ESSENTIAL SERVICES COMMISSION

Interim commentary - Port of Melbourne tariff compliance statement 2019-20

16 December 2019

An appropriate citation for this paper is:

Essential Services Commission 2019*, Interim commentary - Port of Melbourne tariff compliance statement 2019-20,* 16 December

Copyright notice

© Essential Services Commission 2019

Contents

About this paper

On 31 May 2019, the Port of Melbourne (the port) submitted its tariff compliance statement 2019-20 to us, which is available on our website.[1] In setting its prices for prescribed services, the port is required to comply with requirements in the pricing order – a regulatory instrument made by the Governor in Council under section 49A of the Port Management Act.

The pricing order requires the port to submit annual tariff compliance statements to us. The tariff compliance statement must, among other things, explain how the prescribed service tariffs it proposes to charge for the forthcoming financial year comply with the pricing order. This is the third tariff compliance statement the port has submitted to us since the private operator commenced operations.

Our role

We are responsible for assessing and reporting on the port's compliance with the pricing order. We must, at five-yearly intervals, conduct an inquiry and report to our minister:

- as to whether the port has complied with the pricing order during the five-yearly review period; and
- if there was non-compliance with the pricing order, whether that non-compliance was, in our view, non-compliance in a 'significant and sustained manner'.[2]

The first compliance inquiry will commence after 1 July 2021.[3]

Why we are providing this commentary

To promote transparency and predictability in our approach, we have chosen to provide interim feedback on aspects of the port's annual tariff compliance statements by publishing commentary prior to undertaking our five-yearly inquiries.

This approach will benefit the five-yearly process by giving advance notice to the port and other stakeholders of key issues or concerns that may, along with any other relevant issues or concerns, form part of our five-yearly inquiries. This approach allows the port to consider the issues and

---

[1] https://www.esc.vic.gov.au/transport/port-melbourne/port-melbourne-compliance-pricing-regulations

[2] Port Management Act 1995, s.49I(1)

[3] Our five yearly inquiry must be conducted in accordance with Part 5 of the Essential Services Commission Act (except for sections 40 and 46), which sets out general provisions relating to inquiries and reports. We also have a role in investigating complaints by port users regarding the port's compliance with the pricing order, under section 49Q of the Port Management Act – for more information refer to https://www.esc.vic.gov.au/transport/port-melbourne/information-port-melbourne-users

concerns raised by us, and to reflect on its position and the information it may provide over time in seeking to demonstrate compliance with the pricing order ahead of our formal inquiry.

The purpose of this commentary is neither to provide a detailed compliance assessment, nor to make findings as to whether there has been any non-compliance with the pricing order.

Rather, our feedback is to provide the port and other stakeholders with an opportunity to understand, given our current state of knowledge, the matters that are likely to be the focus of our attention in assessing the port's compliance with the pricing order as part of our five-yearly inquiries.

The list of issues raised in this interim commentary reflects a high-level assessment of the port's tariff compliance statement. The issues we may consider in future commentaries will therefore not necessarily be limited to those in this commentary. Likewise, this commentary does not limit the scope of issues we may consider in our five-yearly inquiries.

Our high-level assessment of the port tariff compliance statement

This is our third interim commentary. It considers at high level whether the tariff compliance statement (TCS) 2019-20 addresses the concerns we raised in our 2018-19 interim commentary, together with any new issues arising from the statement. In doing this, and similar to our previous commentaries, our high-level assessment will assess:[4]

- the weight the port has given to the evidence it relies on in seeking to explain how the prescribed service tariffs comply with the pricing order
- whether parameter value estimates:

  - are consistent with good theory
  - are developed using robust empirical methods
  - recognise and allow for uncertainties in the data

- whether there appear to be any implementation errors in the models the port has applied

As outlined above, the issues we may consider in future commentaries will not necessarily be limited to those in this commentary.

The rest of this paper sets out the commission's consideration of the above assessment criteria based on the port's 2019-20 tariff compliance statements, with a particular focus on the port's weighted average cost of capital (WACC) estimation and deferred depreciation.

---

[4] We note that the issues we are considering in our high-level assessment are similar to the issues considered by AER, as outlined in its report: AER, Final 2018 Rate of Return Instrument: Explanatory Statement, December 2018 p 73.

What has changed between the port's 2018 and 2019 tariff compliance statements?

This is the port's third annual tariff compliance statement, which mostly focusses on the issues we raised in our 2018-19 interim commentary. We have reviewed the port's tariff compliance statement 2019-20 and sought advice from Frontier Economics on the rate of return the port has applied in its cost building blocks and in explaining how the prescribed service tariffs comply with the pricing order.[5] Following our consideration of the port's tariff compliance statement 2019-20, any further information we have requested from them, and the report of Frontier Economics, we have the following main observations:

- the port has improved the transparency of its modelling and the transparency of its treatment of depreciation in the revenue requirement, improving ease of understanding of the calculation of its tariffs
- the port has made a number of minor changes to its weighted average tariff calculations and tariffs, which we consider is now more consistent with the requirements of the pricing order
- the port's rate of return continues to appear high and, in the commission's interim view, would require further substantial justification to demonstrate compliance with the pricing order
- we are still unclear on the port's approach to managing its deferred depreciation and the subsequent future price impacts arising from deferring depreciation until after the 'Tariff Adjustment Limit' period (being the period during which tariffs are essentially limited to increases in consumer price index).

We note that the port has reduced its WACC estimate from 11.52 per cent (pre-tax nominal) in 2018-19 to 10.46 per cent (pre-tax nominal) in 2019-20. The return on equity applied by the port is 12.67 per cent in 2019-20 (or 149 basis points lower than the return on equity applied in the 2018-19 tariff compliance statement). A large proportion of the reduction in the return on equity is attributable to a decline in the risk free rate (78 basis points). However we continue to consider that the input parameters in the ports WACC estimation – market risk premium, asset beta and gamma, contribute to the port's relatively high WACC estimate.

In particular, we reviewed the port's approach to estimating its beta – especially in relation to its choice of benchmark comparators and approach to removing statistically insignificant estimates. We are concerned with the port's approach and outline our concerns in detail in this interim commentary. We raised similar issues in our 2018-19 interim commentary, which on our review of the ports tariff compliance statement 2019-20, have not, or have not adequately, been addressed. We consider that if the port were to address the concerns identified in this 2019-20 interim commentary and adopted our findings, the port's WACC would fall to within the range of about 7.5

---

[5] Frontier Economics' report is available on our website. We have reviewed and accept the findings of Frontier Economics' report as part of our 2019-20 interim commentary.

per cent (pre-tax nominal) to 8 per cent (pre-tax nominal), at values of gamma of 0.4 and 0.25 respectively. The commission considers that the port should pay particular attention to the issues we raise in our 2019-20 interim commentary on its choice of comparators and approach to removing statistically insignificant betas, and address these issues in its future tariff compliance statements.

Appendix A contains a summary of our full list of observations, including those from our previous interim commentaries.

The port has demonstrated an effective engagement program with port users and other stakeholders

The 2019-20 tariff compliance statement has clearly outlined the port's engagement program with port users and other stakeholders over the course of 2018-19, which covered: (1) business plans as set out in its 2050 Port Development Strategy (PDS), including for the accommodation of larger vessels; (2) rail project; and (3) broad business engagement on the markets in which the port provides its prescribed services and charges its tariffs.[6]

We are satisfied with the port's engagement program based on the detailed information it provided in Appendix I. The port had listed the type of engagement activities for a wide range of issues, the feedback from port users and other stakeholders on those issues, and the port's responses to the feedback. We are encouraged by this open and ongoing dialogue between the port and its stakeholders and customers which over time should equip the port to respond to the ongoing needs of its customer base.

---

[6] Port of Melbourne, 2019-20 Tariff Compliance Statement: Appendix I, May 2019

The port's rate of return

In last year's interim commentary, we noted that the WACC applied by the port in determining its aggregate revenue requirement (ARR) was higher than that applied to other regulated entities.[7] We have reviewed recent regulatory decisions which indicate that the WACC applied by the port remains materially higher relative to recent Australian regulatory determinations. Table 1 below compares the WACC applied by the port to recent regulatory decisions.

Table 1   Comparison of port's WACC parameters for selected regulated businesses

Entity	AER	QCA	IPART	ERA	ICRC	OTTER	Port
Source	Essential Energy distribution determination 2019–24	Queensland Rail 2020 draft access undertaking	WACC Model	Western Power access arrangement 2017-2022	Regulated water and sewerage services prices 2018–23	TasWater - final decision	TCS 2019-20
Date of publication	Apr-19	Apr-19	Feb-19	Jan-19	May-18	May-18	May-19
Risk free rate	2.14%	2.28%	3.15%	2.37%	2.79%	2.88%	1.96%
Market risk premium	6.10%	6.50%	7.30%	6.00%	6.50%	6.50%	7.77%
Equity beta	0.60	0.71	0.84	0.70	0.70	0.65	1.00
Debt risk premium	3.59%	2.28%	2.50%	2.49%	1.84%	1.98%	3.18%
Debt raising costs	n/a	0.11%	0.13%	0.21%	0.13%	0.10%	0.10%
Gearing	60%	40%	60%	55%	60%	60%	30%
Gamma	0.59	0.48	0.25	0.50	0.40	0.40	0.25
Cost of equity – SL CAPM	6.62%	8.16%	11.98%	7.73%	8.95%	8.66%	12.55%
Cost of equity – port's approach	n/a	n/a	n/a	n/a	n/a	n/a	12.69%
Cost of debt	5.73%	4.67%	5.78%	5.07%	4.75%	4.96%	5.24%
WACC	6.09%	6.76%	8.26%	6.27%	6.43%	6.44%	10.46%
WACC margin[a]	3.95%	4.48%	5.11%	3.90%	3.64%	3.56%	8.50%

Sources: AER - Australian Energy Regulator; QCA - Queensland Competition Authority; IPART - Independent Pricing and Regulatory Tribunal; ERA - Economic Regulation Authority Western Australia; ICRC - Independent Competition and

---

[7] Like most regulated infrastructure entities, the port is a highly capital-intensive business and the return on capital makes up a large proportion of its aggregate revenue requirement.
The port's benchmark rate of return takes the form of a 'weighted average cost of capital' (WACC). The WACC is based on separate estimates of the returns to debt and equity that are weighted according to the proportion of debt and equity in the benchmark efficient financing structure.

The relatively high WACC applied by the port appears to be driven by the values it has applied for the market risk premium (MRP), gamma and beta, which are inputs to the calculation of the return on equity. We raised a number of issues on each of these estimates in our 2018-19 interim commentary, which the port partly addressed in its 2019-20 tariff compliance statement. In the sections below and in Appendix C, for each estimate we have identified some additional issues that the port may wish to consider. We have also restated some of the issues raised in our previous interim commentary where we consider the port has not fully addressed those issues in its 2019-20 tariff compliance statement, and may wish to add further comment if it is to maintain its approaches and the resulting WACC value in future tariff compliance statements.

Summary of the port's WACC estimate

The port's point estimate for the WACC for 2019-20 is 10.46 per cent, down from 11.52 per cent for 2018-19. The WACC applied by the port reflects the advice of its consultant, Synergies Economic Consulting, who also advised the port last year.[8]

Table 2 lists the parameter estimates adopted by the port in its tariff compliance statement.

The WACC is a critical element of building block regulatory frameworks as it affects incentives to invest as well as prices for users. If the WACC is too high, a regulated entity may be encouraged to over-invest in its facilities, and users would be paying more than is necessary for the service outcomes they desire. If the WACC is too low, the regulated entity may be discouraged from undertaking prudent investment and service outcomes may suffer, to the detriment of users.

[8] The port adopted Synergies' advice in its entirety in submitting its tariff compliance statement 2019-20. Where we refer to the port's report throughout our interim commentary, we are referring to the Synergies report *Determining a WACC estimate for the Port of Melbourne May 2019.* Synergies' methods and data sources are largely unchanged from last year and are listed at Appendix B.

