ESSENTIAL SERVICES COMMISSION

Interim commentary - Port of Melbourne tariff compliance statement 2018-19

26 October 2018

An appropriate citation for this paper is:

Essential Services Commission 2018*, Interim commentary - Port of Melbourne tariff compliance statement 2018-19,* 26 October

Copyright notice

Contents

Contents ii
About this paper iv

About the Port of Melbourne iv
Our role iv
Why we are providing this commentary v

Summary of observations 1

The port's rate of return appears high 1
The port's revenue requirement includes depreciation and excludes contract revenues 2
The port's calculation of regulated prices appears to have minor issues 2
The port's asset modelling should be more transparent 2
The port should provide more supporting information 3

The port's rate of return 4

Summary of the port's WACC estimate 4
The port's WACC estimate is relatively high and warrants closer examination 8
We will address the pricing order WACC provisions in our Statement of Regulatory Approach 13

The port's aggregate revenue requirement 15

Depreciation is being deferred, but is still included in the revenue requirement 15
It is not clear that the port's revenue requirement includes contract revenues 17

The port's calculation of regulated prices 20

Export tariffs have been included in the WATI 20
The WATI is based on historical volumes 20
Prices increase at different rates each year 21
Other price modelling issues 22

The port's asset modelling and deferred depreciation 24

The port's modelling of asset values 24
Deferred depreciation and price impacts 25
Other issues with the port's asset calculations 27

Sufficiency of the port's supporting evidence 30

Capital expenditure 30
Operating expenditure 31
Cost allocation 31

Substantiation of asset lives 32
Demand forecasts 33

Appendix A Issues raised in our interim commentaries 35
Appendix B Approaches used by Synergies in estimating the port's WACC 38
Appendix C Detailed considerations on the port's WACC estimate 42

We have concerns with the port's reliance on the Fama French model 42
The port's MRP estimate is materially higher than recent decisions 54
The port's methods for estimating beta and gearing have shortcomings 61
The port's gamma estimate is at the lowest end of recent decisions 72

About this paper

About the Port of Melbourne

The Port of Melbourne is Australia's largest container, automotive and general cargo port. In 2016, the Victorian Parliament passed legislation enabling the port's commercial operations to be leased to a private operator for 50 years. The port's lease commenced on 1 November 2016.

A number of services provided by the port are 'prescribed services' for the purposes of the Port Management Act 1995. These include the provision of shipping channels, berthing facilities and other services defined in section 49 of the Port Management Act.

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 places the onus on the port to demonstrate that in setting prescribed service tariffs it is compliant with the pricing order provisions. Demonstrating compliance is facilitated by the submission of annual tariff compliance statements.

On 31 May 2018, the port submitted its tariff compliance statement 2018-19, which is available on our website.[1] This is the second tariff compliance statement the port has submitted to us since it commenced operations.

Our role

The Essential Services Commission is 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 the ESC Minister:

- as to whether the port has complied with the pricing order during the five year 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]

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. The first compliance inquiry will commence after 1 July 2021.

---

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

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

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.[3]

Why we are providing this commentary

The pricing order requires the port to submit annual tariff compliance statements to the commission. To promote transparency and predictability in our approach, we have chosen to provide interim feedback on aspects of the port's tariff compliance statements by publishing commentary prior to our five-yearly inquiries. This 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 give consideration to the issues and concerns raised by the commission, and to reflect on its position and the information it may provide over time in demonstrating compliance with the pricing order ahead of our inquiry.

The purpose of this commentary is neither to provide an exhaustive compliance assessment, nor to make findings as to whether there has been any non-compliance with the pricing order. Rather, our feedback is designed to ensure that the port has an opportunity to understand, given our current state of knowledge, the matters we are likely to consider 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.

[3] https://www.esc.vic.gov.au/transport/port-melbourne/information-port-melbourne-users

Summary of observations

We have reviewed the port's tariff compliance statement 2018-19, and requested the port provide clarifications on a range of issues, which it has provided. Following our consideration of this information, we have the following main observations:

- the port's rate of return appears high and requires further substantial justification
- the port needs to clarify whether it is including depreciation and contract revenues in its aggregated revenue requirement
- the port should provide further justification for some detailed elements of its tariff calculations
- the port's modelling of asset values is complex and should be more transparent
- some areas of the port's statement require more detailed supporting information.

Appendix A contains a full list of observations, including those from our 2017 interim commentary.

The port's rate of return appears high

The port has used a pre-tax, nominal weighted average cost of capital (WACC) of 11.52 per cent for 2018-19. The pricing order provides that the rate of return is to be commensurate with that of a benchmark efficient entity. The WACC is a significant driver of the port's revenues, making up 78 per cent[4] of the revenue requirement for 2018-19. A value of 11.52 per cent is high by comparison to those that have been applied in recent 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 determining a rate of return that is commensurate with a benchmark efficient entity.

Other input parameters in the port's WACC estimation, namely the market risk premium, asset beta and gamma, are significant in contributing to the port's WACC estimate of 11.52 per cent.

[4] This value is in proportion to the revenue requirement if accumulated deferred depreciation is excluded.

The port's revenue requirement includes depreciation and excludes contract revenues

The port's revenue requirement includes an item that represents cumulative deferred depreciation. For 2018-19 this amount is $645.1 million, out of its total revenue requirement of $1,184 million. This amount is included in the revenue requirement even though the port is not seeking to recover depreciation in its revenues. After discussing this issue with the port we understand this is an issue of presentation rather than of substance. The inclusion of depreciation materially misrepresents the revenue requirement and we expect that the approach adopted by the port in this regard will be clarified in future statements.

The port's treatment of costs and revenues arising from prescribed services contracts should also be clarified. Our view is that the pricing order requires both the costs and revenues associated with these contracts to be included in the revenue requirement.

The port's calculation of regulated prices appears to have minor issues

We have identified what appear to be several minor issues with how the port has calculated its weighted average tariff increase (WATI) and reference tariffs. Most of these do not have a large impact on tariffs, however they relate to critical elements of the pricing order. The port should explicitly state whether its calculations are consistent with these pricing order requirements.

The port's asset modelling should be more transparent

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 deferred the recovery of depreciation but has not specified how or when it will recover any amounts. In examining this same issue last year, we highlighted the need to provide clarity about possible future price shocks. The port acknowledges this is of keen interest to port users. Last year we asked the port to provide further information on its depreciation schedule, and it has now provided an example 10 year calculation in its 2018-19 compliance statement. The port has also inserted a schematic and a 'change log' in its model to assist us and other stakeholders monitor improvements in the modelling over time.

We appreciate that the port faces some challenges in providing certainty on the eventual recovery of deferred depreciation, and possible price impacts, as these depend on how costs and revenues change over the long term. We will continue to engage with the port on what further information might assist in demonstrating compliance with the pricing order and otherwise be of interest to port users.

The port should provide more supporting information

In several cases we sought further information to assist us and other stakeholders understand the port's approaches to:

- capital and operating expenditures
- cost allocation
- asset lives
- demand forecasts.

We consider this supporting information should be included in future tariff compliance statements.

The port's rate of return

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 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.

The port's WACC is materially higher than all but one recent Australian regulatory determination.

A key driver of the port's WACC is the use of the 'Fama French three factor model' for estimating the return on equity. This model has been examined by several Australian regulators, who have decided not to use it in estimating or determining the WACC following their findings as to empirical and theoretical shortcomings of the model.[5] The port may wish to address these shortcomings in future tariff compliance statements.

