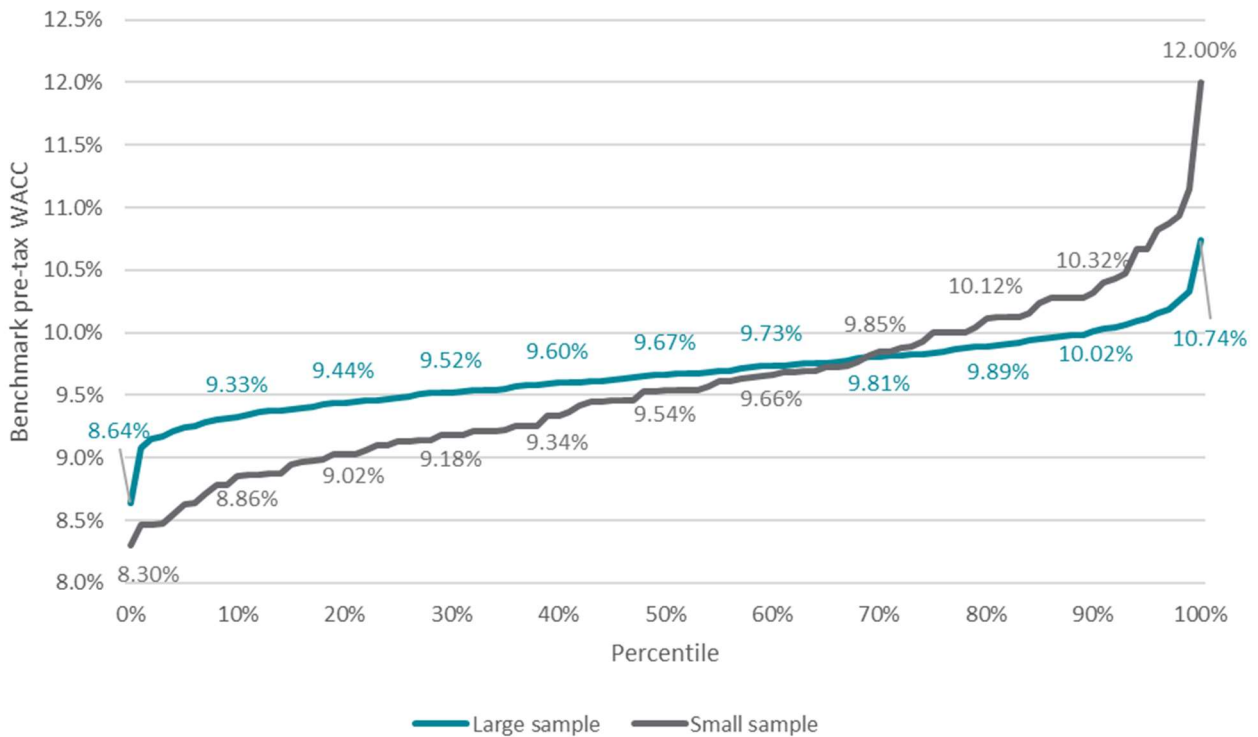


Source: Bloomberg, HoustonKemp analysis.



Similar observations can be made from Figure A 6, which presents the bootstrap cumulative distribution of benchmark pre-tax WACC, as well as the bootstrap estimates for every 10<sup>th</sup> percentile.

Figure A 6: Bootstrap cumulative distribution of benchmark pre-tax WACC



Source: Bloomberg, HoustonKemp analysis.

Table A.1 below shows bootstrap summary statistics of the benchmark asset beta, gearing and pre-tax WACC derived from the 10,000 bootstrap samples.

Table A.1: Bootstrap summary statistics of benchmark asset beta, gearing and pre-tax WACC

	Asset beta – large sample	Asset beta – small sample	Gearing – large sample	Gearing – small sample	Pre-tax WACC – large sample	Pre-tax WACC – small sample	Pre-tax WACC – difference
Average	0.71	0.70	0.20	0.10	9.67%	9.56%	0.11%
Standard deviation	0.04	0.08	0.03	0.04	0.27%	0.61%	NA
Min	0.57	0.54	0.09	0.02	8.64%	8.30%	0.34%
1Q	0.68	0.65	0.18	0.07	9.48%	9.13%	0.35%
Median	0.71	0.70	0.20	0.10	9.67%	9.54%	0.13%
3Q	0.73	0.76	0.22	0.12	9.84%	10.00%	(0.16%)
Max	0.86	1.03	0.32	0.24	10.74%	12.00%	(1.26%)

Source: Bloomberg, HoustonKemp analysis.

## A1.2 Survey of regulatory precedent on comparator selection

In this section, we set out the approaches that regulators in Australia and New Zealand, as well as the Supreme Court of Western Australia (WASC), have adopted when identifying the sample of comparator firms for the purpose of deriving the benchmark asset beta and/or gearing.

### A1.2.1 Summary of regulatory precedent

We observe from Table A.2 that the only precedent that support not applying a country filter are:

- the NZCC's WACC methodology for airports in New Zealand; and
- the WASC's WACC methodology for Perth Airport, which accepts the NZCC's airport comparator sample as a starting point.

All other regulatory precedent in Table A.2 include variations of country filters, where the regulator:

- selects an explicit subset of countries to be considered for the comparator sample; or
- refers to qualitative characteristics, such as IPART's reference to 'deep and liquid equity markets'.