Table 2   Comparison of WACC estimates for 2018-19 TCS and 2019-20 TCS

Parameter / return	2018-19 TCS	2019-20 TCS
Input parameters [a]		
Risk free rate	2.74	1.96
Gearing	30%	30%
Debt risk premium	2.53%	3.18%
Debt raising costs	0.10%	0.10%
Credit rating	BBB	BBB
Market risk premium	7.71%	7.77% [b]
Asset beta	0.7	0.7 [b]
Equity beta	1.0	1.0
Gamma	0.25	0.25
Corporate tax rate	30%	30%
Pre-tax return on equity estimates		
Sharpe-Lintner Capital Asset Pricing Model	13.48%	12.55% [b]
Black Capital Asset Pricing Model	13.48%	12.55% [b]
Fama-French Three Factor Model	15.51%	15.37% [b]
Pre-tax return estimates		
Return on equity	14.16%	12.69% [b]
Return on debt	5.37%	5.24%
Pre-tax nominal WACC	**11.52%**	**10.46%** [b]

Source: Synergies, Determining a WACC estimate for Port of Melbourne, May 2019, pp. 3-5.

[a] For the sake of brevity, input parameters for the Fama-French model and Black CAPM are not listed.

[b] Point estimates are reported rather than the range submitted by the Port of Melbourne.

In support of its individual WACC parameters, the port presented a range of evidence that the approaches it used are also used by economic regulators, finance practitioners and academics. In support of the overall WACC estimate, the port discussed WACC 'margins' (i.e. the WACC minus the risk free rate) for recent Australian transport determinations, marine ports and services and rail, as shown in Figure 1.

Essential Services Commission
Interim commentary - Port of Melbourne tariff compliance statement 2019-20

Figure 1   Comparison of the port's WACC margin
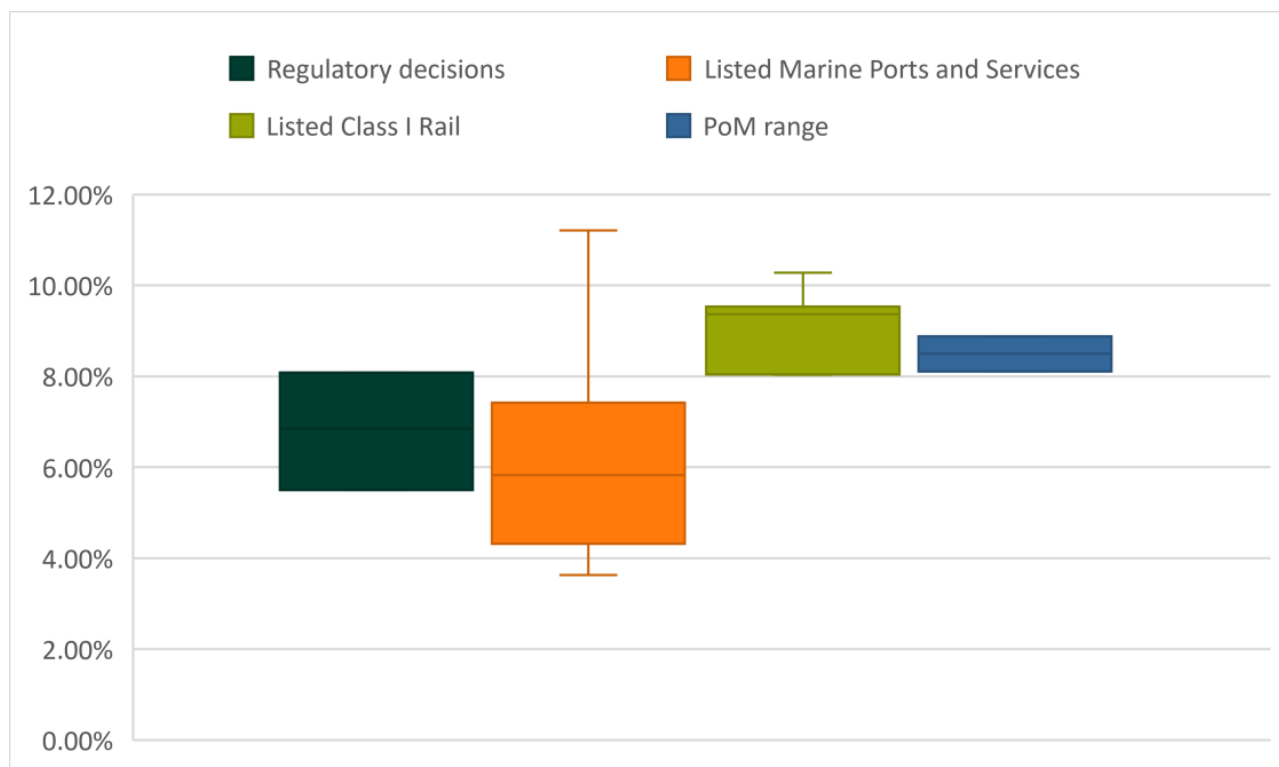
Source: Synergies, *Determining a WACC estimate for Port of Melbourne*, May 2019, p 211.

Figure 1 outlines that the port's pre-tax nominal WACC margin is higher than recent Australian transport determinations and listed marine ports and services but lower than 'Listed Class I rail decisions'[9].

The port submits that its WACC estimate satisfies the well-accepted and overall reasonableness stages of our compliance assessment framework. The assessment framework referred to is the three-stage process outlined in our statement of Regulatory Approach. The statement is intended to guide the port and other stakeholders on how we would likely apply the pricing order at the time of our five yearly compliance assessments under section 49I the Port Management Act.

While the port has referred to the statement in developing its tariff compliance statement, the statement is not intended to suggest how we will prepare our interim commentaries. Our comments below are therefore of a more general nature and do not address specific elements of the pricing order or the indicative approach to the interpretation of provisions as contained in our statement of Regulatory Approach.

---

[9] Freight railroads (in particular, North American Class I railroads) have been included in the comparator set due to their freight-focussed business model, strong market position and below rail infrastructure services.

We will address the pricing order WACC provisions in our statement of Regulatory Approach

We noted in our 2018-19 interim commentary that we would review our interpretation of the pricing order as stated in our statement of Regulatory Approach.[10]

Our preliminary view is that, in the regulatory framework established by the pricing order, the requirement to use 'one or a combination of well accepted approaches' is a requirement to use an approach that is broadly or generally recognised as being used, or appropriate for use, to estimate the 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.

We have commenced engaging with the port and will engage with port users and stakeholders on our interpretation of pricing order provisions in the statement of Regulatory Approach in 2020.

We will aim to issue any revised statement of Regulatory Approach in early 2020, after consulting with the port and relevant stakeholders in January 2020.

Our review of the 2017 statement of Regulatory Approach will also consider the other issues raised by the port on our interpretation of the pricing order, which are detailed in our 2018 interim commentary, as well as the timing of release of future interim commentaries, prior to the five-yearly review.[11]

We maintain our cautious view on the port's use of the Black CAPM and Fama French models

To estimate the return on equity for use in the WACC applied by the port, the port continues to combine the results of three models – the Sharpe-Lintner CAPM (SL-CAPM), Black CAPM, and Fama French three-factor model (FFM).

---

[10] Clause 4.3.1 of the pricing order requires that subject to the rate of return being determined on a pre-tax, nominal basis, in determining a rate of return on capital for the purposes of clause 4.1.1(a) the port must use one or a combination of well accepted approaches that distinguish the cost of equity and debt, and so derive a weighted average cost of capital. Clause 4.1.1(a) provides that for the purposes of determining its Aggregate Revenue Requirement, the Port Licence Holder must apply an accrual building block methodology over the Regulatory Period comprising 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.

[11] The port raised additional issues on our interpretation of the pricing order, outlined in its 2018-19 Tariff Compliance Statement. These issues include: (1) whether combinations of approaches need to be 'well accepted'; (2) the three step WACC assessment process; and (3) discretion in administering the pricing order. We will also consider these issues as part of our review of the statement of Regulatory Approach.

We outlined in our 2018-19 interim commentary that our preliminary view is that neither the Black CAPM or the Fama French (FFM) models are well-accepted by Australian regulators due to data uncertainties when implementing the models, lack of strong theoretical underpinnings and unreliable empirical results.[12] We sought advice from Frontier Economics as to whether the SL-CAPM, Black CAPM and FFM are well-accepted by the various classes of persons identified by the port, being academics, finance practitioners and economic regulators in Australia and overseas. This is set out in Table 3 below.

Table 3   Preliminary view of the ports approaches to estimate the WACC

Port's approach to estimate WACC	Well accepted by:		
	Academics	Finance Practitioners	Economic Regulators in Australia or regulators in the UK, US, NZ or Canada
SL-CAPM	Yes – However, there is a strong consensus in the academic literature that that the empirical performance of the SL CAPM is poor – hence the development of other models like the Black CAPM and Fama-French model.	Yes – However, there is also some evidence that practitioners recognise the weaknesses of the SL CAPM. For example, some valuation experts in Australia make 'adjustments' to SL CAPM estimates.	Yes – Used universally in Australia, UK and New Zealand. Also gaining wider acceptance amongst US and Canadian regulators.
Black CAPM	Yes – The Black CAPM now appears in standard undergraduate textbooks.	No clear evidence of explicit use. Some finance professionals appear to use risk-free rates in excess of spot rates, which would be consistent with Black CAPM.	AER gave some consideration to theoretical foundations of Black CAPM in its 2013 Guideline. However, in the 2018 Guideline, the AER stated that it will no longer give weight to the Black CAPM in estimating beta or adjust the equity beta estimate. Regulators in UK and NZ do not use the Black CAPM. As cited by Synergies, there is some historical evidence that some regulators in the US and Canada have accepted the ECAPM (an empirical application of Black CAPM) as relevant to the

---

[12] Also refer to Appendix C WACC for more of our analysis on the FFM.

			estimation of the cost of equity. Some Canadian regulators have considered and rejected the ECAPM recently. Synergies does not acknowledge that. Further, some examples cited by Synergies relate to consultants/experts proposing the use of estimates derived using the ECAPM, rather than direct evidence of US or Canadian regulators actually accepting and using the ECAPM. Synergies has not provided evidence that the ECAPM has widespread acceptance amongst regulators overseas.
Fama-French Three Factor Model	Yes – The Fama-French Model appears in standard undergraduate textbooks and in academic research. The Fama-French Model has become the 'benchmark' for estimating expected returns in academic papers.	No clear evidence of widespread use by valuation experts. However, there are a number of traded index funds designed using the Fama-French Model. And some academic surveys of finance practitioners (e.g., CFOs) has identified use of the model by professionals. Some finance practitioners appear to apply adjustments to risk premiums to reflect company size.	Not used by regulators in Australia, UK or New Zealand. There is no clear evidence of widespread use by regulators in the US or Canada, although some Canadian regulators have indicated tentative support for the use of such models as part of a broader set of evidence on return on equity

Source: Frontier Economics, Issues in cost of capital estimation for the Port of Melbourne, December 2019, p 6

However, we note that the port now gives significantly less weight to the latter two models in response to our concerns outlined in our 2018-19 interim commentary.

In its 2018-19 tariff compliance statement, the port attached equal weight to estimates from all three models. In its 2019-20 tariff compliance statement the port gives 90 per cent weight to the SL-CAPM and 5 per cent weight each to the Black CAPM and Fama-French models. The impact of

the inclusion of these two methods is shown in Table 4. We estimate that the difference if using only SL-CAPM is 0.10 per cent or $4.6 million[13] impact on aggregate revenue requirement.

Table 4   Impact of inclusion of Black CAPM and Fama French model on WACC estimates

Element	SL CAPM	Black CAPM	Fama French
Return on equity	12.55%	12.55%	15.37%
Return on debt	5.24%		
Pre-tax nominal WACC	10.36%	10.36%	12.32%
Average WACC (90% SL CAPM, 5% Black CAPM, and 5% FFM)	10.46%		
Difference if using only SL CAPM (all else remaining equal)	0.10%		

Source: Synergies, Determining a WACC estimate for Port of Melbourne, May 2019, p. 17.

The port has recognised in its tariff compliance statement 2019-20 that there are significant data concerns when applying the Black CAPM and FFM models, but noted that it will revisit its current weightings of 5 per cent in future tariff compliance statement if the data concerns are rectified.[14] Our interim view is that, at this stage and based on the information provided, we would be concerned if the port did consider increasing the weightings of the Black CAPM and FFM models in its future tariff compliance statements. We continue to hold the preliminary view outlined in our previous interim commentaries that neither model is well accepted by Australian regulators for various reasons, which indicates that the approaches are unlikely to be considered well accepted.