The port's high WACC estimate also appears to be driven by its estimates of the market risk premium (MRP), gamma and beta, which are inputs to the calculation of the return on equity. For each estimate we have identified some issues for the port to consider.

In last year's interim commentary, we noted generally that the port's WACC was higher than that applied to several comparable regulated entities.[6] In the sections below and in Appendix C, we raise more explicit concerns that, in our view, require careful consideration by the port, particularly 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 WACC for 2018-19 is 11.52 per cent, slightly down from 11.54 per cent for 2017-18. The port's WACC reflects the advice of its consultant, Synergies, who also advised the port last year.

[5] These decisions are discussed further on pages 47 to 52.

[6] Essential Services Commission, *2017-18 Port of Melbourne tariff compliance statement: Interim commentary*, 9 November 2017, p. 10.

Synergies' methods and data sources are largely unchanged from last year and are listed at Appendix B.

Table 1 lists the parameter estimates recommended by Synergies and adopted by the port in its tariff compliance statement.

Table 1 WACC for the Port of Melbourne for 2018-19 (Synergies' estimates)

Parameter / return	Estimate
Input parameters[a]	
Risk free rate	2.74%
Gearing	30%
Debt risk premium	2.53%
Debt raising costs	0.10%
Credit rating	BBB
Market risk premium	7.71%
Asset beta	0.7
Equity beta	1.0
Gamma	0.25
Corporate tax rate	30%
Pre-tax return on equity estimates	
Sharpe-Lintner Capital Asset Pricing Model	13.48%
Black Capital Asset Pricing Model	13.48%
Fama-French Three Factor Model	15.51%
Pre-tax return estimates	
Return on equity	14.16%
Return on debt	5.45%
Pre-tax nominal WACC	**11.52%**

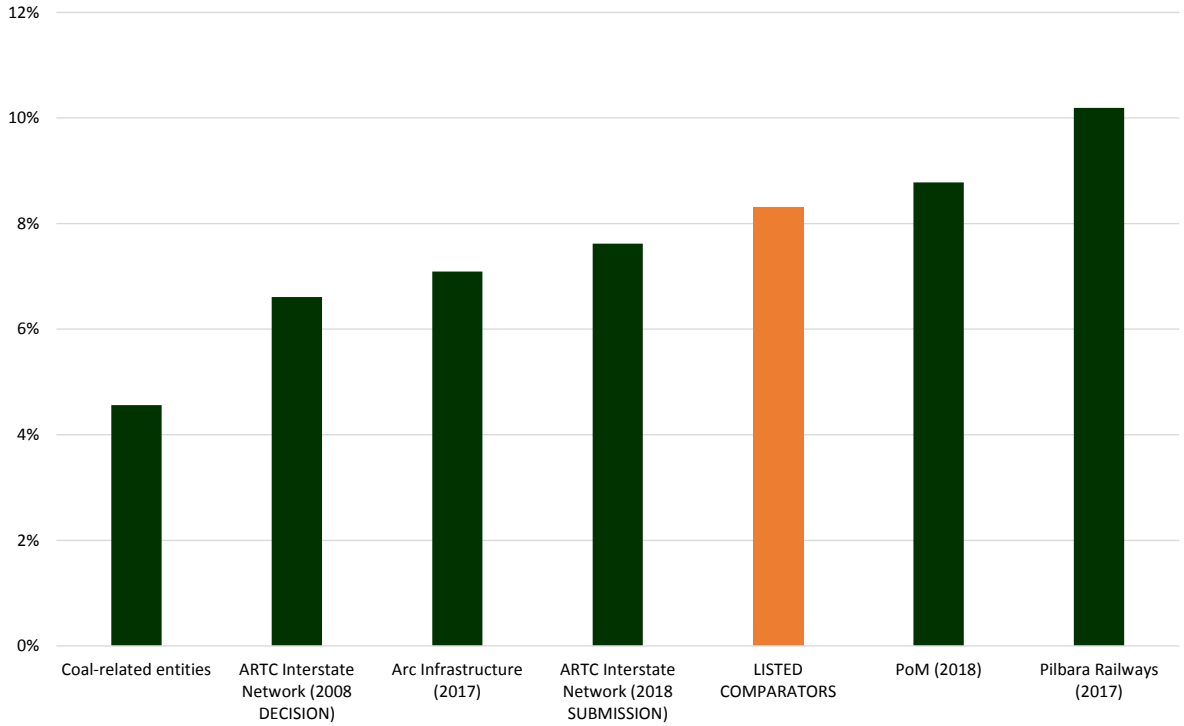
Source: Synergies, *Determining a WACC estimate for Port of Melbourne*, May 2018, pp. 3-4.
[a] For the sake of brevity, input parameters for the Fama French model and Black CAPM are not listed.

The port's tariff compliance statement outlined the methods used in parameter estimation, reflecting the approaches adopted by Synergies. It discussed the interpretation of 'well accepted'

under clause 4.3.1 of the pricing order in the context of the assessment process and other guidance listed in our Statement of Regulatory Approach.[7] The port provided a separate appendix on WACC issues, addressing its view of the roles of the port and the commission in assessing compliance, as well as further discussion of the interpretation of 'well accepted'.[8] The port did not comment on how its WACC (or the estimation of individual parameters) was compliant with the pricing order requirements, and referred to the appendix containing its consultant's report.

In support of its individual WACC parameters, the port's consultant 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 consultant discussed WACC 'margins' (i.e. the WACC minus the risk free rate) for Australian rail determinations and international comparators in ports, airports and rail, as shown in Figure 1.

Figure 1 Comparison of the port's WACC margin



Source: Synergies, *Determining a WACC estimate for Port of Melbourne*, May 2018, p. 146.

Based on its analysis, the consultant concluded that its WACC estimate 'satisfies the well-accepted and overall reasonableness stages of the ESC's compliance assessment framework, such that further detailed analysis of the proposed estimate is not required.'[9]

[7] Port of Melbourne, *2018-19 Tariff Compliance Statement: General Statement*, May 2018, pp. 18-22.

[8] Port of Melbourne, *2018-19 Tariff Compliance Statement: Appendix I*, May 2018.

[9] Synergies, *Determining a WACC estimate for Port of Melbourne*, May 2018, p. 146.

The assessment framework the consultant referred to is the three-stage process outlined in our Statement of Regulatory Approach.[10] 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 49L(3) 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.[11] 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.

The port's WACC estimate is relatively high and warrants closer examination

On a comparable[12] basis, the port's WACC is materially higher than all but one recent regulatory determination in Australia. Figure 2 compares the port's WACC margin with that from Australian regulatory decisions over the last two years.

The port's relatively high WACC could be explained by industry or firm-specific factors, including aspects of different regulatory regimes. For example, energy and water businesses may involve less risk than the port's reference services. A comparison of WACC parameters excluding energy and water firms is presented in Table 2.