Table A.2: Regulatory precedent on comparator selection

Regulator	Industry	Country filter	Other industries	Sample size
ACCC	Postal services	Unclear	Assign 5% weight to sample of logistics and transport firms	8, 11
ACCC	Rail (interstate)	Australia and North America	Excluded	8
ACCC	Telecommunications (mobile termination)	OECD	≥ 50% revenue from mobile market	25
ACCC	Telecommunications (NBN)	Australia, New Zealand, UK, North America, Eastern and Western Europe, Japan, Singapore, South Korea	Only telecommunications services	77
AER	Electricity networks and gas pipelines	Australian firms only, US firms as cross check	Excluded	9 (including delisted)
IPART	Water	Deep and liquid equity markets (excludes China, Russia and some African stocks)	Electric and multiline utilities as cross checks	~35
ERA	Electricity networks and gas pipelines	Australia, US, Canada, UK and New Zealand	Excluded	4 Australian (including delisted) and 58 international, pooled by countries
ERA	Rail	Australia, US, Canada and New Zealand	Excluded	5-11
QCA	Water	Australia, US, UK and Canada	Water and energy businesses	39
QCA	Rail	US and Canada	Excluded	6
QCA	Toll roads	Australia, Italy and Germany	Excluded	4
NZCC	Electricity networks and gas pipelines	New Zealand, Australia, UK and US	Include vertically integrated utilities	74
NZCC	Airports	No countries excluded	Excluded	26
WASC	Airports	No countries excluded	Excluded	19
ESCOSA	Water	Derived from decisions of other Australian regulators		
ICRC	Water	Derived from decisions of other Australian regulators		
OTTER	Water	Derived from decisions of other Australian regulators		

Source: ACCC, *Decision on Australia Post's 2022 price notification*, December 2022, pp iii-iv. ACCC, *Australian Rail Track Corporation's 2018 interstate access undertaking*, Draft decision, 20 December 2018, pp 133-140. ACCC, *Public inquiry on the access*

determination for the domestic mobile terminating access service, Final report, October 2020, pp 84-85. ACCC, *Variation to the NBN Co Special Access Undertaking*, Draft decision, April 2023, pp 68-69. Frontier Economics, *Return on capital and inflation*, 7 December 2022, paras 209-211. AER, *Rate of Return Instrument | Explanatory statement*, February 2023, pp 178-183. IPART, *Estimating equity beta*, Fact sheet, 1 April 2019, pp 3-7. IPART, *Review of prices for Sydney Water*, Final report, June 2020, p 258. ERA, *Explanatory statement for the 2022 final gas rate of return instrument*, 16 December 2022, paras 1,000-1,110. ERA, *2018 and 2019 Weighted Average Cost of Capital | For the Freight and Urban Networks, and the Pilbara Railways*, Final determination, 22 August 2019, paras 268-295. QCA, *Rate of return review*, Final report, November 2021, pp 105-107. NZCC, *Input methodologies review decisions | Topic paper 4: cost of capital issues*, 20 December 2016, paras 275-285, 460-467. *Perth Airport Pty Ltd v Qantas Airways Ltd [No 3] [2022] WASC 51* paras 262-267. ESCOSA, *SA Water regulatory determination 2020*, Final determination: statement of reasons, June 2020, pp 221-223. ICRC, *Regulated water and sewerage services 2023-28*, Final report, May 2023, pp 82-83. OTTER, *Investigation into TasWater's prices and services for the period 1 July 2022 to 30 June 2026*, Final report, May 2022, pp 94-95.

We note that Table A.2 includes precedent from the ACCC's decision for Australia Post, for which it is unclear whether the ACCC includes a country filter. In that decision, the ACCC calculates the benchmark asset beta by assigning:<sup>350</sup>

- 95 per cent weight to a sample of international postal companies;
  - > the ACCC accepts Australia Post's proposed sample of eight international postal companies operating in Europe, Singapore and Malaysia; and
- 5 per cent weight to a sample of transportation and logistics services companies;
  - > the ACCC accepts Australia Post's proposed sample of eight logistics and transport providers headquartered in Australia, New Zealand, USA and Japan, but further adds three Australian logistics companies to the sample.

We observe that the ACCC's final two comparator samples for Australia Post meet the ESC's country filter criteria, in that all the firms in the comparator samples are from the FTSE developed or advanced emerging countries. However, the ACCC's decision does not discuss explicit criteria for excluding firms outside of the FTSE developed or advanced emerging countries.

We note that Australia Post's consultants, Deloitte, considered including Aramex PJSC as a potential comparator, but filtered it out of its proposed comparator sample without stating its reasons for doing so.<sup>351</sup> As such, it is unclear whether the ACCC would have accepted Aramex PJSC in its final comparator samples for Australia Post.

In addition, the ACCC accepted NBN Co's proposed WACC when assessing NBN Co's proposed variation to its special access undertaking. NBN Co's proposed WACC uses a beta estimate based on Frontier Economics' preferred comparator sample, which includes countries from Australia, New Zealand, UK, North America, Eastern and Western Europe, Japan, Singapore, South Korea.<sup>352</sup>

Frontier Economics' preferred comparator sample includes Siminn HF, an Icelandic telecommunications company. Iceland currently is classified as a FTSE secondary emerging country.<sup>353</sup> However, we note that the ACCC's reasoning for accepting NBN Co's proposed WACC is that the WACC values in the variation will not have substantive impact on pricing.

The ACCC will consider NBN Co's WACC proposals more closely in future regulatory cycles.<sup>354</sup> In particular, the ACCC's consultation paper suggests that it may:<sup>355</sup>

- restrict the sample to firms whose functions match NBN Co more closely; or

<sup>350</sup> ACCC, *Decision on Australia Post's 2022 price notification*, December 2022, pp iii-iv.

<sup>351</sup> Aramex PJSC is headquartered in the UAE, which is a FTSE secondary emerging country.