Australian regulators have recognised issues with the SL CAPM but do not use the Black CAPM as an alternative model

The port submitted that one of the main weakness with the SL CAPM is that it produces downwardly biased estimates of the rate of return for low-beta assets and overestimate the returns

---

[13] Aggregate revenue requirement (excluding depreciation allowance) based on port's WACC of 10.46 per cent is $549.7 million. Aggregate revenue requirement based on a WACC (using only SL CAPM) of 10.36 per cent is $545.1 million. The difference in aggregate revenue requirement is $4.6 million.
[14] ibid., p. 125.

of high-beta assets.[15] Australian regulators currently rely on the SL CAPM either alone or as a 'foundation model'[16] to estimate the return on equity for regulated businesses. While Australian regulators recognise issues with the SL CAPM (such as a downward biased estimate for low-beta firms), in some cases these have been accounted for by adjusting inputs to the SL CAPM rather than using Black CAPM and/or FFM.[17] [18]

Recent decisions by other Australian regulators and courts supports the view for not using the Black CAPM as an alternative model to the SL CAPM to estimate the return on equity. For example, the Australian Competition Tribunal (Tribunal) in July 2018 upheld the Economic Regulation Authority Western Australia's (ERA) decision to reject the low beta bias when estimating the return on equity. It rejected adjustments both quantitatively (to the return on equity based on historical returns) and qualitatively (to select a top of the range equity beta). It noted that the former would be 'near impossible' and the latter would be arbitrary. The Tribunal considered that the exercise by the ERA of regulatory judgment was correct, having regard to all of the circumstances, and that it was not unreasonable.[19]

Additionally, the Australian Energy Regulator (AER) set out in its 2018 Rate of Return Instrument: Explanatory Statement that its decision was 'to not adjust its Sharpe-Lintner CAPM return on equity estimate for the low beta bias and the Black CAPM'.[20] The AER made the following observations:

- 'The Sharpe-Lintner CAPM remains the standard and most widely-used model in practice.
- The AER received no evidence of Australian market practitioners considering low beta bias or using the Black CAPM.
- Experts and submissions did not provide sufficient evidence that the low beta bias is factored in or that investors and market practitioners account for it on an ex-ante basis.

---

[15] Synergies, Determining a WACC estimate for Port of Melbourne, May 2019, p. 96.
[16] For example, the AER uses the SL CAPM but has regard to the Black CAPM when setting the equity beta. However, it has signalled diminished confidence in the robustness of the Black CAPM when determining the value of beta. See AER, Final 2018 Rate of Return Instrument: Explanatory Statement, December 2018, p. 24.
[17] As we have previously documented in our 2018-19 interim commentary, IPART implements the Vasicek adjustment to its estimation of equity betas to partly correct for the downward bias of the SL CAPM. The Vasicek adjustment gives a higher weight to more precisely estimated equity betas, and a lower weight to estimated equity betas with higher standard errors. IPART chose not to use the Black CAPM to address downward bias of the SL CAPM in favour using the Vasicek adjustment. IPART was of the view that the adjusted equity beta estimates sufficiently accounted for the known downward bias of the SL CAPM. For more detail refer to IPART, Review of our WACC method: Final report, February 2018, p. 96.
[18] The port's view is that regulators are utilising methodologies and/or approaches for reasons different from their originally intended purpose (Synergies, Determining a WACC estimate for Port of Melbourne, May 2019, p. 102.) We believe this is an example of a regulatory judgment (or discretion), which has been applied having regard to all the circumstances.
[19] Australian Competition Tribunal, Application by DBNGP (WA) Transmission Pty Ltd [2018] ACompT1, July 2018, para 289, 295
[20] AER, Final 2018 Rate of Return Instrument: Explanatory Statement, December 2018, p. 196.

- The Black CAPM has empirical issues including instability, sensitivity to the choice of inputs, lack of consensus, and nonsensical and counter-intuitive results.
- Observations of higher actual returns than the Sharpe-Lintner CAPM estimates for low beta stocks do not necessarily imply low beta bias or that the bias should warrant increasing the allowed rate of return. A range of reasons can explain these observations and it is not clear investors expect a higher return from low beta stocks.'[21]

The port does not agree with the AER's final decision. It notes that the AER's consideration of the Black CAPM was not related to low-beta bias, but was instead intended to 'capture possible market imperfections that may lead actual returns to differ from expected returns.' The port further adds that 'the AER abandoned the Black CAPM without ever addressing what these "possible market imperfections" may include' and that 'a number of stakeholders in the AER review process have been concerned that the regulator has reached an entirely different conclusion on much the same evidence base as was available at the time of the previous guideline review in 2013.'

The AER had stated that since the 2013 Guideline, its confidence in the Black CAPM model has 'diminished' based on its assessment of information. Hence, the AER was not persuaded to use the Black CAPM model to select an equity beta point estimate.[22] Some of the reasons the AER stated for its diminished confidence in the Black CAPM model include:

- The empirical implementation is unreliable
- There was little evidence that other regulators, academics or market practitioners use the Black CAPM to estimate the return on equity
- Implementing the Black CAPM typically results in estimates of the zero-beta return being less reflective of prevailing market conditions than risk free rate estimates.[23]

Moreover, the practice of 'cross checking' inputs to and outputs of the SL CAPM, is adopted by other regulators including the ERA[24] and the Queensland Competition Authority (QCA)[25] and is intended to overcome shortcomings in parameter estimation and in mechanistically applying the SL CAPM.

The above regulators do not estimate the Black CAPM quantitatively as the port has done. Therefore, whilst the 'theoretical principles underpinning the Black CAPM' may be accepted by a small number of regulators, the position on the material provided to date appears to be that the Black CAPM, as applied by the port, is not accepted by any regulator in Australia for the purposes of setting the return on equity allowance.

---

[21] ibid., p. 196.
[22] AER, Final 2018 Rate of Return Instrument: Explanatory Statement, December 2018, p. 197.
[23] ibid., p. 207.
[24] ERA, Rate of Return Guidelines - Meeting the requirements of the National Gas Rules, December 2013, pp. 22-23.
[25] QCA, Draft decision - Aurizon Network's 2017 draft access undertaking, December 2017, pp. 125-133.

Statistical insignificance of the zero-beta premium for the Black CAPM is a material concern

The port's Black CAPM estimate for the cost of equity matches that for the SL CAPM. In circumstances in which the equity beta is 1.0, which is the case in the port's tariff compliance statement 2019-20, the SL-CAPM and the Black CAPM produces identical return on equity estimates (12.55 per cent), all else remaining equal.

The port's estimate for the zero-beta premium[26] for the tariff compliance statement 2019-20 is 3.36 per cent per annum, revised from 3.34 per cent in the previous year. The port acknowledges that the new estimate for the zero-beta premium with a t-statistic of 0.61 still remains statistically insignificant. But, notes that the estimate 'has remained very stable over the last 5 years' and 'is the most robust estimate of this parameter currently available in an Australian context.'[27] To overcome the statistical weakness the lower weight (5 per cent) was assigned to the return on equity estimated using the Black CAPM model.[28]

We do not believe it is reasonable to use 'weights' as an appropriate methodology to overcome the statistical weakness in Black CAPM estimate. This issue will become significant in the event the best forecast or estimate of the equity beta to be used in the WACC is less than 1.0. In cases where the equity beta is lower than 1.0, the Black CAPM will typically produce a higher cost of equity estimate than the SL-CAPM, all else remaining equal.

We remain unconvinced of the Fama French model's application in a regulatory context to estimate the benchmark return on equity

The port's FFM-based return on equity estimate (15.06 per cent) is materially higher than the SL-CAPM and Black CAPM estimates (12.55 per cent). The overall WACC estimate adopted by the Port is 10.46 per cent based on the combined new weights to the three models (90 per cent to SL CAPM and 5 per cent each to the Black CAPM and FFM).

Our previous interim commentary raised several concerns about the use of FFM in a regulatory context to estimate the benchmark return on equity. The port responded to our concerns in its tariff compliance statement 2019-20. We have reviewed the port's responses and our preliminary view at this stage based on the information provided is that we are not persuaded as to the FFM's application in a regulatory context to estimate the benchmark return on equity. We have outlined

---

[26] Zero beta premium is the difference between the expected return to a zero-beta portfolio and the risk-free rate. A zero-beta portfolio is a portfolio built with zero systematic risk. i.e. the investments comprised in a zero-beta portfolio are chosen in such a way that the portfolio's value does not fluctuate as a result of market movements.

[27] Synergies, Determining a WACC estimate for Port of Melbourne, May 2019, p. 239.

[28] ibid., p. 104.

the ports comments to our 2018-19 interim commentary and our response at Appendix C as our reasons are the same as we outlined in our 2018 interim commentary.[29]

The port's MRP estimate is higher than recent Australian regulatory decisions

The port's 2019-20 point estimate for the market risk premium (MRP) is 7.77 per cent, with a lower range of 7.34 per cent.[30] This is an increase from 7.71 per cent from the port's 2018-19 market risk premium estimate.[31] Table 5 outlines recent market risk premium estimates by Australian regulators. The port's market risk premium estimates remain at the high end of recent regulatory decisions, with the lowest estimate at 5.9 per cent by the ERA and the highest at 7.3 per cent by Independent Pricing and Regulatory Tribunal (IPART).

Table 5   Most recent market risk premium estimates applied by Australian regulators

Regulator	Date	Sector	MRP (per cent)
IPART	February 2019	Biannual WACC update	7.3%
QCA	April 2019	Rail	6.5 %
ERA	May 2019	Rail	5.9 %
ACCC	December 2018	Rail	6.0 %
ESCOSA	June 2016	Water	6.0 %
ESC	July 2018	Water	6.0 %
AER	December 2018	Electricity and Gas	6.1 %
OTTER	May 2018	Water	6.5 %
ICRC	May 2018	Water	6.5 %

Source: Synergies Economic Consulting 2019, Determining a WACC estimate for Port of Melbourne, May 2019, p 131

---

[29] Essential Services Commission 2018, Interim commentary - Port of Melbourne tariff compliance statement 2018-19, Appendix C, October 2018, p. 42-54.
[30] The lower range is reflective of the range of risk-free rate estimated by the Port of Melbourne.
[31] Port of Melbourne 2019, 2019-2020 Tariff Compliance Statement General Statement, May 2019, p 39

In our 2018-19 interim commentary, we noted our concerns with applying the Wright method (which implies a perfectly negative correlation between the risk free rate and market risk premium) to estimating the market risk premium.[32] The port continues to adopt the Ibbotson and Wright approach to derive a market risk premium estimate - deriving estimates of 6.48 per cent and 9.54 per cent respectively.[33] And possibly partly in response to our concerns, the port has diluted the higher market risk premium estimate of the Wright model by including the Dividend Discount Model (DDM) in its mix of approaches in its tariff compliance statement 2019-20.

To accommodate the dividend discount model approach, the port has reduced the weighting of the Wright model by half (to 25 per cent) and applied a weighting of 25 per cent to the dividend discount model. For the tariff compliance statement 2019-20, the dividend discount model approach gives an estimate for the market risk premium of 8.56 per cent.[34] Our preliminary view remains that the Wright approach is not a well-accepted approach by Australian regulators. In addition, our preliminary view is that we do not consider the dividend discount model is a well-accepted approach and the port has not at this stage provided a sufficient explanation as to why it adopted a third approach (that is the dividend discount model) to estimating the market risk premium.

Table 6 presents market risk premium estimates across the previous three tariff compliance statements.

Table 6   Comparison of the ports market risk premium approaches

Methodology	2017-18 TCS	2018-19 TCS	2019-20 TCS
Ibbotson MRP approach	6.53 %	6.56 %	6.48 %
Weighting	*50 %*	*50 %*	*50 %*
Wright MRP approach	9.01 %	8.86 %	9.54 %
Weighting	*50 %*	*50 %*	*25 %*
Dividend Discount Model	N/A	N/A	8.56 %
Weighting	*N/A*	*N/A*	*25 %*
Weighted average MRP	7.77 %	7.71 %	7.77 %

---

[32] In our 2018 interim commentary we also requested the port provide more transparency on how the market risk premium was derived under the Ibbotson method, and how the port converted the IPARTs market risk premium into an effective market risk premium for comparison with its own estimate. The port responded to our request in its 2019 tariff compliance statement and provided the additional information - Synergies Economic Consulting 2019, Determining a WACC estimate for Port of Melbourne, May 2019 pp 137 – 145.

[33] Synergies Economic Consulting 2019, Determining a WACC estimate for Port of Melbourne, May 2019, p. 145

[34] ibid., p. 145.