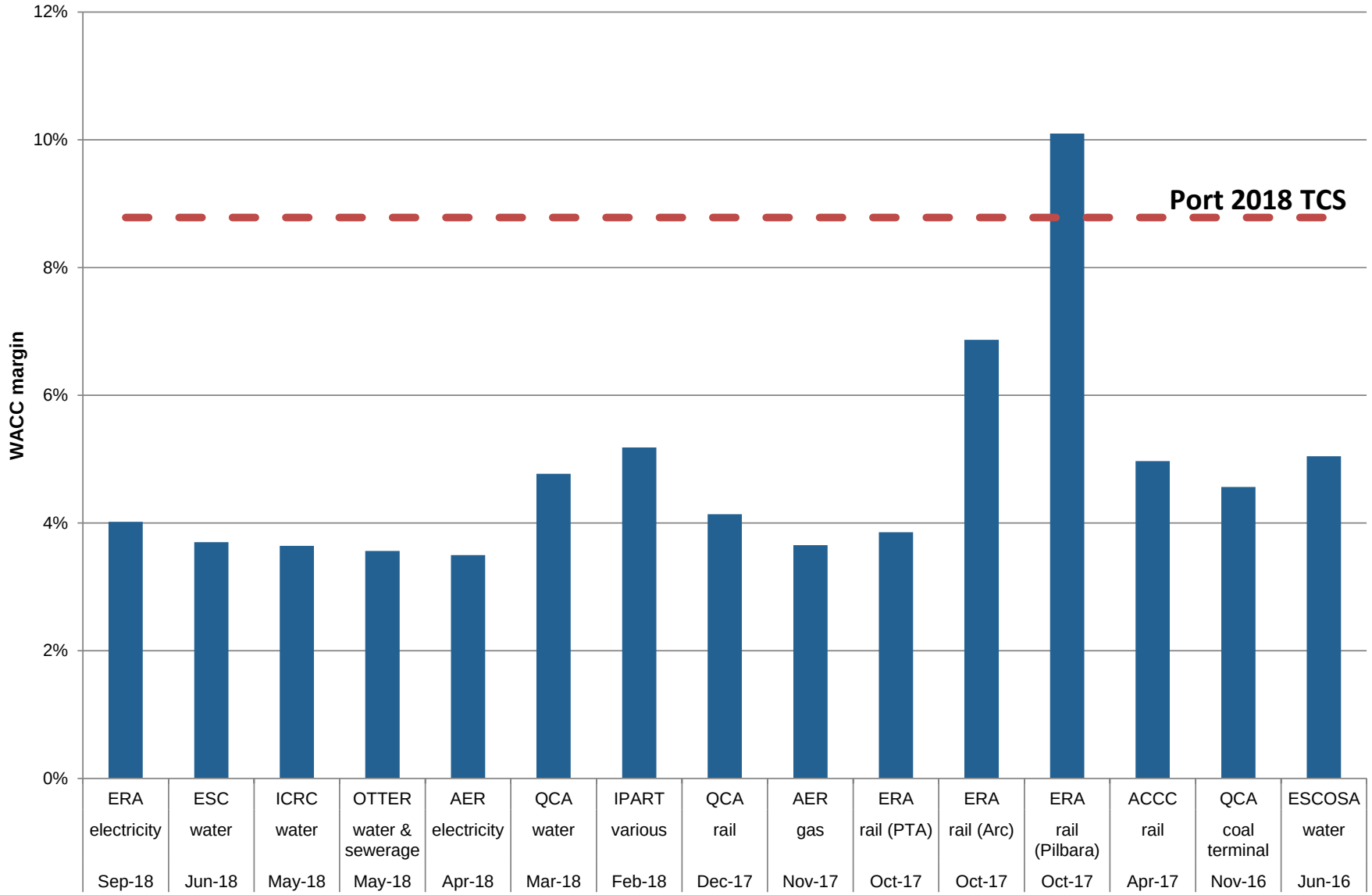
These comparisons suggest further investigation, including of individual WACC parameters, is necessary. Our views on several of these parameters are summarised below and detailed in Appendix C.

[10] Essential Services Commission, *Statement of Regulatory Approach – version 1.0*, December 2017, pp. 22-23.

[11] ibid, pp. 3-4.

[12] WACC values are calculated on a pre-tax nominal basis.

Figure 2 Comparison of port's WACC margin with recent determinations



Source: Port's tariff compliance statement 2018-19, various regulatory determinations.

Table 2 Comparison of port's WACC parameters for selected regulated businesses

Entity	ARTC	QCA	ERA	ERA	ERA	ACCC	QCA	Port
Source	Interstate rail proposal (2018)	Aurizon draft – rail (2017)	Rail WACC update - PTA (2017)	Rail WACC update - Arc (2017)	Rail WACC update - Pilbara (2017)	ARTC Hunter draft – rail (2017)	DBCT final - coal terminal (2016)	2018 TCS
risk free rate	2.78%	1.90%	2.49%	2.49%	2.49%	2.12%	1.82%	2.74%
market risk premium	7.00%	7.00%	7.20%	7.20%	7.20%	6.00%	6.50%	7.71%
equity beta	1.572	0.73	0.60	0.90	1.30	0.94	0.87	1.00
debt risk premium	1.73%	2.00%	1.77%	1.99%	2.51%	2.81%	2.65%	2.53%
debt raising costs	0.10%	0.23%	0.13%	0.13%	0.13%	0.01%	0.24%	0.10%
Gearing	52.5%	55%	50%	25%	20%	53%	60%	30%
gamma	0.4	0.46	0.4	0.4	0.4	0.4	0.47	0.25
cost of equity – SL CAPM	16.81%	8.37%	8.30%	10.94%	14.45%	9.46%	8.89%	13.48%
cost of equity – port's 3 model approach	n/a	n/a	n/a	n/a	n/a	n/a	n/a	14.16%
cost of debt	4.61%	4.13%	4.39%	4.61%	5.13%	4.94%	4.72%	5.37%
WACC	10.40%	6.04%	6.35%	9.36%	12.59%	7.09%	6.39%	11.52%
WACC margin[a]	7.62%	4.14%	3.86%	6.87%	10.10%	4.97%	4.56%	8.78%

Sources: Synergies; various regulatory determinations; ARTC *2018 Interstate Network Access Undertaking Renewal Explanatory Guide*.

[a] 'WACC margin' is the WACC value minus the risk free rate.

The port's consultant stated that a precise reconciliation of WACC values across regulatory decisions should not be attempted and that such comparisons can only give a broad indication of reasonableness.[13] Such broad comparisons or 'cross checks' are standard regulatory practice. They are used to overcome shortcomings in assessing WACC components in isolation that may produce an unreasonable result when aggregated.

The consultant's main findings from its own high-level comparisons, as encapsulated by Figure 1 above, were:

- the port's WACC estimate is between the values adopted by the Economic Regulation Authority (ERA) for Arc Infrastructure and Pilbara Railways. The consultant presented commentary from the ERA which it considered demonstrates that this is not unreasonable under the current conditions
- the port's WACC estimate is also above average values for OECD airports, which the consultant considered form the lower bound of the port's systematic risk, and below class I railroads, which it considered are likely to form the upper bound.[14]

The consultant listed various reasons why Pilbara Railways faces high systematic risk and would therefore have a higher WACC than the port, including deriving income from a single commodity and from a concentrated customer base.[15] In its discussion of gearing assumptions, the consultant considered the Australian Rail Track Corporation (ARTC) Interstate network and Arc Infrastructure to be the most relevant comparators when considering the benchmark efficient entity for the port.[16] The port's beta and gearing estimates are somewhat closer to those of Arc Infrastructure, as shown in Table 2.

Our own comparisons of port's WACC values against these three entities suggest the port's WACC margin may not be fully justified. Specifically:

- Pilbara Railways — the port's WACC margin is around 130 basis points lower, while its cost of equity is only 30 basis points lower. These differences appear to be very small given the higher risks associated with Pilbara's service delivery.
- Arc Infrastructure — the port's WACC margin is around 200 basis points higher, while its cost of equity is around 300 basis point higher. We consider these differences are not fully explained by the risks faced in the provision of the respective regulated services. Importantly, estimates of beta and gearing for both entities are fairly similar, suggesting their risks are roughly comparable.