<sup>352</sup> ACCC, *Variation to the NBN Co Special Access Undertaking*, Draft decision, April 2023, pp 68-69. Frontier Economics, *Return on capital and inflation*, 7 December 2022, paras 209-211.

<sup>353</sup> FTSE, *FTSE equity country classification September 2022*, Annual announcement, 29 September 2022, p 5.

<sup>354</sup> ACCC, *Variation to the NBN Co Special Access Undertaking*, Draft decision, April 2023, pp 68-69.

<sup>355</sup> ACCC, *Proposed variation to the NBN Co special access undertaking*, Consultation paper, January 2023, pp 55-56.

- expand the sample to include utility firms providing wholesale access.

We also note that Table A.2 does not include the ACCC's decision for ARTC's 2017 Hunter Valley undertaking, where the ACCC applies the same beta from its 2010 decision, which itself was derived from prior regulatory precedent.<sup>357</sup>

### A1.2.2 Commentary set out in regulatory decisions

The QCA has provided additional commentary that sets out their assessments regarding the use of country filters for identifying comparators.

For example, the QCA identifies that the decision regarding whether international firms should be included as comparators involves evaluating the trade-offs between identifying firms operating in markets with similar market compositions against generating a larger sample with more stable beta estimates.

Overall, the QCA's evaluation of these trade-offs supports including international comparators.<sup>358</sup>

Since beta is a measure of the covariance of the asset's return against the broader market's return, the composition of this market is important. **If the make-up of two markets is dissimilar, then the betas for two otherwise identical firms operating in different countries could be different. Differences in market composition may also cause the betas for two otherwise similar firms operating in different countries to move in varying directions.** Because of this, a certain level of caution needs to be exercised when assessing betas from internationally listed firms.

However, we consider that continuing to use an international sample of firms (alongside domestic firms) is preferable, as relying purely on Australian firms to form comparator sets for the entities subject to our regulatory regime is problematic. We are not confident that there are a sufficient number of listed Australian firms for us to draw upon in order to determine reasonable betas. **In particular, any industry sample would comprise a very small number of firms, which could result in beta estimates fluctuating by large margins from review to review. This does not provide regulatory predictability.** (emphasis added)

In addition, the QCA considers that including international comparators will reduce the impact of anomalous beta estimates and estimates affected by country-specific effects:<sup>359</sup>

**An advantage of using a larger sample of firms is that the impact of any one seemingly anomalous beta estimate is not significant when taking an average or median beta from all the firms in the sample.** This would not be the case when relying on a very small sample of firms. The potential loss of comparator firms from delisting as a result of mergers and acquisitions would only exacerbate the above issues.

Alongside the statistical advantages that using an international sample offers, it also allows greater flexibility when choosing comparators—due to the availability of firms listed in other industries that are not listed on the ASX—that may better match the level of systematic risk facing the regulated entity. **To the extent that there may be country-specific effects on beta estimates, we consider that these can be limited by using a sample of relevant firms from a cross-section of countries where possible.** Using a longer time horizon to estimate beta will also limit the impact that a particular country-specific event will have on the beta calculation. (emphasis added)

The above reasoning is consistent with the NZCC's justification for using a large energy comparator sample without making 'significant refinements' to it.<sup>360</sup> Specifically, the NZCC states that one of the benefits of using

<sup>357</sup> ACCC, *Australian Rail Track Corporation's 2017 Hunter Valley access undertaking*, Draft decision, 20 April 2017, pp 154-158. ACCC, *Australian Rail Track Corporation's proposed Hunter Valley Rail Network access undertaking*, Position paper, 21 December 2010, pp 110-112.

<sup>358</sup> QCA, *Rate of return review*, Final report, November 2021, pp 71-72.

<sup>359</sup> QCA, *Rate of return review*, Final report, November 2021, pp 71-72.

<sup>360</sup> NZCC, *Input methodologies review decisions | Topic paper 4: cost of capital issues*, 20 December 2016, para 276.

a large comparator sample is that it reduces the need for subjective assessments regarding the inclusion of specific companies:<sup>361</sup>

277. We consider that using the large energy sample has several benefits over the alternative approaches suggested in submissions. For example, this approach:

**277.1 limits the need to make subjective judgement calls regarding whether each of the 74 companies from the draft comparator sample should be included**, as required under TDB's approach to refining the comparator sample. In particular, we consider there is a lack of clarity regarding the thresholds, evidence, and judgement calls TDB made when excluding companies from the sample... (emphasis added)

The QCA further states that its preference is to include firms from developed countries, and that it is open to considering firms operating in developing countries if it is concerned about the size of the comparator sample. The QCA also favours identifying comparator firms across several different countries, and observes that the higher sovereign risks associated with developing countries may not affect the beta estimates of the comparator firms operating in those countries:<sup>362</sup>

Generally, we consider that firms originating from developed countries are preferable to those from developing or emerging economies, as the former are more likely to operate within a more stable political and business environment and are subject to a well-developed system of property rights and legal protections. **However, if after reviewing firms operating in developed countries, we are still concerned with the size of our industry sample, we will turn to investigate firms operating in developing countries to potentially generate a larger sample.**<sup>220</sup> In investigating firms operating in developing countries, we will have particular regard to country-specific factors that may make inclusion of certain firms unsuitable...

Where possible, we will try and include relevant, listed companies from a range of different countries to limit the concentration of firms coming from any one country. However, this approach may not be possible if firms in other countries are less relevant—that is, if they are exposed to substantially different risks—relative to the benchmark we are trying to assess...

<sup>220</sup> **While firms operating in developing countries might face a greater level of sovereign risk, this may not necessarily be reflected in beta estimates of those firms, as the relative systematic risk of firms within the country may be unchanged.** (emphasis added)

However, as shown in Table A.2, we observe that the QCA has not included firms from developing countries in its comparator samples for rail and toll road businesses, even though its preferred samples for those industries only include six and four comparators respectively.