We maintain our preliminary view that the Wright method to estimating the market risk premium is not widely relied upon by Australian regulators

Our previous interim commentary noted that the port's market risk premium estimate was materially higher than other recent decisions by other Australian regulators and observed that this was driven by the port placing material reliance (50 per cent) on the 'Wright' approach.[35] Our commentary viewed the Wright approach as not being widely relied on by Australian regulators. Further, where it has been used, regulators have noted that evidence supporting its core premise was mixed.

With respect to the port's views for the Wright approach, our interim commentary concluded that the evidence considered by the AER and the ERA and the comments by the QCA contrasts with the port's submission that evidence supports the Wright approach and justifies the port's material reliance on the Wright approach. [36] We requested the port to consider the reliability of such an approach and reflect our findings and observations on recent regulatory sentiment.[37]

In response to our previous commentary:

- The port has recognised that although the Wright approach is not supported by all Australian regulators, evidence on the core premise of a constant market risk premium (provided by the Ibbotson approach) is also far from unanimous. The port notes that the AER's own advisors have acknowledged the feasibility of the inverse relationship between the risk-free rate and market risk premium relationship. The port also raises that in the QCA's final decision for Aurizon Networks December 2018, the QCA noted they will now have greater regard to the Wright approach.[38]

- In relation to the ERA's withdrawal of support for the Wright approach, the port primarily cites the analysis by Partington and Satchell for the AER. The port notes that although it does not disagree with Partington and Satchell's technical appraisal of the ERA's econometric analysis – it is not persuaded by those arguments. The port's position is to 'respectfully disagree' with Partington and Satchell's comments that the Wright approach has no 'well-accepted theoretical support', 'does not seem too much used, if at all' and 'runs contrary to the well accepted view that asset prices are inversely related to interest rate'. The port submits that it has presented a

---

[35] Essential Services Commission 2018, Interim commentary - Port of Melbourne tariff compliance statement 2018-19, 26 October, p. 54
[36] ibid., p. 59-60
[37] ibid., p. 59-60
[38] Queensland Competition Authority 2018, Aurizon Network's 2017 draft access undertaking – Appendices p. 69

wide range of evidence and as a result, maintains that the Wright market risk premium estimate should continue to be given some weight in the market risk premium estimate.[39]

- The port emphasises that at no point has it recommended the Wright approach should be the only source of information that informs the market risk premium estimate and highlights that the port's estimate adopts a mix of approaches.[40]

Our preliminary position is that we maintain our view that given the ERA's withdrawal of support of the Wright approach and the recent AER's WACC guidance final decision, the Wright approach may no longer be considered (to the extent it was ever considered to be) well-accepted by Australian regulators:

- The AER's recent decision on the rate of return rejected the Wright approach to estimating the market risk premium. The AER's position is that an approach (which implies a perfectly negative correlation between the risk-free rate and the market risk premium) that stabilises the return on equity is less likely to reflect market conditions over time.[41]
- The AER acknowledges there is some evidence for some negative correlation however concludes that this is not observed consistently and often this relationship is reversed (positively correlated). The AER also notes that these correlations do not prove a causal relationship between the parameters.[42]

Given the AER's recent decision and withdrawal of support for the Wright approach by the ERA, our preliminary view is that the port's weighting on the Wright approach may not be well supported.

The port has not explained why it has included the dividend discount model approach to estimating the market risk premium

The port's previous two tariff compliance statements had opted not to adopt the dividend discount model approach to estimating the market risk premium instead preferring some combination of the Wright and Ibbotson approaches. The reasons given by the port for not adopting the dividend discount model was driven by its lack of confidence in the model's underlying inputs and small sample of relevant Australian listed entities.[43] [44] However we note that the port does endorse the principles underpinning the dividend discount model approach.[45]

---

[39] ibid., p. 139-142
[40] ibid., p. 138
[41] ibid., p. 231
[42] ibid., p. 234
[43] Synergies Economic Consulting 2018, Determining a WACC estimate for Port of Melbourne, May 2018, p. 86
[44] Synergies Economic Consulting 2017, Determining a WACC estimate for Port of Melbourne, May 2017, p. 48
[45] Synergies Economic Consulting 2019, Determining a WACC estimate for Port of Melbourne, May 2019, p. 143

The port has previously specifically argued against adopting the dividend discount model for the following reasons[46]:

- The model's assumption of constant growth in dividends for all stocks over time is likely to be unrealistic and ignores intertemporal changes in dividend yields.
- Determining a constant growth assumption is also challenging.
- The model is only applicable to mature, stable companies who have a proven track record of paying out dividends consistently.
- Immature growth stocks or stocks more generally without a track record of paying dividends are not captured in the model.
- The dividend discount model is built on the assumption that the only value of a stock is the return on investment it provides through dividends rather than expectations of capital growth, which in practice is unrealistic.

In its tariff compliance statement 2019-20, the port provides only two reasons for justifying its adoption:

- The dividend discount model likely provides more reliable estimates of the market risk premium than the overall return on equity for individual stocks.[47]
- Three economic regulators have some regard to the dividend discount model approach when informing market risk premium estimates. Specifically, IPART, QCA and ERA use some form of the dividend discount model in their approach to estimating the market risk premium.[48]

At this stage, and based on the information provided, we consider that the port has not adequately addressed or clarified why its previous reservations no longer apply or explained what has caused the port to adopt the dividend discount model methodology. The port's previous reservations are similarly outlined in the AER's recent final decision on its rate of return.

The AER's final decision emphasises that:

- The dividend discount model assumes that market participants expect a stable return on equity, and then solves for the expected return on equity. The AER does not consider this a realistic assumption.[49]

---

[46] ibid., p. 84
[47] Synergies Economic Consulting 2019, Determining a WACC estimate for Port of Melbourne, May 2019, p. 143
[48] ibid., p. 143
[49] AER, Final 2018 Rate of Return Instrument: Explanatory Statement, December 2018, p. 256

- The growth rate is a key input into dividend discount model calculations and can lead to different estimates.[50] The port also noted that 'different estimates [of growth rates] can lead to substantial differences in final estimates of the market risk premium'.[51]
- The AER consider the issues with dividend discount model to be material. The AER does not consider that there is sufficient evidence to give the dividend discount model significant weighting in estimating the market risk premium.[52]

We are concerned that the port is adopting inconsistent approaches over time, which may be driven by outcomes rather than sound principles. Our preliminary view is that at this stage the port has not provided sound justification for adopting the dividend discount model when in previous tariff compliance statements, it had set out the shortfalls of this model and has not otherwise addressed those limitations.

At this stage the port has not provided enough information to assess whether it has applied the dividend discount model models correctly

The port has adopted three approaches to the estimation of the market risk premium using dividend discount models.[53] These are:

- Damodaran (2013), a modified two stage method
- Bank of England (2010), a multi-stage dividend discount model
- Gordon Constant Growth Model, a simpler model that serves as a useful robustness check on multi-stage approaches.

The port then applies an equal weighting to all three models as 'there is sufficient differentiation between assumptions in the models to provide an appropriate estimate when they are averaged'.[54]

Our preliminary concerns with the port's lack of justification aside, at this stage we consider that the port has not provided enough information on the assumptions used in each of the three dividend discount model approaches adopted for us to form a preliminary view on the appropriateness or otherwise of the implementation of those dividend discount models. If there are implementation errors this will mean that even if the dividend discount model was considered a well-accepted model, the WACC is likely to misestimate the rate of return required by a benchmark efficient entity with risk characteristics similar to the port.

---

[50] ibid., p. 254
[51] Synergies Economic Consulting 2018, Determining a WACC estimate for Port of Melbourne, May 2018, p. 104
[52] AER, Final 2018 Rate of Return Instrument: Explanatory Statement, December 2018, p. 263
[53] Synergies Economic Consulting 2019, Determining a WACC estimate for Port of Melbourne, May 2019, p. 144
[54] ibid., p. 144.

Our preliminary view is that the port should reassess its use of the dividend discount model to estimate the market risk premium and if it remains of the view that the dividend discount model is appropriate to use, provide detailed information on how it has implemented the model or models used in that estimate.

The port has maintained its gamma estimate of 0.25

The port's 2019-20 estimate for the gamma value is 0.25, consistent with its previous tariff compliance statements.[55] This remains at the lowest end of recent decisions (refer to Table 1). We attributed the port's low gamma value to its material (a third) weighting on a value of zero gamma.[56] Similarly, the port continues to apply equal weighting to the following three approaches to estimating the theta [57] and the gamma estimate:

- Surveys of finance academic literature and valuation experts which the port concludes indicates an estimate of zero gamma is reasonable.
- A non-market-based approach to estimating theta, including an equity ownership approach and review of tax statistics, which in turn yielded a gamma estimates of 0.5 [58]
- A market-based approach to estimating theta, including dividend 'drop-off' analysis and market value studies, which seek to ascribe the value that investors place on $1 of franking credits (the theta), which in turn yields a gamma estimate of 0.25.

The port has maintained their weighting on a zero gamma

The port submits that a gamma of 1 invoked by the commission to counter the port's gamma of zero is unsupported empirically and that it is not entirely clear that a zero gamma is a theoretical extreme given Australia is a country where the marginal investor is likely to be foreign.[59] The port additionally disagrees with our previous commentary that their academic literature referenced was not compatible with the foundational papers on gamma in Australia nor did they reference empirical evidence. The port outlines that none of the foundation papers referenced by us establish a value for gamma based on empirical evidence.[60]

The port highlights in its compliance statement that although it uses a gamma of zero in its mix of approaches, the port are not proposing full weight on a zero gamma. Given the pros and cons of

---

[55] Synergies Economic Consulting 2019, Determining a WACC estimate for Port of Melbourne, May 2019, p. 162
[56] Essential Services Commission 2018, Interim commentary - Port of Melbourne tariff compliance statement 2018-19, 26 October, p. 172
[57] Theta is a component of the gamma estimate. Estimating theta results in an estimate for gamma.
[58] Based on 70 per cent distribution rate. This value was updated in the port's 2019-20 tariff compliance statement from 0.45 to 0.50 but is immaterial on the overall gamma estimate.
[59] Synergies Economic Consulting 2019, Determining a WACC estimate for Port of Melbourne, May 2019, p. 258
[60] ibid., p 258

each methodology, the port applies a weighting of a third to a gamma of zero, equal to the weight it places on the market and non-market-based approaches. However, the port notes that it favours the market valuation approach given the evidence presented in the compliance statement.[61]

The port considers value in continuing to use the market-based approaches to estimate theta and gamma

Our previous interim commentary raised concerns on the port's submission that current regulatory sentiment on gamma remain mixed and that current regulatory precedent involves two distinct approaches, the market and non-market estimation method. We considered this not to be an accurate reflection of recent appeal decisions and sentiments since 2010 and commented that most Australian regulators are placing increasing weight on non-market approaches, particularly given the decisions in favour of AER's non-market approach.[62]

In response to our commentary, the port maintains that the current value of gamma in the regulatory setting is mixed with a range of 0.25 to 0.585.[63]

The port concedes that Australian regulators are placing increasing weight on non-market approaches and some recent appeal decisions found no error in the AER's and ERA's reliance on the non-market-based approach. However, the port submits that those regulatory decisions were made under a different regulatory framework to that of the pricing order.[64]

The port suggests we have only focused on the correctness of the port's estimate of gamma. The port considers such views are irrelevant under the port's pricing order and that the only relevant consideration for us is whether the approach or combination of approaches used to estimate gamma is well-accepted.[65]

In response to our commentary on adopting a higher weighting on non-market approaches to gamma, the port concludes that it does not believe there to be sufficient justification at this point in time for increasing the weight.[66] The port again emphasises that it is adopting an average of three approaches and not relying on a market-based approach exclusively.[67]

---

[61] ibid., p. 202-203

[62] Essential Services Commission 2018, Interim commentary - Port of Melbourne tariff compliance statement 2018-19, 26 October, p. 77

[63] Synergies Economic Consulting 2019, Determining a WACC estimate for Port of Melbourne, May 2019, p. 183

[64] ibid., p. 201-202

[65] ibid., p. 201-202

[66] ibid., p. 201-202

[67] ibid., p. 201-202

We maintain our preliminary view that the market-approach to estimating gamma is not well-accepted

Our initial view is that we consider the port's conclusion that there is no justification 'at this point in time' for increasing the weight to be selective. We found that the high weighting on the market-approach relative to non-market approach does not align with recent regulatory decisions and sentiment. For example, we looked at the following two scenarios:

- Australian regulators that currently adopt a 'utilisation' approach to estimating gamma which considers the extent to which investors can utilise the imputation credits they receive to reduce their tax or obtain a refund (based on equity ownership or tax statistics or other relevant measure); and
- Australian regulators that currently adopt an 'implied market value' approach to estimating gamma which is based on market valuation studies.