---

[13] Synergies, *Determining a WACC estimate for Port of Melbourne*, May 2018, p. 140.

[14] ibid, pp. 140-141.

[15] ibid, p. 143.

[16] ibid, pp. 54; 58.

- ARTC Interstate Network[17] — the port's WACC margin is over 100 basis points higher, even though ARTC's proposed asset beta (0.75) is close to the port's value (0.7), suggesting similar degrees of systematic risk.

The differences between the port's WACC margin and that for other entities listed in Figure 2 also appear difficult to justify, even after noting the broad nature of such comparisons.

We consider this gives rise to concerns that warrant further examination of detailed WACC components. The reasons why the port's WACC estimate is higher than most of the comparators above include:

- its cost of equity is the simple average of outputs from three financial models, namely the Sharpe-Linter Capital Asset Pricing Model (SL-CAPM), Black CAPM and the 'Fama-French' model (FFM). The cost of equity in all other determinations has been calculated using outputs of the SL-CAPM
- the port's cost of equity resulting from its version of the FFM is 15.51 per cent. The port's estimates from the SL-CAPM and Black CAPM (both 13.48 per cent) are also comparably high
- the port's asset beta is 0.7, while the values in other Australian determinations tend to be less than this
- the estimates for the market risk premium and gamma, which are typically treated as 'market' parameters and not dependent on industry or firm-specific factors, are also materially different from other determinations
- while not a material driver of the WACC value, the port's gearing estimate presumes an efficient financing structure of 70 per cent equity funding. The value assigned to gearing varies considerably outside of water and energy determinations, which observe that benchmark entities in those industries use around 40 per cent equity funding.

Our observations on these detailed elements are contained in Appendix C. In summary:

- The FFM has been examined by several Australian regulators and found to be inappropriate as a basis for estimating the return on equity. Our examination of the port's consultant report and supporting data underlines these shortcomings. If the port is to continue to use the FFM as part of its estimation process it may wish to reflect on our concerns and consider how they might be addressed.
- The estimate of the MRP relies in part on the 'Wright' approach, which now has very limited support and usage by Australian regulators.

[17] Synergies did not make a direct comparison to the ARTC Interstate Network as it was still in submission stage at the time of preparing its report.

- The estimate of gamma also relies in part on an approach that reflects a theoretical extreme and has never been adopted by Australian regulators.
- The estimates of beta and gearing reflect what appear to be some shortcomings in how the port's consultant selected comparator firms, including a limited consideration of comparable risk. The consultant may have introduced an upward bias in its beta estimate by excluding firms on the basis of statistical insignificance.

We have not examined other elements of the port's WACC in detail. We note that the port is transitioning to a 'portfolio' cost of debt approach. The port has stated that it has adopted this transition on the basis that the on-the-day approach was appropriate for 2017-18 in light of the lease transaction, and that it is now appropriate to move to a trailing average approach that results in less volatility over time and that it is more consistent with the debt management practices of a benchmark efficient entity.[18] Our expectation is that, having now adopted such an approach, the port would not revert to the on-the-day approach.

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

The port and its consultant responded to our interpretations of the pricing order as stated in our Statement and related commentary. These responses relate to three related issues:

- the definition of 'well accepted' in clause 4.3.1 — the port and its consultant provided reasons to support their view that the definition of 'well accepted' should include approaches accepted by academia and finance practitioners.[19] This contrasts with the view in our Statement that, in the context of the rate of return provisions, approaches should be 'well accepted' by regulators only and accepted by at least one regulator.
- whether combinations of approaches need to be 'well accepted' — the port and its consultant considered the port is not necessarily required to adopt a 'well-accepted combination of well-accepted approaches'[20], which we mentioned in our Statement feedback paper.
- the three step WACC assessment process outlined in our Statement — the port and its consultant suggested that the three tests should be applied simultaneously not sequentially as suggested by our Statement[21]

---

[18] Port of Melbourne, *2018-19 Tariff Compliance Statement: General Statement*, May 2018, p. 21.

[19] Port of Melbourne, *2018-19 Tariff Compliance Statement: Appendix I*, May 2018, pp. 5-6; Synergies, op. cit., pp. 31-37.

[20] Port of Melbourne, *2018-19 Tariff Compliance Statement: Appendix I*, May 2018, p. 7; Synergies, op. cit., pp. 39-40.

[21] Port of Melbourne, *2018-19 Tariff Compliance Statement: General Statement*, May 2018, p. 21; Synergies, op. cit., p. 31.

- discretion in administering the pricing order — the port and its consultant considered that the pricing order offers the port discretionary choices and the commission's role does not include prescribing outcomes.[22]

We will continue to engage with the port, port users and other interested stakeholders on our approach to the interpretation of pricing order provisions. However, given our annual commentary is not a compliance assessment, these issues may be considered via potential revisions to our Statement.

[22] Port of Melbourne, *2018-19 Tariff Compliance Statement: Appendix I*, May 2018, p. 3; Synergies, op. cit., pp. 37-39.

The port's aggregate revenue requirement

We have two sets of observations on the port's revenue requirement calculation, namely the treatment of depreciation and contract revenues. The port's approach to both, in light of its modelling calculations and comments in its tariff compliance statement, is not entirely clear.

If depreciation is being deferred to future years and has a value of zero, this zero value should be reflected in the revenue requirement. We also consider that contract revenues should be included in the revenue requirement. The port should give further consideration to our views in preparing future tariff compliance statements.

Depreciation is being deferred, but is still included in the revenue requirement

The port is currently deferring all depreciation, however there are items relating to depreciation in its revenue requirement calculation. Specifically, amounts for 'Return of capital (Straight-line depreciation)' as well as for 'Return of capital (Uncharged straight-line depreciation from previous periods)' are included in the port's revenue requirement. The former appears to reflect depreciation as would be recovered if the port were using a straight-line depreciation method as per clause 4.4.1 of the pricing order. The latter appears to reflect accumulated straight-line depreciation from all prior years. For 2018-19, these amounts total $645.1 million and make up over half of the revenue requirement, as presented in the port's tariff compliance statement and regulatory model summaries.[23]

The port states elsewhere it has chosen to set straight-line depreciation to zero and has chosen an alternative to the straight-line depreciation method as per clause 4.4.2(a) of the pricing order.[24] These statements conflict with the aforementioned depreciation amounts contained in its revenue requirement.

We have raised this with the port, and understand this is an issue of presentation. The port notes that the application of the Tariffs Adjustment Limit (TAL) prevents it from increasing tariffs such that prescribed services revenues would recover its revenue requirement with the application of straight-line depreciation.[25] Its intention appears to be to show the extent to which the TAL prevents the recovery of its regulated costs, which is raised as an important issue elsewhere in its

[23] Port of Melbourne, *2018-19 Tariff Compliance Statement: General Statement*, May 2018, p. 2.