<sup>361</sup> NZCC, *Input methodologies review decisions | Topic paper 4: cost of capital issues*, 20 December 2016, para 277.

<sup>362</sup> QCA, *Rate of return review*, Final report, November 2021, pp 73-74.

## A2. List of firms in the comparator samples

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As section 3.2 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.3 sets out the list of firms in our preferred and alternative comparator samples.



Table A.3: List of comparators

Ticker	Company	Sample	Bloomberg description
000582 CH Equity	Beibuwan Port Co Ltd	Preferred	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 oversea transportation agent and develops real estate.
1199 HK Equity	COSCO SHIPPING Ports Ltd	Preferred	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.
144 HK Equity	China Merchants Port Holdings Co Ltd	Preferred	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.
600017 CH Equity	Rizhao Port Co Ltd	Preferred	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.
600018 CH Equity	Shanghai International Port Group Co Ltd	Preferred	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.
601008 CH Equity	Jiangsu Lianyungang Port Co Ltd	Preferred	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.
601018 CH Equity	Ningbo Zhoushan Port Co Ltd	Preferred	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.
6198 HK Equity	Qingdao Port International Co Ltd	Preferred	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.
ADSEZ IN Equity	Adani Ports & Special Economic Zone Ltd	Preferred	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.
GPPV IN Equity	Gujarat Pipavav Port Ltd	Preferred	Gujarat Pipavav Port Ltd. operates a marine shipping port. The port loads and unloads container, bulk, and liquid cargo.
HHFA GR Equity	Hamburger Hafen und Logistik AG	Preferred and applied country filter	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.
POT NZ Equity	Port of Tauranga Ltd	Preferred and applied country filter	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.
PPA GA Equity	Piraeus Port Authority SA	Preferred and applied country filter	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.
WPRTS MK Equity	Westports Holdings Bhd	Preferred and applied country filter	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.

Ticker	Company	Sample	Bloomberg description
002040 CH Equity	Nanjing Port Co Ltd	Preferred	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.
001872 CH Equity / 201872 CH Equity	China Merchants Port Group Co Ltd	Preferred	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	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.
GMD VN Equity	Gemadep Corporation	Preferred	Gemadep 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	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	Saudi Industrial Services Company (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 applied country filter	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.
<b>Removed from sample due to illiquidity or low market capitalisation</b>			
2880 HK equity	Liaoning Port Co Ltd	Preferred but removed due to illiquidity	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.
600317 CH Equity	Yingkou Port Liability Co Ltd	Preferred but removed due to illiquidity	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.
DVP VN Equity	Dinh Vu Port Investment & Development JSC	Preferred but removed due to low market capitalisation	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.

Source: Bloomberg, HoustonKemp analysis



## A3. Industry-specific parameter estimates

This appendix sets out our approach for using the comparator firms set out in appendix A2 to estimate the benchmark gearing and asset beta in sections 5.2 and 5.4 respectively. We generate our asset beta and gearing estimates using data collected from Bloomberg on 28 April 2023.

### A3.1 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.4 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 of all firms; and
- 0.10 gearing for our alternative sample with a country filter applied.

Table A.4: 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	Preferred	0.22	0.20
1199 HK Equity	COSCO SHIPPING Ports Ltd	Preferred	0.49	0.35
144 HK Equity	China Merchants Port Holdings Co Ltd	Preferred	0.39	0.29
600017 CH Equity	Rizhao Port Co Ltd	Preferred	0.46	0.36
600018 CH Equity	Shanghai International Port Group Co Ltd	Preferred	0.14	0.12
601008 CH Equity	Jiangsu Lianyungang Port Co Ltd	Preferred	0.37	0.34
601018 CH Equity	Ningbo Zhoushan Port Co Ltd	Preferred	0.19	0.16
6198 HK Equity	Qingdao Port International Co Ltd	Preferred	0.00	0.00
ADSEZ IN Equity	Adani Ports & Special Economic Zone Ltd	Preferred	0.21	0.22
GPPV IN Equity	Gujarat Pipavav Port Ltd	Preferred	0.00	0.00
HHFA GR Equity	Hamburger Hafen und Logistik AG	Preferred and applied country filter	0.28	0.22
POT NZ Equity	Port of Tauranga Ltd	Preferred and applied country filter	0.10	0.10
PPA GA Equity	Piraeus Port Authority SA	Preferred and applied country filter	0.00	0.03
WPRTS MK Equity	Westports Holdings Bhd	Preferred and applied country filter	0.06	0.06
002040 CH Equity	Nanjing Port Co Ltd	Preferred	0.16	0.13
001872 CH Equity	China Merchants Port Group Co Ltd	Preferred	0.49	0.29
601228 CH Equity	Guangzhou Port Co Ltd	Preferred	0.24	-
GMD VN Equity	Gemadept Corporation	Preferred	0.15	-
NMTP RM Equity	Novorossiysk Commercial Sea Port PJSC	Preferred	0.24	0.38
SISCO AB Equity	Saudi Industrial Services Co (SISCO)	Preferred	0.21	0.32
STBP3 BZ Equity	Santos Brasil Participacoes S/A	Preferred and applied country filter	0.00	-

Ticker	Name	Sample	5 yr gearing	10 yr gearing
<b>Mean - preferred</b>			<b>0.21</b>	<b>0.20</b>
<b>Mean - alternative</b>			<b>0.09</b>	<b>0.10</b>

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.