The summary of the findings is outlined in the Table 7.

Table 7   Gamma approaches applied by Australian regulators

Regulator[68]	Type of gamma approach
IPART	Market value approach
AER	Utilisation approach
ERA	Utilisation approach
QCA	Utilisation approach
ESC (water)	Utilisation approach
ICRC	Utilisation approach
ESCOSA	Utilisation approach
OTTER	Utilisation approach

Source: Frontier Economics, Issues in cost of capital estimation for the Port of Melbourne, December 2019, p 25

---

[68] IPART - Independent Pricing and Regulatory Tribunal; AER - Australian Energy Regulator; ERA - Economic Regulation Authority Western Australia; QCA - Queensland Competition Authority; ESC - Essential Services Commission of Victoria; ICRC - Independent Competition and Regulatory Commission; ESCOSA - Essential Services Commission of South Australia; OTTER - Office of the Tasmanian Economic Regulator

We maintain our preliminary view that the utilisation approach, and not the market value approach to estimating gamma, is the well-accepted approach when setting gamma within the context of an economic regulatory regime. Our initial view is that the port should consider reviewing the appropriateness of its use of market based approaches to estimating gamma in preparing future tariff compliance statements.

We disagree that the payout ratio was not contentious

The payout ratio reflects how much of the dividend imputation credits generated are actually paid out to shareholders. The port's previous tariff compliance statement submitted that a payout ratio estimates of 0.7 was not contentious.[69] Our commentary noted that several regulators have highlighted issues with relying on tax statistics data and have adopted estimates of 0.83, namely the AER, ERA and QCA. We reference that the estimate of 0.83 was derived from work undertaken by Lally using data for the years 2000 to 2013.[70]

In its response, the port noted that the three recent decisions by Australian regulators relied on the same methodology – only to corroborate each other's findings and payout ratio estimate of 0.83 concluded by us.[71]

The port additionally raises issues with the AER and ERA approach, specifically the 'Lally 50 firms' approach. Lally's approach bases the distribution rates on the top 50 firms on the ASX. This leads to a payout ratio of approximately 90 per cent. The port notes that concerns have been raised with Lally's approach insofar as it places no weight on ATO-based data.[72] The concerns that the port raises are that:

- The 50 firms are not appropriate comparators for the benchmark efficient entity.
- The methodology relies on the use of franking account balances, which is a main criticism of the taxation statistics approach which is no longer relied upon by the AER.
- The distribution rate for listed firms can be distorted by the presence of foreign profits – this causes issues with applicability to the port's benchmark efficient entity which provides prescribed services in Australia.[73]

---

[69] Synergies Economic Consulting 2018, Determining a WACC estimate for Port of Melbourne, May 2018, p. 89
[70] Essential Services Commission 2018, Interim commentary - Port of Melbourne tariff compliance statement 2018-19, 26 October, p. 75-76
[71] Tariff compliance statement 2019-20
[72] Synergies Economic Consulting 2019, Determining a WACC estimate for Port of Melbourne, May 2019, p. 184-185
[73] ibid., p. 184-185

The port's adoption of a 0.7 distribution rate was based on the AER's 2009 WACC guideline review.[74] Specifically, we note the AER's 2018 final decision on the rate of return guidelines has adopted a distribution rate of 0.9. This was based primarily on data of audited financial reports of the top 50 ASX listed firms over the period of 2001 to 2017.[75] The report also noted other sources of the distribution rate – noting publicly available ATO franking account balance data which indicated an aggregate distribution rate of 0.765 for all listed firms over the period 2004-2016.[76]

The AER considers an estimate of the payout ratio estimated from listed equity would be appropriate for a regulated firm operating efficiently. Unlisted firms are owned by individuals who have an incentive to reduce dividends to limit the amount of tax paid at higher marginal personal rates. Therefore, the dividend policy of these firms would be different from a regulated firm acting efficiently and a distribution rate from all equity will overcompensate such a firm.[77]

Our preliminary view is that the port should revisit the appropriateness of the distribution rate used in its estimate of gamma in light of recent regulatory decisions.

The port's approach has led to an upward bias in its beta estimate

We consider that the port's current approach to estimating beta to create the notional benchmark efficient entity (BEE) leans away from compliance with the pricing order which places requirements on the port in creating a benchmark efficient entity.[78]

In the tariff compliance statement 2019-20, the port has maintained an asset beta of 0.70. This translates to an equity beta of 1.0 when combined with the port's estimated gearing ratio of 30 per cent. We raised a number of concerns in our 2018-19 interim commentary in relation to the approach the port has adopted when estimating beta. The port has addressed a few of these concerns in its 2019-20 tariff compliance statement. In particular, the port has now excluded airports from its comparator sample as our initial view was that the inclusion of airports was questionable given that they only derived a small proportion of revenues from freight. And the port is now seeking comparators drawn from developed economies similar to Australia.

However, there remain a number of issues arising from the port's estimation of beta, which we also raised in our 2018-19 interim commentary, that it may wish to revisit in its next tariff compliance statement – the inclusion of railroads as a set of comparators, its choice of industry classification system, and the exclusion of low significance comparators.

---

[74] Synergies Economic Consulting 2018, Determining a WACC estimate for Port of Melbourne, May 2018, p. 123
[75] AER, Final 2018 Rate of Return Instrument: Explanatory Statement, December 2018, p.309
[76] ibid., p. 309
[77] AER, Final 2018 Rate of Return Instrument: Explanatory Statement, December 2018, p.331
[78] See clause 4.1.1 (a) of the pricing order

Our initial view is that the port should review its approach concerning the inclusion of railroads and consider other industry classification systems in compiling its comparator set

To estimate its beta, the port used data from marine ports and services and railroads companies, including:

- 11 marine ports and services firms, and
- 8 railroads (one from Australia, four from the US and three from Canada)

We sought independent advice on the port's choice of comparators and our initial view is that the railroad comparators do not appear to have similar systematic risk profiles as the port. A comparison of the port with the eight railroad comparators it included in its comparator set is summarised in Table 8.

Table 8   Summary of Port of Melbourne and railroad comparators

	Port of Melbourne	Aurizon (Australian)	US & Canadian railroads
Industry sector	Ports	Freight rail	Freight rail
Predominant revenue sources	Containers	Bulk freight (coal)	Bulk freight (varied courses)
Trade exposed	Yes	Coal	Yes
Long term contracts with customers	No	Yes	Mixture of short term and longer term
Integrated into transport	Landlord only	Track plus transport	Track plus transport
Operating leverage	High	Medium-high	Medium
Exposed to competition/ regulation	Minor degree	Minor degree Heavily regulated	Significant degree Lightly regulated

Source: Frontier Economics, Issues in cost of capital estimation for the Port of Melbourne, December 2019, p 15

Each of the factors outlined in Table 8 suggest that Aurizon and the US and Canadian Railways are not good direct comparators of the port. For example, Aurizon's use of longer term contracts,

and small proportion of revenue from containerised businesses suggest that its systematic risk is not closely comparable with the port. Similarly, the North American and Canadian railways are not in the same industry as the port, are not land-lord operators, and operate in a different jurisdiction to the port.

We consider the inclusion of the railroad comparators appears to be driving up ports asset beta estimates. That is, if the railroad comparators (and the three logistics firms) are excluded from the sample:

- the median asset beta estimate (across 5-year and 10-year estimates) would fall to 0.53, and
- the mean asset beta estimate (across 5-year and 10-year estimates) would fall to 0.68.[79]

We suggest the port investigate further whether the characteristics of those railroad firms warrant their inclusion in the overall comparator sample or alternatively the port may want to review the weightings of the betas in the North American railroads, or consider the betas as upper bound values only.

Relevant comparators may have been excluded from ports set of comparators

Our preliminary view is that the port should investigate whether it has omitted relevant comparators that ought to be included in its sample. The port has used a reputable industry classification system known as the Global Industry Classification Standard (GICS). However, GICS is one of a number of such classification systems. Other systems include the Bloomberg Industry Classification System (BICS), the Thomson Reuters Business Classification (TRBC) system and the Industry Classification Benchmark (ICB) system.

Investigations using all four classification systems identified 6 companies that the port may have included in its sample of comparators which may be inappropriate comparators and 4 new companies that were excluded by the port which seem more appropriate comparators.[80] Table 9 outlines all the companies identified through the investigations and notes if it was included in the ports sample of comparators.

Table 9   Ports comparators

FIRM	PORT
China Merchant Ports Holding Company	Final sample
Cosco Shipping Ports	Final sample
Port of Tauranga	Final sample

---

[79] Frontier Economics, Issues in cost of capital estimation for the Port of Melbourne, December 2019, p 12
[80] ibid., p.20. Frontiers process of investigation to identify ports comparators is outlined in detail on p 17 of the report.

Hutchinson Port Holdings Trust	Final sample
Ocean Wilsons Holdings	Excluded – holding company
China Infrastructure & Logistics Group Lt/CIG Yangtze Ports PLC	Excluded – missing data
Global Ports Holding PLC	Excluded – holding company
Global Ports Investments	Final sample
Marsden Maritime Holdings Limited	Excluded – holding company
Mercantile Ports and Logistics Limited	Excluded – statistically insignificant
South Port New Zealand Limited	Excluded – statistically insignificant
Xinghua Port Holdings Limited	Not considered
PYI Corporation Limited	Not considered
Bremer Lagerhaus-Gesellschaft AG	Excluded – statistically insignificant
The following may have been included in the ports comparator sample but may not be appropriate comparators as their main activities are not relevant to the activities of a port operator or port owner)	
Qube Holdings – classified as logistics	
Hamburger Hafen und Logistik – classified as logistics	
Dalian Port – not FTSE developed	
Dongbang Transport Logistics – classified as logistics	
Rinko Corporation – classified as transportation and real estate	
Sakurajima Futo Kaisha – classified as transportation and warehousing	
The following have not been included in the ports sample but have been identified as potential appropriate comparators	
Xinghua Port Holdings	
Marsden Maritime Holdings Limited	
Global Ports Holding	
Ocean Wilsons Holdings	

Source: Frontier Economics, Issues in cost of capital estimation for the Port of Melbourne, December 2019, p 18-19

The port may wish to investigate whether the sample of relevant port comparators can be expanded which may assist in reducing reliance on railroads which, in our preliminary view, are less obviously appropriate comparators.

Exclusion of firms with statistically significant betas remains unaddressed

In our 2018-19 interim commentary, we raised concerns that the port's approach of filtering out beta estimates that were not found to be statistically significant is likely to bias the overall beta estimate up. In our view, the ports response to our concern outlined in its tariff compliance statement 2019-20 is not persuasive:

- the port has not addressed our main concern that the test for statistical significance applied by the port will tend to exclude stocks with low beta estimates (because those estimates are close to zero) and retain stocks with high beta estimates—even if both sets of estimates have a similar degree of statistical imprecision. That is, there is an inherent asymmetry in the ports approach, which could result in an upward-biased estimate of beta.

- Further, the analysis that the port presents in response to our concern (set out in Appendix B.5 of the Synergies report and summarised in 2 below) appears to be somewhat misleading. Figure 2 presents the thresholds for statistical significance consistent with a t-statistic of 2 (or a 5% level of significance). However, it appears as though the port applies two criteria for assessing statistical significance:

  – The t-statistic of the beta estimate must be at least 2; and
  – The R-squared of the estimate (which measures statistical explanatory power) must be at least 10%.

When the sample size used to estimate the beta of an individual stock is 60 (i.e., consistent with five years of monthly returns data), an R-squared of 10% is equivalent to a required t-statistic of 2.54. This translates to a level of significance of approximately 1%, which is a very stringent requirement by conventional standards.[81] This implies that the number of comparators the port is actually excluding from its sample is greater than implied by the analysis set out in Appendix B.5 of Synergies' 2019 report.

---

[81] In the case of a one-tailed test, which would correspond more closely to the present case, the level of significance would be approximately 0.5 per cent, which would be an unusually strict level of significance.