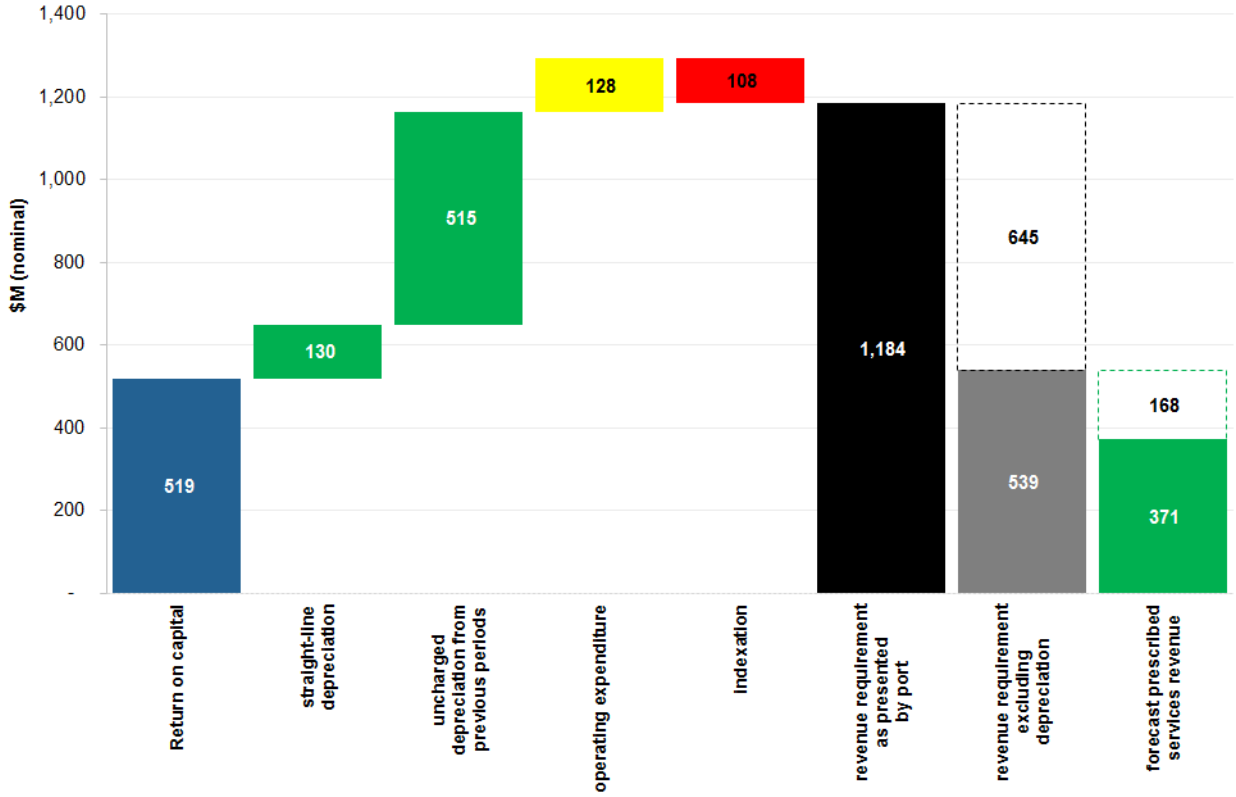
[24] Port of Melbourne, *2018-19 Tariff Compliance Statement: Appendix F*, May 2018, p. 20.

[25] Port of Melbourne, *2018-19 Tariff Compliance Statement: General Statement*, May 2018, p. 24.

tariff compliance statement.[26] In this context, the port appears to have listed amounts for depreciation in its revenue requirement to provide an indication of the true underlying cost of its operations.

Our understanding is that, consistent with the port's statement that depreciation has been set to zero, the amounts listed in the revenue requirement would not be relevant for the purposes of assessing compliance. For such an assessment, the port's 'true' revenue requirement for 2018-19 would be $539 million, rather than the $1,184 million presented in its modelling and tariff compliance statement.[27] The port's revenue requirement components and its forecast revenues are shown in Figure 3.

Figure 3 The port's forecast prescribed services costs and revenues for 2018-19



Source: Commission analysis using port's regulatory model

The port's approach to presenting accumulated deferred depreciation will result in its reported revenue requirement increasing at a rate of roughly $150 million per year. A large and accumulating revenue requirement, relative to prescribed revenues that are constrained under the TAL, may suggest that reference tariffs will need to increase significantly once the TAL ceases to apply. Assuming the port continues its current approach, its revenue requirement would amount to several billion dollars by this time. Aside from raising potential concerns amongst users about future price shocks, the port's approach may raise other concerns among stakeholders that its

[26] Port of Melbourne, *2018-19 Tariff Compliance Statement: General Statement*, May 2018, p. 27.
[27] ibid., p. 2 (Table 1).

costs are well in excess of its revenues, and this may discourage prudent investment or otherwise affect service quality. For example, the port's approach as shown in Figure 3 suggests there is a $645 million difference between its revenues and revenue requirement in 2018-19, whereas the 'true' difference is $168 million.

If the port continues to present its revenue requirement this way in future tariff compliance statements, it may wish to explicitly state that depreciation for the purposes of calculating its revenue requirement in accordance with the pricing order is actually zero and is being deferred. In doing so it may also wish to present its revenue requirement reflecting this zero amount.

Nothing in the above should be taken as the commission expressing any view as to whether the fact that there has been deferral of depreciation, or the quantum of that deferral, is compliant with the requirements of the pricing order. To the extent the commission finds as part of its five-yearly inquiry that the revenue requirement is not compliant with the requirements of the pricing order, this will have implications for whether the recovery of any depreciation is or should properly be deferred, and if so, the amount of that depreciation.

It is not clear that the port's revenue requirement includes contract revenues

Clause 6.2.2(b) of the pricing order states that revenue from prescribed services contracts must be included in the port's calculation of the revenue requirement under clause 2.1.1.

The port stated that it had 'included contract revenue in its Prescribed Services revenue (subject to the TAL) and the revenue requirement but not in the WATI calculation.'[28] In examining the port's model, we have not identified where the port's revenue requirement reflects contract revenues. Following discussions with the port we understand it has included costs associated with all of its existing prescribed services contracts in its revenue requirement.

This issue is important as it relates to how costs for prescribed services arise and are subsequently recovered, namely from specific users in the form of negotiated contracts, or from users generally through charges under the reference tariff schedule. One issue in considering whether costs are recovered from contracts or from the tariff schedule is the need to ensure costs in total are not under or over-recovered.

In this context, two alternative approaches could be used for the treatment of prescribed contract costs and revenues, relative to those relating to reference tariffs:

[28] Port of Melbourne, *2018-19 Tariff Compliance Statement: General Statement*, May 2018, p. 26.

1. Costs associated with providing prescribed services under contracts are included when calculating the revenue requirement. Revenues recovered through these contracts are then deducted from the revenue requirement. Reference tariffs are set with respect to this 'net' revenue requirement.
2. Costs associated with providing prescribed services under contracts are excluded from the revenue requirement. Revenues from prescribed services contracts are effectively ignored and do not need to be deducted from the revenue requirement when setting reference tariffs.

Both approaches ensure that the total cost of providing prescribed services is only recovered once, either when charging prescribed tariffs or via negotiated contract revenues.

The relevant pricing order provisions may give rise to a question over which approach might be compliant. Specifically, clause 6.2.2(b) explicitly refers to 'revenue' from prescribed services contracts, whereas clause 2.1.1(a) establishes a building block 'cost' methodology. How a revenue item must be 'included' in the calculation of an accrual building block framework is not explained in the pricing order. Our Statement repeats the requirement of clause 6.2.2(b) to 'include' contract revenues in the revenue requirement, but does not provide an indication as to how the port should do so.[29]

We note that clause 2.1.1(a) refers to the cost of providing 'all Prescribed Services'. Clause 6.2.2(a) further states that 'for the avoidance of doubt', services under these contracts remain 'Prescribed Services'. These suggest that costs arising out of providing prescribed services under contracts should be included in the revenue requirement, as per the first approach. To ensure costs are only recovered once, clause 6.2.2(b) could then be interpreted to mean that revenues from contracts should be deducted from the revenue requirement, and then reference tariffs are set to recover this (lower) revenue requirement amount.