## A3.2 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.5 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:

- 0.71 for our preferred sample of all firms; and
- 0.70 for our alternative sample with a country filter applied.

Table A.5: 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	Preferred	0.54	0.49	0.76	0.69
1199 HK Equity	COSCO SHIPPING Ports Ltd	Preferred	0.44	0.50	0.51	0.55
144 HK Equity	China Merchants Port Holdings Co Ltd	Preferred	0.53	0.51	0.67	0.66
600017 CH Equity	Rizhao Port Co Ltd	Preferred	0.49	0.54	0.74	0.74
600018 CH Equity	Shanghai International Port Group Co Ltd	Preferred	0.89	0.79	0.92	0.87
601008 CH Equity	Jiangsu Lianyungang Port Co Ltd	Preferred	0.68	0.86	0.79	0.85
601018 CH Equity	Ningbo Zhoushan Port Co Ltd	Preferred	0.81	0.82	0.97	1.10
6198 HK Equity	Qingdao Port International Co Ltd	Preferred	0.53	0.53	0.65	0.77
ADSEZ IN Equity	Adani Ports & Special Economic Zone Ltd	Preferred	0.87	0.91	0.96	0.95
GPPV IN Equity	Gujarat Pipavav Port Ltd	Preferred	0.68	0.95	0.71	1.05
HHFA GR Equity	Hamburger Hafen und Logistik AG	Preferred and applied country filter	0.83	0.81	0.74	0.78
POT NZ Equity	Port of Tauranga Ltd	Preferred and applied country filter	0.60	0.66	0.57	0.62
PPA GA Equity	Piraeus Port Authority SA	Preferred and applied country filter	0.50	0.53	0.56	0.56

Ticker	Name	Sample	5-yr weekly AD	5-yr 4-weekly AD	10-yr weekly AD	10-yr 4-weekly AD
WPRTS MK Equity	Westports Holdings Bhd	Preferred and applied country filter	0.53	0.66	0.51	0.52
002040 CH Equity	Nanjing Port Co Ltd	Preferred	0.70	0.70	0.89	0.82
001872 CH Equity	China Merchants Port Group Co Ltd	Preferred	0.37	0.31	0.62	0.52
601228 CH Equity	Guangzhou Port Co Ltd	Preferred	0.70	0.76	-	-
GMD VN Equity	Gemadept Corporation	Preferred	0.82	0.78	-	-
NMTP RM Equity	Novorossiysk Commercial Sea Port PJSC	Preferred	0.57	0.59	0.45	0.51
SISCO AB Equity	Saudi Industrial Services Co (SISCO)	Preferred	0.78	0.83	0.73	0.70
STBP3 BZ Equity	Santos Brasil Participacoes S/A	Preferred and applied country filter	1.39	1.41	-	-
<b>Mean preferred</b>			<b>0.68</b>	<b>0.71</b>	<b>0.71</b>	<b>0.74</b>
<b>Mean alternative</b>			<b>0.77</b>	<b>0.81</b>	<b>0.59</b>	<b>0.62</b>

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.

We note that we have switched the ticker for China Merchants Port Group Co Ltd to '001872 CH Equity' instead of using the '201872 CH Equity' ticker that we used in our previous report. Both tickers refer to the same firm, except that:

- 001872 CH Equity are 'A-shares' that trade in CNY; and
- 201872 CH Equity are 'B-shares' that trade in HKD.

Bloomberg identifies the Shenzhen Stock Exchange Composite Index as the market index for China Merchants Port Group Co Ltd. Since the index is quoted in CNY, we now use the 001872 CH Equity ticker so that the equity return series and market return series will have the same currency when estimating asset betas for this port.

We note that the asset beta point estimate remains unchanged at 0.71 if we had instead used 001872 CH Equity as the ticker for China Merchants Port Group Co Ltd.

## A4. 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.

### A4.1 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.

#### A4.1.1 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.<sup>363</sup>

IPART's 2013 WACC review sets out the following formula:<sup>364</sup>

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

IPART's total market return for July 2022 is 9.7 per cent, consisting of 2.0 per cent current risk free rate for a five-year regulatory period plus 7.7 per cent current MRP.<sup>365</sup> Assuming a corporate tax rate of 30 per cent, we apply the above formula to derive the gamma-adjusted total market return as follows:<sup>366</sup>

$$\begin{aligned} \text{Gamma adjusted total market return} &= \frac{\text{IPART total market return} \times \frac{1 - \text{tax rate}}{1 - \text{tax rate}(1 - \text{IPART gamma})}}{\left( \frac{1 - \text{tax rate}}{1 - \text{tax rate}(1 - \text{PoM gamma})} \right)} \\ &= \frac{\text{IPART total market return} \times \frac{1 - 0.3}{1 - 0.3(1 - 0.25)}}{\left( \frac{1 - 0.3}{1 - 0.3(1 - 0.5)} \right)} \\ &= 9.7\% \times 1.10 = 10.6\% \end{aligned}$$

<sup>363</sup> 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].

<sup>364</sup> 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.

<sup>365</sup> See: IPART, Spreadsheet-WACC-model-February-2022.XLSX, 'WACC Calculator' sheet assuming a five-year regulatory period.

<sup>366</sup> 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 3.45 per cent ten-year risk free rate estimate. This results in a 'current' market risk premium estimate of 7.15 per cent.

#### A4.1.2 AER, ERA, and QCA

AER, ERA, and QCA adjust their dividend forecasts for the impact of imputation credits.<sup>367</sup> We use the following formula to gross up the cash dividend yields obtained from Bloomberg:<sup>368</sup>

$$\text{Gross div. yield} = \text{Cash div. yield} + \text{ATO average franking rebate yield} \times \text{Utilisation rate}$$

We understand that when grossing up dividend yields, the AER and QCA use the same utilisation rates as that used for calculating the gamma parameters in their regulatory determinations.<sup>369</sup> The ERA's DDM estimate in 2016 uses a utilisation rate of 0.53 based on BHM academic literature,<sup>370</sup> but does not otherwise describe how it will update its utilisation rate estimates for its most recent DDMs.