Figure 1　Synergies presentation of 5-year asset beta estimates, standard errors and cut-offs for statistical significance
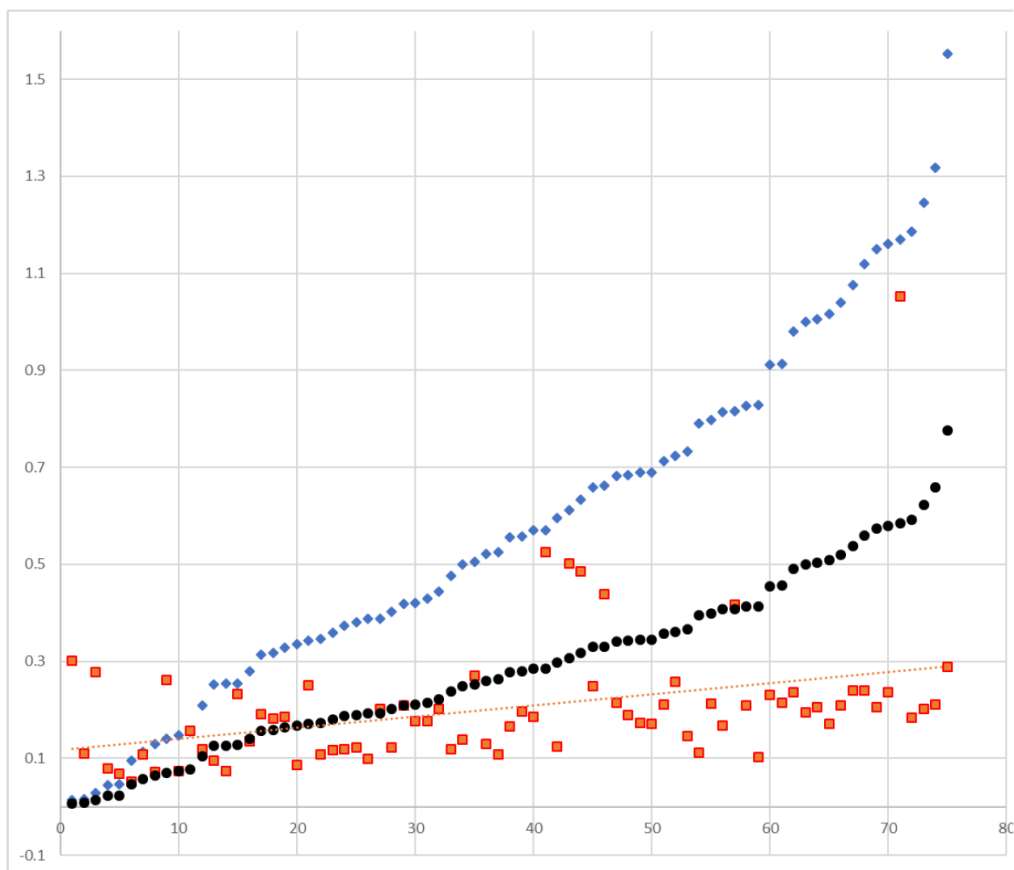
Source: Synergies 2019 report, Figure 18, p. 230.

The port's use of its R-squared rule is asymmetric and may introduce an upward bias in its estimates

The port requires that an individual beta estimate must have an R-squared of at least 10% before it is included in its sample. Low beta estimates will have low R-squared and will be excluded even if the estimate is highly precise.[82] However, the port does not have an analogous statistical filer that would exclude high beta stock, which would likely introduce an upward bias in its overall beta estimate.

Additionally, the port appears to have applied its statistical filtering rule inconsistently. The statistical significance filter is used as the sole justification for eliminating 24 Marine comparators from its sample. However, there are several instances where comparators were retained failing the significance criterion, or omitted despite passing the criterion. [83]

---

[82] Frontier Economics, Issues in cost of capital estimation for the Port of Melbourne, December 2019, p 41-42 for an explanation of low beta, R-squared and sample size.
[83] ibid, p 43.

The impact of the statistical significance filter on the port's beta estimate is outlined in Table 10

Table 10   Comparator asset beta summary under different approaches to statistical significance

		Ports rule	Ignore significance
Rail	Mean	0.87	0.72
	Median	0.94	0.80
	Max	1.11	1.11
	Min	0.38	0.18
Ports	Mean	0.68	0.39
	Median	0.53	0.52
	Max	1.22	1.22
	Min	0.39	-0.22
Full	Mean	0.76	0.48
	Median	0.79	0.73
	Max	1.22	1.22
	Min	0.38	-0.22

Source: Frontier Economics, Issues in cost of capital estimation for the Port of Melbourne, December 2019, p 43

If we do not apply the same significance criterion as the port, this reduces the average asset beta substantially by 0.15 for the rail sample, and 0.29 for the ports sample and by 0.28 for the full sample.

For the reasons outlined above, the concerns raised by us on the port's approach to filtering out estimates found to not be statistically significant remain unaddressed. Furthermore, we considered the impact to the estimates of the WACC applied by the port by removing both railroads as comparators and the upward bias in the estimates of the port's beta. The results are outlined in Table 11 with a gamma of 0.25 and 0.4.

Table 11   Pre-tax nominal WACC sensitivity analysis

	Asset Beta Approach				
Gamma	Port values	Port average	Remove significance filter	Remove rail comparators	Remove rail comparators and significance filters
0.25	10.46%	11.00%	8.38%	10.26%	7.57%
0.4	9.97%	10.49%	8.01%	9.80%	7.24%

Source: Frontier Economics, Issues in cost of capital estimation for the Port of Melbourne, December 2019, p 28

The port's estimated WACC would be within the range of 7.30 per cent to 8.00 per cent, pre-tax nominal (at gamma of 0.4 and 0.25 respectively), if the upward bias in the estimation of beta was addressed and if railroads were not used as benchmark comparators. As noted previously, we had raised similar concerns in our 2018-19 interim commentary and consider that the port in its tariff compliance statement 2019-20 has not addressed our concerns on the basis of the information provided to date. We strongly suggest the port review its approach to estimating the equity beta in its future tariff compliance statements and the explanation given for that approach.

Regulatory modelling and deferred depreciation

We are satisfied with the port's revised regulatory model

In our previous commentary, we had several concerns regarding the port's regulatory modelling. Our main modelling concerns were as follows:

- asset calculations were complex and not sufficiently transparent
- the modelling did not cover the full 50-year port lease period
- the modelling included unrecovered depreciation in the aggregate revenue requirement calculation
- the modelling did not correctly recognise that capital expenditure was assumed to be incurred in the middle of the year
- the modelling did not use the same CPI to index both tariffs and the capital base

We suggested the port simplify the model to reduce its complexity and increase its transparency and include a user manual or other explanatory material to aid useability of the model.

In response to our feedback, the port submitted a revised, simpler and more transparent regulatory model and user guide. The revised structure of the model clearly distinguishes inputs, calculations and outputs with common formatting, and includes explanatory notes in each of the tabs. Further, the model covers the full 50-year port lease period, which gives greater transparency in its calculation of how asset values might change when the tariff adjustment limit (TAL) does not apply and the impact of deferred depreciation on the capital asset base in the post-tariff adjustment limit period. The port has reduced the complexity of the calculation of asset values in its model. [84]

We had previously noted in our 2018 interim commentary that the port had included depreciation in its revenue requirement even though the port was not seeking to recover depreciation in its revenues. We considered that this had the effect of materially misrepresenting the port's revenue requirement. The port has now resolved this by presenting the aggregate revenue requirement in two ways – one excluding unrecovered depreciation, the other including it.

The port has also amended its model to treat capital expenditure as being incurred mid-year. Our initial view is that this satisfies clause 4.6.1(b) of the pricing order, which requires capital expenditure to be recognised as if it is all incurred in the middle of the year. This is mostly given effect in how inflation is applied to capital expenditure.

---

[84] The number of rows in the 'Capital Base' tab has been reduced to 177 from just over 800 the previous period which aids us (and any other interested stakeholders) in understanding the port's asset calculations. Port of Melbourne, 2019-20 Tariff Compliance Statement: Appendix B, Capital Base tab, May 2019.

In our previous commentary, we had raised a concern about the port's usage of an 'actual' versus 'lagged' March CPI to escalate prices/revenues and index the capital base. The port has addressed this concern, by applying the same 'lagged' March CPI to index both tariffs and the capital base. We agree with the view of the port that 'the annual March CPI will be the long-term approach' as 'consistency of approach is important over time'.[85]

The port should provide more information on its deferred depreciation and impact on future prices

In its modelling, the port has continued the use of the alternative depreciation method, recognised in clause 4.4.2(a) of the pricing order, rather than straight-line depreciation under clause 4.4.1 of the pricing order. The port has used this methodology as a result of the application of the tariff adjustment limit to the Aggregate Revenue Requirement determined by the port, which prevents the port from increasing tariffs to the level whereby the port could recover its aggregate revenue requirement with the application of straight-line depreciation.[86] Therefore, the port has set the 2019-20 return of capital to zero and deferred recovery of straight-line depreciation to future years. This method is recognised in the pricing order provisions relating to depreciation, including clause 4.4.3, which requires that the return of capital allowance is not below zero.

Depreciation accounts for a significant share of the port's aggregate revenue requirement. For example, based on the port's regulatory model, assuming at the end of the tariff adjustment limit period 2032-33, the total depreciation available for recovery is estimated at $2,281 million.[87] The depreciation building block in 2032-33 will be equal to straight line depreciation for that year plus all deferred depreciation accumulated since the beginning of the lease period. We had previously noted in our interim commentary that tariffs could increase significantly if depreciation is deferred until the tariff adjustment limit ceases to apply, and outlined to the port to provide us with information on the timing and approach for recovering its deferred depreciation.

In response to our feedback from last year, the port's regulatory model demonstrates that its methods for calculating deferred and straight-line depreciation only recover depreciation once over their economic lives. In addition, the port has explained in detail its five-step approach to

---

[85] Port of Melbourne, 2019-20 Tariff Compliance Statement, May 2019, p. 43.

[86] The imposition of the tariff adjustment limit has constrained the port's ability to align prices to enable the recovery of its revenue requirement if depreciation were included. The pricing order is silent on the requirements of the depreciation profile put forward by the port. But we have stated throughout our previous guidance to the port, that the depreciation profile should ensure that assets are only depreciated once over their economic life, or otherwise by the end of the port lease.

[87] Port of Melbourne, 2019-20 Tariff Compliance Statement: Appendix B, Return of Capital tab, May 2019.

calculating the return of capital for the tariff adjustment limit period in its tariff compliance 2019-20[88] and in the regulatory model's user guide.[89]

However, the port has not clearly indicated in its model or tariff compliance statement 2019-20 how it is going to recover the deferred depreciation in the future years. While the port has built-in a mechanism or tool to implement this treatment, it has not made use of it in the model.[90]

In its tariff compliance statement 2019-20, the port stated that it cannot provide us with a 'precise indication of the timing and approach for recovering its deferred depreciation'. The port continues to maintain that it will consult 'port users and other stakeholders and the ESC on options for recovering any deferred depreciation to minimise volatility in tariff levels through price smoothing closer to the end of the tariff adjustment limit period'.[91] We note that in our 2018-19 interim commentary, the port stated that its users were satisfied with the level information provided by the port.[92]

We sent a 'request for information' to the port to provide an update on its approach to consulting port users and other stakeholders on options for recovering any deferred depreciation. In its response, the port noted that there were a number of factors that remain uncertain and as such, the exact timing and nature of consultation required as the port approaches the conclusion of the tariff adjustment limit period has not yet been determined. These factors include:

- the expected timing of the conclusion of the tariff adjustment limit period
- movements in CPI over the duration of the tariff adjustment limit period and beyond
- actual and forecast demand for prescribed services
- actual and forecast expenditure over the duration of the tariff adjustment limit period and beyond, including the amount of unrecovered depreciation
- key regulatory settings, such as the length of the regulatory period, during the tariff adjustment limit period and beyond
- industry and policy settings.

We understand that it can be difficult to forecast accurately 20+ years into the future but note that in industries with significant and lumpy infrastructure spends, capital planning and forecasting over a lengthy time period is a normal part of business.