In responding to our questions on this issue, the port expressed a preference to adopt different approaches depending on whether contracts are existing or new. Specifically:

- costs associated with all existing or legacy prescribed services contracts are included in the revenue requirement cost base
- once new contracts are struck, costs are only included in the revenue requirement 'to the extent that the Port User does not pay in full for the relevant assets'.[30]

The port's approach appears to disregard the pricing order in key respects. Firstly, the pricing order does not distinguish between new and existing contracts regarding the treatment of associated costs and revenues. Secondly, and as noted above, it is not clear how the exclusion of any costs

[29] Essential Services Commission, *Statement of Regulatory Approach – version 1.0*, December 2017, p. 13.

[30] Port of Melbourne, *Response to Essential Services Commission Information Request # 2 16 August 2018 CONFIDENTIAL*, p. 19. Note the port currently does not have any new contracts.

or revenues associated with prescribed services contracts would comply with clause 6.2.2(b) (which explicitly states contract revenues must be 'included'), and clause 2.1.1(a).

The port already includes costs associated with existing prescribed services contracts in the revenue requirement, consistent with the first approach outlined above. If it does not then deduct contract revenues from the revenue requirement, the port may be over-recovering its prescribed services costs. That is, when reference tariffs are set such that prescribed revenues recover the revenue requirement, and the revenue requirement includes contract costs, any amounts received via contract revenues may be an over-recovery of costs.

Whether revenues recovered are actually in excess of costs depends on the extent to which negotiated contract prices are perfectly cost reflective, as well as the imposition of the TAL, which may prevent prices from reflecting the revenue requirement cost base.

We will continue to engage with the port on this issue and expect in future compliance statements it will give further consideration to its preferred approach. The port should also be clear in distinguishing the treatment of revenues, as well as costs, arising from prescribed services contracts for the purposes of enabling assessment of compliance with clause 6.2.2(b) of the pricing order.

The port's calculation of regulated prices

Clause 3.1.1 of the pricing order sets the current binding price constraint for the port's prescribed services. It states that the increase in the weighted average of reference tariffs in each year must not exceed the tariffs adjustment limit (TAL). There appear to be several minor issues with how the port has calculated the weighted average tariff increase (WATI) and how it has demonstrated that prices comply with the TAL.

We have raised these issues with the port, including with respect to specific price order provisions, and expect the port to make its positions more explicit in submitting future tariff compliance statements.

Export tariffs have been included in the WATI

In calculating the WATI, the port has included price changes for export tariffs. Clause 3.8(b)(i) of the port concession deed requires them to be excluded. The pricing order's 'Export Pricing Decision' and related provisions effectively set a separate price control for export tariffs, namely that they must decrease by 2.5 per cent each year until 2021. Because export tariffs are decreasing, their inclusion in the WATI overstates the extent to which the WATI is below (and compliant with) the TAL. The port's reported WATI for 2018-19 is 0.9 per cent, which is then directly compared to the TAL of 1.90 per cent in its regulatory model, suggesting it has comfortably complied with the requirements of clause 3.1.1.

In order to make a comparison with the TAL as per the port concession deed, we recalculated the port's WATI with export tariffs excluded. For 2018-19, the recalculated WATI was 1.87 per cent, below but much closer to the TAL of 1.90 per cent. The recalculated WATI for 2017-18 was 2.15 per cent, slightly above (and therefore in apparent breach of) the TAL in that year of 2.13 per cent.

In response to our questions on this issue, the port stated that, going forward it would provide us a demonstration of compliance with clause 3.8(b)(i) of its concession deed.[31]

The TAL is a key price constraint under the pricing order, and full transparency of how the port complies with the TAL is therefore critical to the regulatory regime. We expect this to be reflected in the port's published regulatory model and tariff compliance statements in the future.

The WATI is based on historical volumes

The port calculated the WATI using historical sales volumes as weights. The pricing order requires the WATI to be based on tariffs that are weighted according to historical revenues.

---

[31] Port of Melbourne, *Response to Essential Services Commission Information Request # 2 16 August 2018 CONFIDENTIAL*, p. 25.

In responding to our questions on this issue, the port noted it did not have audited revenues available at the individual tariff level, hence it used audited volumes as this was the best information available.[32]

We consider the pricing order is clear with respect to the requirement for the WATI to be based on audited historical revenues. In the absence of such information, the pricing order provides for the commission to determine 'an alternative estimate of revenue' for calculating weightings. Such a determination, as it may constitute 'sufficient supporting information', could be made under clauses 9 and 7.1.2(f) of the pricing order.

Prices increase at different rates each year

The TAL, which constrains price increases at 1 July each year, is the percentage change in the most recently published March quarter CPI relative to the previous year's March quarter CPI. The port's calculation of reference tariffs effectively takes advantage of the maximum increases allowed by the TAL and is similarly based on movements in the March quarter CPI. However, rather than applying the same change in the TAL's CPI each year, the port escalates prices from 1 July 2016, as published in the pricing order, by the percentage change in the CPI since March 2016.

The pricing order is silent on how prices are set, subject to them being compliant with various provisions, including constraints in the form of the TAL or the revenue requirement, as well as rebalancing requirements under clause 3.2. Clause 3.2.1 requires the port, in the absence of an approved rebalancing application, to revise each tariff in respect of a financial year by the 'same percentage adjustment'.

The port stated that tariffs have been 'adjusted by the same percentage adjustment (i.e. the TAL of 1.9 per cent) consistent with clause 3.2.1 of the Pricing Order'.[33] However by setting prices with respect to a cumulative increase in the CPI relative to prices in 1 July 2016, the annual percentage change in prices is slightly different across different services. In other words, each year, the port is applying the same percentage adjustment to prices from 2016, rather than from the prior year.

The port's calculation of reference tariffs also reflects a specific method in its regulatory model that rounds tariffs to either two or four decimal points, depending on how these were published in the pricing order schedule. The explanatory notes contained in the port's model notes that 'the rounding of the Prescribed Services Tariffs has resulted in a [sic] some increases slightly higher or lower than the TAL.'[34]

---

[32] Port of Melbourne, *Response to Essential Services Commission Information Request # 2 16 August 2018 CONFIDENTIAL*, p. 6

[33] Port of Melbourne, *2018-19 Tariff Compliance Statement: General Statement*, May 2018, p. 26.

[34] Port of Melbourne, *2018-19 Tariff Compliance Statement: Appendix B – Regulatory Model*, May 2018, Cover sheet.

In combination, these approaches resulted in tariffs on 1 July 2018 increasing from between 0.91 per cent to 2.11 per cent across the range of prescribed services (excluding export tariffs, which as noted above must decrease by 2.5 per cent). (Prices for slipway tariffs increased by 4.07 per cent and are addressed separately below.)

In response to our observations on using 2016 prices as a base, the port noted that this 'results in minor aggregate rounding issues that are self-correcting over time.'[35] We have not investigated whether the port's approach would be self-correcting over time, but consider that the aggregate effect may currently be small. However, in the event the port rebalances its tariffs, subsequently deriving tariffs by applying a uniform percentage change to prices from 2016 would reverse the effect of any rebalancing. More generally, we do not understand why the port, in escalating prices by the same CPI measure as used in the TAL, would chose to apply this cumulatively and not annually as per the TAL.