We note that our previous report used the following formula for grossing up cash dividend yields, where the proportion of fully franked dividends was assumed to be 0.75:<sup>371</sup>

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

That formula represented our best attempt to replicate the methodology adopted by the AER and ERA, given the lack of guidance as to how the AER and ERA used ATO imputation credit yields to adjust their MRP estimates.

However, the AER has since published the spreadsheet it uses for generating its HER MRP estimates,<sup>372</sup> which shows how the AER uses average franking rebate yields published by the ATO to gross up its cash dividend yields.

As such, we have changed our DDM estimation methodology to gross up cash dividend yields using the same methodology that the AER uses for generating its HER MRP estimates. We apply this change to our DDM estimates for the AER, ERA and QCA models.

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

## A4.2 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 2023.

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

<sup>367</sup> See discussions in: AER, *Rate of Return Instrument | Explanatory statement*, Draft, June 2022, pp 150-151. 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, paras 539-542. QCA, *Cost of capital: market parameters*, Final decision, August 2014, pp 1-2.

<sup>368</sup> 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.

<sup>369</sup> 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.

<sup>370</sup> 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.

<sup>371</sup> HoustonKemp, *Estimation of the weighted average cost of capital for the Port of Melbourne*, 11 May 2022, p 61.

<sup>372</sup> See: AER, *AER - Historical Excess Returns - 2 November 2022.xlsx*, Spreadsheet, 2 November 2022.

- take IPART’s 7.7 per cent current MRP estimate from its January 2023 WACC update;
- add IPART’s 2.0 per cent current risk free rate to obtain a market return of 9.7 per cent;
- adjust the market return estimate for a gamma of 0.5 using the formula set out in appendix A4.1.1, obtaining a market return of 10.6 per cent; and
- deduct our 3.45 per cent risk free rate as at 31 March 2023 from section 5.3 to obtain a point estimate of 7.15 per cent.

We note that the date of IPART’s DDM estimate from 31 January 2023 differs from the estimation dates of the other WACC parameters, which we estimate as at 31 March 2023. 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.

### A4.3 AER DDM

As section 5.5.3 describes, the AER publishes estimates for its two-stage DDM and three-stage DDM, but its preferred model is the three-stage DDM. As such, we only use the three-stage DDM in our estimates.

#### A4.3.1 Description of AER DDMs

The two-stage DDM assumes that future dividends are characterised by the following formula:<sup>373</sup>

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

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.<sup>374</sup> The AER uses the ASX 200 index as its market proxy and assumes a long-term dividend growth rate based on Consensus Economics forecasts, for which the most recent estimate set out by the AER is  $g = 3.85$  per cent.<sup>375</sup>

<sup>373</sup> AER, *Rate of Return Guideline (Appendices)*, Explanatory Statement, December 2013, pp 116-117.

<sup>374</sup> AER, *Rate of Return Guideline (Appendices)*, Explanatory Statement, December 2013, p 117.

<sup>375</sup> AER, *Rate of Return Instrument | Explanatory statement*, February 2023, p 132.



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, 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 A4.1.2 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.

#### A4.3.2 Comparison against AER DDM forecast

We compare our three-stage DDM estimate against the AER's average estimates for its preferred averaging period, ie, two months up to December 2022.<sup>376</sup> We also compare our estimates for a six-month period.

The AER has published a spreadsheet setting out hardcoded three-stage DDM estimates from January 2012 to December 2022.<sup>377</sup>

We estimate the AER's three-stage DDM assuming a 3.85 per cent long-term dividend growth rate consistent with the AER's assumption. We also use average franking credit yields from the ATO,<sup>378</sup> and 0.65 utilisation rate.<sup>379</sup>

Using these assumptions, we estimate an average DDM market return of:<sup>380</sup>

- 8.78 per cent for the two months from November 2022 to December 2022, which is within approximately 0.1 per cent of the AER's 8.69 per cent average DDM market return over the same period; and
- 8.69 per cent for the six months from July 2022 to December 2022, which is within approximately 0.1 per cent of the AER's 8.81 per cent average DDM market return over the same period.

The AER's DDM market return estimates vary substantially between its 2022 draft RoRI and 2022 RoRI. For example, the 2022 draft RoRI includes a 9.49 per cent market return estimate as at September 2022, while the corresponding estimate from the 2022 RoRI is 8.80 per cent for the same month.<sup>381</sup>

The AER has not explained the reasons for these discrepancies. It is difficult to identify the causes of these differences since the AER has not provided its full calculations, although we note that these discrepancies may arise due to:

- changes in the AER's assumptions on the utilisation rate and the long-term growth rate; and
- changes to analyst forecasts between the 2022 draft RoRI and the 2022 RoRI.

We observe that the differences between our market return estimates and the AER's vary for individual months, although the average differences over a six-month period and over the AER's preferred two-month period are within approximately 0.1 per cent, as set out above.

For our DDM estimates in section 5.5.3 above, we collected analyst forecasts on 3 April 2023, ie, close to 31 March 2023, which is the last day of the averaging period.

<sup>376</sup> AER, *Rate of Return Instrument | Explanatory statement*, February 2023, pp 132, 154.

<sup>377</sup> AER, *Two & three stage DGM results - December 2022*, Spreadsheet, December 2022.