As outlined in our previous interim commentaries, the pricing order provisions (clause 4.4.2(b)), set out that an (alternative) depreciation profile consider pricing impacts, implying that the recovery of

[88] Port of Melbourne, 2019-20 Tariff Compliance Statement, May 2019, p. 41.
[89] Port of Melbourne, 2019-20 Tariff Compliance Statement: Appendix C, May 2019, p. 11.
[90] Row 69 (in Return of Capital tab, the port's Regulatory Model 2019-20) allows for depreciation to be deferred in order to smooth tariffs by nominating a per centage to defer, but this row has been left blank by the port.
[91] Port of Melbourne, 2019-20 Tariff Compliance Statement, May 2019, p. 42.
[92] The Essential Services Commission, 2018-19 Interim Commentary, Oct 2018, p. 26.

deferred depreciation minimise any volatility in tariffs through price smoothing, and at least certainly once the tariff adjustment limit period has concluded.

We continue with our preliminary view that the port should consider providing us and other stakeholders with illustrative modelling to demonstrate the impact of its depreciation method on future tariffs for its next tariff compliance statement, and provide us with updates from port users on their views on the port's proposed recovery method.

Appendix A Issues raised in our interim commentaries

Issue	Commission views in 2017 commentary	Commission views in 2018 commentary	Commission views in 2019 commentary
WACC	The port's approach to estimating the WACC appears to differ from established regulatory approaches and has resulted in a relatively higher WACC estimate than seen in comparable industries.	The port's WACC value is high by comparison to other regulatory determinations and is our primary area of concern with the port's tariff compliance statement. The port's WACC is derived partly from the 'Fama French three factor' model, which has not been used in setting a rate of return by any Australian regulator. Our examination of recent Australian regulatory decisions indicates this model may have significant theoretical and empirical shortcomings that may undermine its suitability for use in a regulatory context. Other input parameters in the port's WACC estimation, namely the market risk premium, asset beta and gamma, contribute to the port's relatively high WACC estimate.	Our view on the port's WACC value is similar to our 2018 interim commentary. We note that the port has reduced the weighting given to the Fama French three factor model to five per cent. However, we continue to consider that there are issues with other input parameters in the WACC applied by the port – in particular the market risk premium, asset beta and gamma, which contribute to the relatively high WACC estimate.

| Length of regulatory period | The port has yet to decide on the length of its future regulatory period(s) but has signalled a period as long as the remaining lease term of 48 years. We expect the port would consult with us and port users on the practicalities and implications of a longer regulatory period. | N/A | The port is still yet to decide on the length of its future regulatory periods. The port has signalled the use of a longer regulatory period once it settles its position on strategies and performance standards. The port notes that it will consult with port users and stakeholders on the benefits and practicalities of applying a longer period.

We expect the port would consult with us as it develops its position as to the use of any longer regulatory period. |

Deferred depreciation and price impacts	The port has deferred recovery of its depreciation costs but has not specified how or when it will recover those costs. We would expect the port to provide further information on how it will recover deferred depreciation in future tariff compliance statements.	We appreciate that the port faces some challenges in providing certainty on the eventual recovery of deferred depreciation, and possible price impacts, as this depends on how costs and revenues change over the long term. We will continue to engage with the port on what further information might demonstrate compliance with the pricing order and otherwise be of interest to port users.	The port has not provided any clear indication of its proposed timing and approach for recovering deferred depreciation. We consider this issue of significant importance. The port maintains that it will consult port users, other stakeholders and the commission on options for recovering any deferred depreciation to minimise volatility in tariff levels through price smoothing closer to the end of the tariff adjustment limit period. We continue to consider that the impact of any deferred depreciation on future prices is unclear and that the port should provide greater clarity through its modelling of this impact in future tariff compliance statements.
Inclusion of depreciation in the revenue requirement	n/a	The port has included amounts reflecting depreciation in its revenue requirement even though the port is not seeking to recover depreciation in its revenues. This appears to materially misrepresent the port's revenue requirement and we expect it to clarify its approach in future statements.	The port has presented its revenue requirement with and without deferred depreciation. We expect the port to continue presenting its revenue requirement without deferred depreciation to illustrate its impact on the port's revenue recovery.

Treatment of contract revenues in the revenue requirement	n/a	The port's treatment of costs and revenues arising from prescribed services contracts should be clarified. Our view of the pricing order provisions is that both the costs and revenues associated with these contracts should be included in the revenue requirement.	As agreed with the commission, the port has applied the following: – 'Prescribed Services' revenue (subject to the tariff adjustment limit)' does not include revenue associated with contracts for Prescribed Services – 'aggregate revenue requirement' includes revenue associated with legacy contracts. The port has added 'Prescribed Services' revenue (subject to tariff adjustment limit)' for the purposes of comparing it with the 'aggregate revenue requirement' We expect the port to maintain this approach.
Weighted average tariff increase – inclusion of export tariffs	n/a	In calculating the WATI, the port has included price changes for export tariffs. Clause 3.8(b)(i) of the port concession deed provides for them to be excluded.	The port has presented the WATI with and without export tariffs to demonstrate compliance with the port's pricing order. We expect the port to continue this approach.

Weighted average tariff increase – use of sales volumes as weights	n/a	The port calculated the weighted average tariff increase using historical sales volumes as weights. The pricing order provides for tariffs to be weighted according to historical revenues.	The port has calculated the WATI using audited 2017-18 revenues in accordance to the port's pricing order. These revenues were audited by KPMG. We expect the port to continue calculating its WATI with respect to audited historical revenues.
Tariff adjustment limit – cumulative not annual percentage changes	n/a	The port's calculation of reference tariffs escalates prices from 1 July 2016, as published in the pricing order, by the percentage change in the CPI since March 2016. Clause 3.2.1 provides that the port, in the absence of an approved rebalancing application, may only revise each tariff in respect of a financial year by the 'same percentage adjustment'.	The port has calculated its 2019-20 tariffs by applying a cumulative CPI index to the Initial Prescribed Service Tariffs, rather than applying the annual CPI to previous year's tariffs. We acknowledge this results in minor aggregate rounding differences that are self-correcting over time as shown in the Regulatory model. We expect the port to continue applying the cumulative CPI index for future tariff compliance statements.

| Tariff adjustment limit – rounding | n/a | The port's calculation of reference tariffs rounds tariffs to either two or four decimal points, depending on how these were published in the pricing order schedule. This results in prices not changing by the same percentage adjustment each year as per clause 3.2.1 of the pricing order. | The port's previous approach to applying the annual CPI to previous year's tariffs rather than the cumulative CPI index to the Initial Prescribed Services Tariffs have resulted in minor rounding differences.

The port has acknowledged that the previous approach to applying CPI has led to prices not adjusting equally each year as per clause 3.2.1 of the pricing order. The port has presented this in a tab in its regulatory model, which compares the impact of the rounding approach. Absent of the impact of annual adjustments than compound adjustments, the port's price movements would be the same. The port's approach results in minor aggregate rounding differences that are self-correcting over time. |
| Tariffs - slipway | n/a | Prices for slipway services are not listed in the pricing order nor were in previous tariff schedules. The port may need to provide further justification for why they are not listed in the pricing order and should now be recognised. | The port has removed slipway tariffs from the Reference Tariff Schedule and will rely on individual Prescribed Services' contracts for this service.

We expect the port to continue adopting this approach. |

| Tariffs – prices expressed as percentages not dollar values | n/a | The prices for some tariffs are expressed as a percentage of prices for other tariffs, rather than a dollar amount. | The port has presented all tariffs as dollar amounts within the port's regulatory model (Appendix B) of the port's tariff compliance statement. However the port's Reference Tariff Schedule (Appendix A) has presented some tariffs as a percentage of other tariffs.

In response to a request for information, the port has expressed its intent to keep the Reference Tariff Schedule as concise as possible by expressing reduced channel fees for certain vessel types as a proportion of the full rate.

We note the Pricing Order uses percentages and is not definite in using dollars rather than percentages; therefore, at this stage we are satisfied with the port's presentation of tariffs. |
| The port's modelling of asset values | n/a | The port's calculation of asset values in its regulatory model is complex. Most of these calculations appear redundant as the port is deferring depreciation. If these calculations are retained in future tariff compliance statements, they should be explained in the port's supporting materials and otherwise made clearer. | The port has addressed our key concerns regarding its regulatory model. The revised model is 'simpler and more transparent' and includes a user guide. The logic and structure of the asset value calculation looks reasonable.

Overall, we are satisfied with the port's new model at this stage. |

| Sufficiency of supporting information | n/a | The port should provide more information justifying its approaches to capital expenditure; operating expenditure; cost allocation; asset lives and demand forecasts in future tariff compliance statements. | **Capex** - we asked the port to provide an explanation for large percentage increases in some capex categories. The port responded with some detailed explanations. This included, low capex base in the previous year, and deviation in actual capex compared to forecast capex.[93]

Further, the port has explained the forecasting methodology used to derive its capex forecast and explained why its capex is prudent and efficient.[94]

Opex – the port has provided information to explain its trade volume forecasts and approach (Appendix K, L and M) and its opex forecasts and methodology (Attachment 1).

Further, the port has explained why its forecasts used to derive its operating expenditure is prudent and efficient (Attachment 1). |

[93] Port of Melbourne, Response to Essential Services Commission Information Request # 3 19 August 2019 CONFIDENTIAL, pp. 1-6.
[94] Port of Melbourne, 2019-20 Tariff Compliance Statement, May 2019, p. 54-62.

Cost allocation – the port has prepared a new Cost Allocation Model and an accompanying Cost Allocation Model User Guide – Appendices D and E. They demonstrate and explain how the port complies with the Pricing Order to attribute and allocate its costs: (1) between Prescribed Services, non-Prescribed Services and shared services, and (2) between individual Prescribed Services.[95]

Asset lives – the asset categories and economic lives that the port has presented in its 2018-19 tariff compliance statement were consistent with the CH2M report, except for Channels and Plant. The port had already explained its reasoning for this variation in its response to our request for information.[96] Further, the port does not consider that these changes have a material impact on the depreciation profile and are reasonable in order to better reflect the economic lives of sub-categories of assets

---

[95] Port of Melbourne, 2019-20 Tariff Compliance Statement, Appendix D and E, May 2019.
[96] Port of Melbourne, Response to Essential Services Commission Information Request # 2 16 August 2018 CONFIDENTIAL, pp. 20-23.

Demand forecasts – we asked the port to provide further information on its demand forecast as we found there was not sufficient information to replicate the ports demand forecasts. In its 2019-20 tariff compliance statement the port has provided the forecasting model and its approach and method to forecasting.

We expect the port to continue to provide the same level of supporting information on the aforementioned items.

Appendix B Synergies' approach to calculating the WACC applied by the port

Element	Approach for 2017-18	Approach for 2018-19	Approach for 2019-20
WACC formulation	Pre-tax nominal as required by the Pricing Order	No change	No change
one or a combination of well-accepted approaches	The port presented its views on the meaning of well-accepted in the context of the Pricing Order	Based on engagement with the commission and the commission's published SoRA, the port believes the majority of the 2017-18 tariff compliance statement is aligned with the commission's view	No change
Benchmark efficient entity	45 entities across (i) Marine and Ports Services (22), (ii) Railroads (10) and (iii) Airports (13) GICS classifications	6 additional entities as a result of removing the US$100m market capitalisation threshold in response to the commission's commentary (new total comparison set of 51 entities)	19 Entities with FTSE Developed classification across (i) Marine and Ports Services (11), (ii) Railroads (8)
Capital Structure	Represented the mid-point (rounded to the nearest 5%) of the gearing ratios for the 17 investment-grade listed benchmark efficient entities of 22% and the gearing ratios for the 3 privatised Australian ports of 42%	No change to approach. Updated median gearing ratio for the 17 investment-grade listed benchmark efficient entities is unchanged at 22% and there have been no new Australian port privatisations	No change to approach. Reflects the midpoint of updated median gearing ratio for the 10 investment-grade listed benchmark efficient entities (21%) and the average acquisition gearing of new Australian port privatisations (42%) and is consistent with the average gearing of the comparator set.