We also highlighted to the port that it would be possible to publish reference tariffs rounded to two or four decimal places without using the truncating function in its regulatory model. This would satisfy its preference to maintain consistency with rounding in the pricing order while also ensuring that prices are adjusted by the same percentage. In response, the port noted its preference to continue to round its tariffs using Excel's rounding function, and considers that any minor aggregate rounding issues will self-correct over time.[36] Again, we question why the port would adopt an approach that potentially raises compliance concerns, even if they may appear presently minor in nature, when alternative approaches are available to satisfy its preferences.

Other price modelling issues

Slipway tariffs

In the context of the above discussion around clause 3.2.1 of the pricing order, we note that prices for 'slipway' services as shown in the port's regulatory model increased by 4.07 per cent from 1 July 2018. The port indicated it had unintentionally omitted these from its tariff compliance statement last year, thus applied two years of price increases.[37]

We questioned the port on the origin of these tariffs, as they are not listed in schedule of prices in the pricing order. The port presented two invoices from 2016-17 and 2017-18 as substantiation of the prices for these services.[38] Prices in these invoices match the values in the port's regulatory model. 'Slipway' services are mentioned in the port's reference tariff schedules from previous

---

[35] Port of Melbourne, *Response to Essential Services Commission Information Request # 2 16 August 2018 CONFIDENTIAL*, p. 23.

[36] ibid., p. 24.

[37] ibid.

[38] ibid.

years, including as part of last year's tariff compliance statement, however have no corresponding prices.[39]

This appears to reflect the previous port owner's practice. The 2016-17 tariff schedule stated 'Prices and conditions of use will be provided on application to the Port Manager.'[40] The absence of explicit prices may mean that these services were overlooked by the drafters of the pricing order at the time. The port may need to provide further justification for why they are not listed in the pricing order and should now be recognised. In the event they cannot be so recognised, the port may need to apply to have them introduced under the pricing order's rebalancing provisions under clause 3.2.

Prices expressed in percentage terms not dollar values

We questioned the port on why the prices for some tariffs are expressed as a percentage of prices for other tariffs, rather than a dollar amount. The port noted this reflected the previous port owner's practice and it will look at how these are expressed in next year's tariff compliance statement.[41]

[39] https://www.portofmelbourne.com/facilities-development/port-pricing/

[40] Port of Melbourne Corporation, Reference Tariff Schedule Effective 1 July 2016.

[41] Port of Melbourne, *Response to Essential Services Commission Information Request # 2 16 August 2018 CONFIDENTIAL*, p. 15.

The port's asset modelling and deferred depreciation

The port's modelling of asset values

The port's asset calculations, contained in the 'Capital_base' sheet of its regulatory model, are complex and span over 800 rows. Many of these calculations appear redundant given the port is deferring depreciation, and it has not yet considered how depreciation might be recovered over the remaining life of the lease.[42]

Last year we issued a series of questions to the port regarding its model. The port has amended its model in response to some of these questions, and has also inserted a 'change log' and a schematic to aid stakeholders understand the model and its development.

This year we separately published the port's regulatory model so users and other stakeholders can have transparency as to the port's calculations.[43] However the version of the model submitted to us by the port for publishing does not allow stakeholders to view any formulae. We consider that exposing the model (and other materials submitted to us) to public scrutiny is important in ensuring that all stakeholders can understand and appropriately test the methods adopted by the port, particularly given our annual commentaries and associated questions cannot cover all modelling details.

In discussing these issues with the port, we understand the complexity of the asset calculations stem from them being an extract from a larger 50 year model that was developed for non-regulatory purposes. Without full visibility of this model we have found it difficult to understand some calculations, particularly those that accommodate how asset values might change when the TAL does not apply. We appreciate these calculations are not as user friendly as other parts of the regulatory model as the port may not have intended them to be subject to regulatory or public scrutiny. As such, these calculations are not explained in its compliance statement or supporting documents. We also understand the port does not have a user manual or other explanatory material for internal purposes.

As part of discussions on the model, the port suggested that it could seek an independent audit of its 50 year model to provide assurances over the model's accuracy.

A less burdensome solution that would aid us (and any other interested stakeholders) in understanding the port's asset calculations is for the port to present them in their entirety, i.e. over 50 years. We understand the port may have some concerns in doing this as it would require inputs and present outcomes that could be misconstrued by some stakeholders. In this context, the port

[42] Port of Melbourne, *2018-19 Tariff Compliance Statement: General Statement*, May 2018, p. 27.

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

has claimed confidentiality over various materials in its tariff compliance statement and in subsequent responses on the basis that certain information is complex and not necessary for port users. To this end the port could, as it has done with its regulatory model, submit a version for publishing that has some features hidden, and another 'confidential' version for the commission's scrutiny.

In the event the port wishes to continue presenting an extract of its 50 year model in its asset calculations, we suggest the following improvements:

- making some of the labels clearer
- inserting user notes e.g. indicating the purpose of each section of the 'Capital_base' sheet
- expanding the diagram in the model's 'Schematic' sheet to include asset calculations
- developing a user manual.

Deferred depreciation and price impacts

The port has chosen to defer the depreciation of its assets but has not specified how or when it will eventually recover those costs. This relates to the imposition of the TAL, which constrains the port's ability to align prices to enable the recovery of its revenue requirement if depreciation were included.

Our 2017 commentary and Statement consultation feedback document noted that the port's alternative, deferred depreciation may have tariff impacts once the TAL ceases to apply. We said the port should consider providing depreciation schedules that match the term of the lease in order to enable users to monitor the materiality of deferred depreciation and potential tariff impacts. Such schedules would also enable us to assess compliance with the pricing order's requirement that assets be depreciated only once over their economic lives.[44]

This year the port noted that a number of users were interested in understanding the likely impact of deferred depreciation on tariffs.[45] The port noted it will consult with users on options for recovering any deferred depreciation to minimise tariff volatility through price smoothing closer to the end of the TAL period.[46]

As outlined above, the port has made several changes to its regulatory model since last year. One such change is the insertion of an illustrative 10 year depreciation schedule. This was added to

---

[44] See Essential Services Commission, *2017-18 Port of Melbourne tariff compliance statement: Interim commentary*, 9 November 2017, p. 19; Essential Services Commission, *Feedback on consultation and other matters: Statement of Regulatory Approach version 1.0*. December 2017, p. 29. Note, however, that clause 4.4.1(c) only appears to apply where straight-line depreciation is used, but there are strong grounds to argue that assets should depreciated only once regardless of the depreciation method used.

[45] Port of Melbourne, *2018-19 Tariff Compliance Statement: Appendix E*, May 2018, p. 8.

[46] ibid., p. 20.

demonstrate that asset values are not being depreciated more than once under the current modelling methodology.[47] The calculation assumes the full deferral of straight-line depreciation each year and does not illustrate situations where the TAL ceases to apply.[48]

While this example calculation is useful, it does not necessarily represent the port's alternative depreciation profile for the purposes of assessing compliance under clause 4.4.2. The pricing order is silent on the requirements of such an alternative profile, but as per our previous guidance (and implied by the port's comments on this matter) any alternative depreciation profile should ensure that assets are only depreciated once over their economic life or otherwise by the end of the port lease. The pricing order provisions (specifically clause 4.4.2(b)) suggest that price impacts through to the end of the port lease are also an important consideration.