<sup>378</sup> See: ATO, <https://www.ato.gov.au/rates/company-tax---imputation--average-franking-credit---rebate-yields/>, accessed 6 April 2023.

<sup>379</sup> We use an unrounded utilisation rate equal to 0.647450918. See: AER, *Rate of Return Instrument | Explanatory statement*, February 2023, p 12.

<sup>380</sup> See: AER, *Two & three stage DGM results - December 2022*, Spreadsheet, December 2022, cells C129:C134.

<sup>381</sup> See: AER, *Three stage DGM results - 2 November 2022*, Spreadsheet, 2 November 2022. AER, *Two & three stage DGM results - December 2022*, Spreadsheet, December 2022.

## A4.4 ERA DDM

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

### A4.4.1 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 A4.3.1:<sup>382</sup>

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

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

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 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.<sup>383</sup>

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 A4.1.2 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.

### A4.4.2 Comparison against ERA DDM estimates

We compare our Gordon DDM estimates against the ERA's estimates as reported in its 2022 gas RoRI.<sup>384</sup> We generate our Gordon DDM estimates assuming:

- average franking rebate yields equal to those published on the ATO's website;
- a utilisation rate of 0.6; and
- a long term dividend growth rate of 4.6 per cent.

For the six months from April 2022 to September 2022, we obtain an average Gordon DDM market return of 10.13 per cent. This is within approximately 0.1 per cent of the ERA's 10.00 per cent average estimate for the same period.<sup>385</sup>

We note that the ERA's DDM estimates in its 2022 gas RoRI contradict the corresponding estimates in its 2022 draft gas RoRI. In particular, the ERA estimates market returns of:<sup>386</sup>

- 9.36 per cent in its 2022 draft gas RoRI and 9.26 per cent in its 2022 gas RoRI for April 2022; and
- 9.54 per cent in its 2022 draft gas RoRI and 9.44 per cent in its 2022 gas RoRI for May 2022.

<sup>382</sup> 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.

<sup>383</sup> 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, para 544. ERA, *Explanatory statement for the 2022 final gas rate of return instrument*, 16 December 2022, para 856.

<sup>384</sup> ERA, *Explanatory statement for the 2022 final gas rate of return instrument*, 16 December 2022, para 858.

<sup>385</sup> ERA, *Explanatory statement for the 2022 final gas rate of return instrument*, 16 December 2022, para 858.

<sup>386</sup> ERA, *Explanatory statement for the 2022 draft gas rate of return instrument*, 17 June 2022, paras 634, 808-813.

The ERA has not explained the reasons for the 10 bp decline in its DDM market return estimates for April 2022 and May 2022. Our market return estimates for individual months match more closely with the ERA's 2022 draft gas RoRI estimates, although our six-month average estimate remains within approximately 0.1 per cent of the 2022 gas RoRI, as described above.

In addition, we note that the ERA's risk free rate estimates in its 2022 gas RoRI appear to contradict. The ERA adopts a nominal risk free rate of 3.78 per cent as at September 2022 when calculating the vanilla WACC, but reports a risk free rate of 3.74 per cent for the same month when calculating its DDM MRP.<sup>387</sup> We have not investigated these discrepancies further.

## A4.5 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.

### A4.5.1 Description of QCA Cornell DDM

The Cornell DDM assumes that future dividends are characterised by the following formula:<sup>388</sup>

$$P_c = \sum_{t=1}^N \frac{D(1+g_1) \dots (1+g_t)}{(1+k)^{t-0.5}} + \frac{\left[ \frac{D(1+g_1) \dots (1+g_N)(1+g)}{k-g} \right]}{(1+k)^{N-0.5}}$$

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.<sup>389</sup>

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 A4.1.2 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.

### A4.5.2 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.<sup>390</sup> Instead, the QCA now assumes a single discount rate across all future dividends.<sup>391</sup>

As such, we only compare our Cornell DDM estimates against the QCA's March 2022 final report for Seqwater, where the QCA derives an estimate of 6.9 per cent.<sup>392</sup> Table A.6 shows our Cornell DDM estimates for the 20 trading days up to 31 January 2022, which is the same averaging period that the QCA

<sup>387</sup> ERA, *Explanatory statement for the 2022 final gas rate of return instrument*, 16 December 2022, paras 856-864, 1,341-1,342.

<sup>388</sup> 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.

<sup>389</sup> 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.

<sup>390</sup> QCA, *Cost of capital: market parameters*, Final decision, August 2014, p 71.

<sup>391</sup> QCA, *Seqwater Bulk Water Price Review 2022-26*, Final report, March 2022, p 69.

<sup>392</sup> QCA, *Seqwater Bulk Water Price Review 2022-26*, Final report, March 2022, p 69.

uses for estimating the risk-free rate.<sup>393</sup> Our median estimate is 6.95 per cent, which is approximately 0.1 per cent higher than the QCA's 6.9 per cent estimate, although the difference may be lower because of rounding.

Table A.6: Replication of QCA's November 2021 DDM estimates

Long-term growth	10-year convergence	20-year convergence
4.04%	6.64%	6.46%
4.55%	7.07%	6.82%
5.06%	7.50%	7.19%

Source: Bloomberg, QCA, HoustonKemp analysis.

#### A4.6 DDM estimates as at 31 March 2023

Table A.7 shows our DDM estimates for the 20-day averaging period up to 31 March 2023. Our point estimates for each regulator are:

- IPART current MRP estimate: 7.15 per cent;
- AER three-stage DDM: 5.41 per cent;
- ERA two-stage Gordon DDM: 6.66 per cent;
- QCA Cornell DDM: 5.74 per cent.

We adopt a DDM point estimate of 6.20 per cent, calculated as the median of the above four estimates.