Cost of equity approaches	In the absence of any substantive grounds to favour one over the other, an equal weighting of the SL CAPM, Black CAPM and FFM estimation methods	No change to approach	90% weighting on the SL CAPM, 5% weighting on the Black CAPM, 5% weighting on the FFM
SL CAPM		No change to approach, but there has been a slight decrease in the risk-free rate and market risk premium	No change to SL CAPM methodology, but there was a range for the market risk premium and asset beta inputs into the SL CAPM formula rather than a point estimate
Risk-free rate	20-day average of the 10-year Australian Government bond yield to 31 March 2017	No change to approach. Updated to reflect the 20-day period to 31 March 2018.	No change to approach. Updated to reflect the 20-day period to 29 March 2019 (being the last business day of March 2019).
Beta	Based on the median (0.68) and average (0.69) 5-year asset betas (rounded to the nearest 0.05) for the 45 comparators, corresponding to an equity beta of 1.00 with 30% gearing. Supported by the 10-year asset beta median (0.75) and average (0.74).	No change to approach. Median (0.69) and average (0.72) 5-year asset betas for the 51 comparator benchmark efficient entities are largely unchanged as a result of the 6 additional entities and updated data, supporting the same asset beta (rounded to the nearest 0.05). Also supported by the 10-year asset beta median and average of 0.75.	No change to approach, but comparator set now consists of 19 entities. 0.70 (low and point estimate) – 0.75 (high)

Market risk premium	In the absence of any substantive grounds to favour one over the other, a 50:50 weighting of the Ibbotson and Wright market risk premium methodologies	No change to methodology, estimates updated for an additional year of data. Wright market risk premium adjusts in line with changes in risk-free rate.	market risk premium is now based on a 50% weighting to the Ibbotson market risk premium, a 25% weighting to the Wright market risk premium, and a 25% weighting to dividend discount model. The lower end of the range is driven by a higher weighting to Ibbotson (66.7%) and correspondingly lower weightings to Wright and dividend discount model (16.7% respectively).
Gearing ratio	The gearing levels for the Port's comparator set ranged from 22 per cent to 42 per cent. Synergies adopted an initial gearing level of 30 per cent, close to the mid-point of the sample range.	Consistent with previous approach. Gearing level unchanged at 30 per cent.	Consistent with previous approach. Gearing level unchanged at 30 per cent.
Demand forecasts		The port used all forecasts provided by its consultant for 2018-19. This is a change in approach from 2017-18, where the port in some cases used its own figures and compared these to its consultant's forecasts.	No change to approach.
Black CAPM		No change to approach. Estimate is identical to SL CAPM estimate due to equity beta of 1.00.	No change to approach. Estimate is identical to SL CAPM estimate due to equity beta of 1.00.

Zero beta premium	3.34%. Based on SFG Consulting (2014). Cost of equity in the Black Capital Asset Pricing Model, 22 May.	No change	3.36%. Based on updated Synergies estimate to the end of 2018.
Fama-French Model		Marginally higher than the 2017-18 estimate. A decrease in the HML beta has been offset by increases in the market risk premium and SMB betas. Synergies submitted that it made a slight adjustment to the methodology to improve the robustness of the estimates for companies from countries without country-specific factors.	Estimate has been affected by a lower risk-free rate and a refined comparator set underpinning the FFM beta estimates.
Market excess returns	0.89 equity beta and 7.77% risk factor premium	1.06 equity beta and 7.71% risk factor premium. Calculation of risk factor premium is unchanged. Updated data	1.07 equity beta and 7.34%-7.77% risk factor premium
High-minus-low factor	0.29 equity beta and 6.05% risk factor premium	0.11 equity beta and 6.10% risk factor premium. Calculation of risk factor premium is unchanged. Updated data	0.17 equity beta and 5.74% risk factor premium.
Small-minus-big factor	0.16 equity beta and 1.77% risk factor premium	0.23 equity beta and 1.93% risk factor premium. Calculation of risk factor premium is unchanged. Updated data.	0.32 equity beta and 2.04% risk factor premium.

Return on debt	100% weighting to the 'on-the-day' cost of 5.45%	90% weighting to the 2017-18 'on-the-day' cost of 5.45% and 10% weighting to the 2018-19 'on-the-day' cost of 4.58%, as weightings are adjusted 10% each year towards a 10-year trailing average approach	80% weighting to the 2017-18 'on-the-day' cost of 5.45%, 10% weighting to the 2018-19 'on-the-day' cost of 4.58%, and 10% weighting to the 2019-20 'on-the-day' cost of 4.21%. Weightings will continue to be adjusted 10% each year towards a 10-year trailing average approach.
Notional credit rating	BBB	No change	No change
Debt risk premium	In the absence of any substantive grounds to favour one source over the other, a 50:50 weighting of the 20-day average on the 10-year RBA and Bloomberg BVAL data series to 31 March 2017	Based on the trailing average return on debt of 5.37%, a risk-free rate of 2.74%, and debt raising costs of 0.10%	No change to approach - based on the trailing average return on debt of 5.24%, a risk-free rate of 1.96%, and debt raising costs of 0.10%
Debt raising costs	The approach adopted was consistent with that set out in PwC (2013), p.6	No change	No change
Gamma	In the absence of any substantive grounds to favour one approach over another, an equal weighting (rounded to the nearest 0.05) of the gamma value implied by finance theory (zero), the equity ownership approach (0.45) and market valuation studies (0.25)	No change	No change to overall estimate. Equity ownership approach estimate has been updated to 0.50 to reflect recent decisions.

Source: Synergies, *Determining a WACC estimate for Port of Melbourne,* May 2018 and 2019, pp. 3-5.

Appendix C WACC

The port's responses to our previous concerns on the use of FFM does not persuade us

The FFM is not used by any other Australian regulators

The port acknowledges that 'no Australian regulator has moved away from SL CAPM in favour of the FFM or any other return on equity model'. The port submits however that 'the SL CAPM, if relied upon exclusively, will tend to understate the return necessary to commensurate the port for the risks involved in providing Prescribed Services and thereby not achieve the regulatory objectives.'[97]

The port conceded that 'IPART's stance on the FFM is not yet an example of an Australian regulator actually applying the Fama-French model to calculate a WACC.' But notes that 'IPART's preparedness to consider the FFM at a future methodology review is a significant development' and that 'it is unlikely that IPART would even be monitoring the FFM if it could not be fit for purpose for calculating the return on equity in a building blocks framework.'[98]

We note that in IPART's 2018 paper, Review of our WACC Method, IPART stated that 'some regulated firms contend that the FFM should be included in cost of equity estimations, stating that the increased explanatory power sufficiently outweighs any theoretical concerns or costs of implementation.'[99] IPART argued that 'while it is sufficient to warrant estimation and comparison of FFM estimates, it is not sufficient reason to replace the SL-CAPM as its model.'[100]

IPART stated that 'the FFM may provide a better statistical fit to historic returns data, but this statistical power varies significantly over time. In particular, there is empirical evidence that the impact of firm size on equity returns is not stable over time in Australia.'[101]

We maintain our preliminary view that that the FFM is not well-accepted by any Australian regulator.

---

[97] Synergies, Determining a WACC estimate for Port of Melbourne, May 2019, p. 116.
[98] ibid.
[99] IPART, Review of our WACC method: Final report, February 2018, p.98.
[100] ibid.
[101] ibid.

The FFM is not based on strong theoretical underpinnings

Our previous commentary noted that several Australian regulators have raised concerns with the theoretical basis for the FFM's risk factors. Specifically, how the risk factors explicitly or implicitly affect investors' perceptions of risk is not well understood.[102]

We also noted that AER had stated, in its 2013 and 2018 rate of return guideline reviews, that 'the FFM could not be used to inform any parameter estimates in its foundation model due its lack of clear theoretical foundation.' A similar view was echoed by the ERA, in the context of a 2016 decision on the Dampier to Bunbury National Gas Pipeline (DBNGP), where the ERA stated that 'the FFM is empirically unstable due to the fact that the model is not developed on a robust theory.'[103]

The port acknowledges that 'the FFM lacks the theoretical elegance and simplicity of the SL CAPM'; but, qualifies that 'there is clear economic logic supporting the existence and persistence of the Fama-French factors.'[104]

Use of the FFM by financial practitioners

Our previous commentary observed that various examples provided by Synergies in its review of expert reports and of financial practice highlight the making of ad hoc adjustments to the SL CAPM formula, rather than adoption of the FFM. We also noted that it is common practice for Australian regulators to use the SL CAPM with some adjustments (e.g. IPART and AER) and cross checks (e.g. ERA and QCA), rather than adopt an alternative model for estimating the cost of equity.[105]

Further, we noted that 'following Synergies review of 344 independent expert reports, it had not located any formal application of the three-factor FFM as it is employed in the port's WACC report'. We considered that this was not consistent with Synergies claim that the FFM is 'well accepted' by financial practitioners.[106]

The port responded that financial practitioners and independent expert report authors have more latitude to apply discretionary adjustments to mechanical cost of equity calculations. The port argues that its approach 'formalises these adjustments by considering the exposure to factor premia for comparators relevant to the port.'[107]

---

[102] Essential Services Commission 2018, Interim commentary - Port of Melbourne tariff compliance statement 2018-19, October 2018, p. 53.
[103] Essential Services Commission 2018, Interim commentary - Port of Melbourne tariff compliance statement 2018-19, October 2018, p. 48.
[104] Synergies, Determining a WACC estimate for Port of Melbourne, May 2019, p. 117.
[105] Essential Services Commission 2018, Interim commentary - Port of Melbourne tariff compliance statement 2018-19, October 2018, p. 46.
[106] ibid., p. 45.
[107] Synergies, Determining a WACC estimate for Port of Melbourne, May 2019, p. 247.

Further, the port responded that 'for Australian regulators, many adjustments to the SL CAPM are somewhat arbitrary in nature and require the exercise of significant regulatory discretion'. Synergies submits that on this basis, the port should be open to 'give weight to other approaches that achieve a similar outcome but in a more formulaic and transparent manner'.[108]

In relation to the independent expert reports, Synergies state that 'independent experts are typically not required to present detailed analysis to substantiate the premia that they apply' and that 'financial practitioners are accounting for premia outside the CAPM framework is a sign that the SL CAPM requires augmentation.'

The FMM has been found to produce unreliable empirical results

Our previous commentary observed that regulators in Australia have found it difficult to apply the FFM in a regulatory context due to a lack of consensus on the appropriate risk factors and portfolio formation. Specifically, the regulators found the results of the FFM are dependent upon the methodology chosen, and they questioned the robustness of the FFM risk factors in explaining Australian data.

We were particularly concerned with Synergies using the Brailsford method (2012) to address data issues[109] and to produce FFM estimates using Australian data that reconciled with US studies. We noted that Brailsford et al (2012)[110] study found the value premium was statistically significant, while the size premium was not.

To reinforce our point, we referenced ERA's 2015 final decision for ATCO Gas, where ERA decided against relying on the Brailsford et al study. Following subsequent review of the ERA's decision, the Australian Competition Tribunal, upheld ERA's decision stating 'ERA considered the latest available research before rejecting the use of the FFM'.[111]

The port continues to rely on the Brailsford method, which they argue 'takes into account the unique composition of the Australian market when forming portfolios'. While Synergies concedes that 'different portfolio formations could lead to different results, they are not aware of any compelling case that has been put forward in the literature for deviating from current practice'.

In relation to size premium not being statistically significant, Synergies has found evidence that 'the size premium is significant at the 10 per cent level'. And added that 'the Brailsford study had

---

[108] ibid.
[109] Synergies noted that past studies of the FFM in the Australian market have yielded inconclusive results, which may be due to 'data issues'. See, Synergies, Determining a WACC estimate for Port of Melbourne, May 2019, p. 248.
[110] The most comprehensive study of the size and book-to-market effects that has been performed using Australian data was compiled by Brailsford, Gaunt and O'Brien (2012a). Using returns information over a 25-year period from 1982 to 2006 the researchers demonstrated that high book-to-market stocks have persistently earned higher returns than low book-to-market stocks. However, there was no persistent difference in the returns to portfolios of small versus large market capitalisation stocks.
[111] Synergies, Determining a WACC estimate for Port of Melbourne, May 2019, p. 248.

access to approximately 25 years of data, while they have access to 32 years of data, which has improved the precision of data.'

Inconsistent data selection with port's application of the FFM

Our previous commentary was concerned with Synergies' methodology in the application of FFM to estimate the return on equity. In particular, we noted that Synergies use of the FFM appears to lack a consistent theoretical approach in terms of whether national share markets are assumed to be integrated internationally or are segmented and reflect domestic investment choices only. We noted the selection of data for the underlying analysis of the Australian stocks was inconsistent with some data points selected locally and some globally.

The port noted that its reliance on global data is not related to the consistency of the theoretical approach; rather, it relates to data availability. Hence the port reduced its weighting on FFM to five per cent for the 2019-20 WACC estimate.