<sup>393</sup> QCA, *Seqwater Bulk Water Price Review 2022–26*, Final report, March 2022, p 63.

Table A.7: DDM estimates for 20-day averaging period up to 31 March 2023

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 3 stage
4/03/2022	6.80	6.14%	5.09%	4.64%	5.59%	5.06%	6.01%	5.41%	4.91%
7/03/2022	6.88	6.20%	5.15%	4.70%	5.66%	5.12%	6.08%	5.48%	4.98%
8/03/2022	6.82	6.17%	5.13%	4.67%	5.63%	5.09%	6.05%	5.45%	4.95%
9/03/2022	6.86	6.21%	5.16%	4.69%	5.66%	5.12%	6.08%	5.47%	4.98%
10/03/2022	6.99	6.46%	5.40%	4.93%	5.90%	5.34%	6.32%	5.70%	5.22%
11/03/2022	7.05	6.55%	5.49%	5.02%	5.99%	5.44%	6.40%	5.79%	5.31%
14/03/2022	7.12	6.68%	5.61%	5.13%	6.11%	5.55%	6.53%	5.90%	5.43%
15/03/2022	7.14	6.66%	5.58%	5.11%	6.09%	5.52%	6.50%	5.88%	5.41%
16/03/2022	7.25	6.86%	5.80%	5.35%	6.30%	5.76%	6.72%	6.11%	5.63%
17/03/2022	7.18	6.76%	5.70%	5.24%	6.20%	5.66%	6.62%	6.01%	5.53%
18/03/2022	7.33	6.97%	5.90%	5.44%	6.40%	5.85%	6.81%	6.20%	5.73%
21/03/2022	7.38	6.99%	5.92%	5.47%	6.42%	5.88%	6.84%	6.23%	5.75%
22/03/2022	7.21	6.77%	5.72%	5.28%	6.22%	5.69%	6.64%	6.04%	5.55%
23/03/2022	7.28	6.88%	5.81%	5.36%	6.31%	5.78%	6.73%	6.13%	5.64%
24/03/2022	7.36	6.96%	5.88%	5.42%	6.38%	5.84%	6.80%	6.19%	5.71%
25/03/2022	7.38	6.98%	5.90%	5.44%	6.40%	5.85%	6.82%	6.20%	5.73%
28/03/2022	7.28	6.83%	5.80%	5.37%	6.29%	5.79%	6.71%	6.14%	5.63%
29/03/2022	7.29	6.79%	5.62%	5.09%	6.12%	5.52%	6.54%	5.87%	5.45%
30/03/2022	7.22	6.66%	5.50%	4.98%	6.01%	5.41%	6.43%	5.77%	5.34%
31/03/2022	7.28	6.68%	5.51%	4.97%	6.01%	5.39%	6.43%	5.75%	5.34%
<b>Average</b>	<b>7.15%</b>	<b>6.66%</b>	<b>5.58%</b>	<b>5.11%</b>	<b>6.08%</b>	<b>5.53%</b>	<b>6.50%</b>	<b>5.89%</b>	<b>5.41%</b>

Source: Bloomberg, AER, ERA, QCA, WASC, HoustonKemp analysis.

## A5. 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 2021 from the AER's spreadsheet.<sup>394</sup> We then obtain the following raw data to update the estimates up to 31 December 2022, 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'):  $\frac{\text{average of the index for the month of December in year } t}{\text{average of the index for the month of December in year } (t-1)} - 1$ ;
- 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:<sup>395</sup>
  - > average franking rebate yield obtained for 31 December of each year ('ATOCDR').

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:<sup>396</sup>

$$\text{Market return} = \text{RTDASX} + 0.625 \times \text{ATOCDR}$$

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.

We note that in our previous report, we instead used the following formula for market return:

$$\text{Market return} = \text{RTDASX} + 0.625 \times \text{ATOCDR} \times \text{EXDRAT} \times (1 + \text{EXDASX})$$

The above formula includes two extra terms based on the stock price index obtained from Bloomberg using the 'AS30 Index' ticker, namely:

- without-dividend return ('EXDASX'):  $\frac{\text{average of the index for the month of December in year } t}{\text{average of the index for the month of December in year } (t-1)} - 1$ ;
- without-dividend ratio ('EXDRAT'):  $\frac{\text{average of the index for all trading days in year } t}{\text{average of the index for the month of December in year } t}$

We included those two terms because the estimate of ATOCDR was based on the average franking rebate yield only for the month ending 31 December. Including the EXDASX and EXDRAT terms would result in market returns that more accurately reflected the average franking rebate yield across the full year.

However, the AER has since published the spreadsheet it uses for generating its HER MRP estimates,<sup>397</sup> which shows how the AER uses average franking rebate yields published by the ATO to gross up its cash dividend yields.

As such, we have changed our HER MRP estimation methodology to be consistent with the AER's method.

<sup>394</sup> AER, *AER - Historical Excess Returns - December 2022.xlsx*, Spreadsheet, December 2022.

<sup>395</sup> ATO, <https://www.ato.gov.au/rates/company-tax---imputation--average-franking-credit--rebate-yields/>, accessed 6 April 2023.

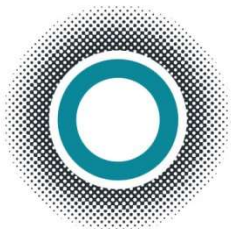
<sup>396</sup> This formula only applies for estimates from 1987 onwards. The market return up to 1986 is equal to the with-dividend return on the index, ie, RTDASX.

<sup>397</sup> See: AER, *AER - Historical Excess Returns - December 2022.xlsx*, Spreadsheet, December 2022.

# Annexure A Instructions

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