We asked the port why it was not possible to extend its illustrative example to 50 years. As an example calculation, this would not bind the port to any particular depreciation profile. It would merely illustrate how deferred depreciation would eventually be recovered under certain assumptions and thus provide some assurances that the model can accurately calculate depreciation over the life of the lease.

In response, the port stated that users have indicated they understand the port's approach to deferred depreciation and are satisfied with the level of information provided by the port.[49] The port also noted that the 10 year example calculation demonstrates that some assets, in the absence of deferred depreciation, are fully depreciated by the end of their economic lives. The port was concerned that extending this example calculation to 50 years would increase the size and complexity of the tab, making it more difficult for the commission and port users to understand the proof.[50]

We appreciate expanding this example calculation would be burdensome. As with addressing the complexity of the port's asset calculations, presenting a functional 50 year calculation of the port's asset values may provide some information for the purposes of demonstrating compliance with clause 4.4.

We acknowledge this does not appear to be an immediate concern for port users. We will continue to engage with the port in seeking clarity on its alternative depreciation method and in generally assessing the robustness of its model for regulatory purposes.

---

[47] Port of Melbourne, *2018-19 Tariff Compliance Statement: Appendix B – Regulatory Model*, May 2018, 'Depreciation_10yrs' sheet.

[48] ibid.

[49] Port of Melbourne, *Response to Essential Services Commission Information Request # 2 16 August 2018 CONFIDENTIAL*, p. 11.

[50] ibid.

Other issues with the port's asset calculations

Timing assumption relating to the recognition of capital expenditure

Clause 4.6.1(b) of the pricing order requires capital expenditure (capex) 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 capex amounts.

We identified some instances in the port's model where inflation is being applied to capital expenditure as if half of capex is incurred at the beginning of the year (and inflated at the full amount of CPI), while the other half is incurred at the end of the year and not inflated. We raised this with the port, namely that these calculations should multiply the total amount of capex by half a year's worth of inflation. We raised similar questions last year, where the port applied inflation by explicitly assuming all capex was incurred at the start of the year.

The port has indicated it will amend its model in light of our most recent observations on this timing assumption.[51]

Consistency in CPI

The port's regulatory model allows for the escalation of prices using a 'lagged' March CPI. That is, price increases from 1 July 2018 reflect changes in the CPI up until the most recent March quarter (i.e. up until March 2018). This is standard practice in most regulatory frameworks and reflects the use of the most recently published CPI data at the time.

It is also standard regulatory practice to then use the same CPI measure when calculating asset values over time. This ensures consistency in how regulated entities are compensated for inflation, and protects the entity from inflation risk in how its regulated assets are valued. In simple terms, the escalation of prices/ revenues implicitly includes an allowance for inflation, which should then be applied in the same way when asset values are recalculated on the basis of actual observed outcomes. The requirement for consistency between the CPI used to escalate prices and in the roll-forward equation has been identified in other regimes, including the National Electricity Rules (e.g. chapter 6, clause 6.5.1(e)(3)).

While the port's prices are escalated by the lagged March CPI, its revenue requirement elements (particularly the asset base) use the 'actual' June 2018 CPI. Part of this reflects forecast inflation since the June 2018 CPI was not published at the time the port prepared its tariff compliance statement.

This use of an 'actual' June CPI reflects a change in approach from last year. The port's previous approach was to use the 'actual' March CPI to index asset values. Specifically, the indexation

[51] ibid., p. 20.

building block was calculated as the opening asset value as at 1 July 2016 multiplied by the annual change in CPI to March 2017. In looking at this last year, we asked the port the following:[52]

> The inflation figures used to index the capital base in the Capital_Base tab (see rows 55 to 74) are 9 months behind when indexation occurs. The financial year begins in July, the indexation allowance is calculated at this time, but the CPI figure used to calculate indexation is for March the following calendar year. If using March CPI figures, standard practice would be to use lagged CPI (CPI from the previous financial year) to index the opening capital base. Could you please explain the port's choice of timing for inflation?

In response to this question, the port stated:[53]

> There are a number of well accepted alternative approaches to index the opening capital base.
>
> PoM has used the March 2016 to March 2017 CPI to index its 2016-17 opening capital base (as at 1 July 2016) because it is the closest to actual CPI for 1 July 2017 (given that actual June 2016 to June 2017 CPI was not available when PoM submitted its TCS to the ESC on 31 May this year).

This year, we questioned the port on its adoption of an 'actual' June CPI. The port responded that it had changed its approach in response to our earlier question:[54]

> In its 2017-18 TCS, PoM used the annual March CPI to index its capital base. In its 2018-19 TCS, PoM changed to the annual June CPI to address feedback from the ESC following the submission of its 2017-18 TCS…
>
> Clause 4.6 of the Pricing Order requires indexation of the capital base to be calculated as follows [underlining added for emphasis]:
>
> *the percentage change, or forecast percentage change, in the CPI for the relevant Financial Year multiplied by the value of the capital base at the commencement of the relevant Financial Year…*
>
> PoM interprets *CPI for the relevant Financial Year* to mean either the annual June CPI or annual March CPI, because it is the most recently available actual CPI for the relevant financial year.

---

[52] Essential Services Commission, *Questions for the PoM regarding its 2017 regulatory model*, 28 July 2017, p. 2.

[53] Port of Melbourne, *ESC 17-18 TCS Questions #1 – Regulatory Model*, 3 August 2017, p. 4.

[54] Port of Melbourne, *Response to Essential Services Commission Information Request # 2 16 August 2018 CONFIDENTIAL*, p. 18.

> PoM agrees with the ESC…that using the same CPI (annual March) to escalate tariffs and index the capital base would increase simplicity and may also reduce PoM's exposure to inflation risk over time. PoM, however considers that consistency in the use of CPI escalators over time is also important.
>
> On this basis, PoM would support changing back to its original indexation approach (of using March CPI) but only if there is a commitment from both the ESC and PoM to it being a long-term approach. This is because consistency of approach is important over time.

For the avoidance of doubt, we have not questioned the appropriateness of a June versus a March CPI, but use of an 'actual' versus 'lagged' March CPI. We appreciate this is not a simple matter to explain, and may raise issues in terms of the pricing order's definition of 'CPI for the relevant financial year'. Noting that the port appears to agree with the principle of using consistent CPI measures, we refer the port to the specific CPI measure it uses when escalating its tariffs for a particular year, and suggest it consider using this same CPI measure in its asset calculations for that year.

Sufficiency of the port's supporting evidence

There were a number of matters where we requested further information from the port in order to understand elements of its tariff compliance statement, rather than in response to potential concerns. These matters are outlined below. We consider this information will be necessary in undertaking compliance assessments and expect the port to take guidance from the level of detail requested when preparing compliance statements in the future. In many cases this guidance reflects our Statement of Regulatory Approach.

This guidance is provided in lieu of us issuing a formal information determination under clause 9 of the pricing order. The absence of such a determination should not be taken as a signal that the port has furnished us with sufficient information, contrary to the port's assertion.[55]

We also note that, while we have referred to the port's responses in this section (and throughout this commentary), we have not published the port's responses in full. For the purposes of our compliance assessments, it would be useful to be able to refer to published information during our assessment. Our general position is that, subject to commercial sensitivities, publishing information will be of benefit to users and other stakeholders in providing transparency of regulatory outcomes including key business drivers that affect service quality and pricing.

Capital expenditure

We asked the port to provide some further substantiation for large percentage increases in some capital expenditure categories. The port responded with some detailed explanations, for example:

- changes in channel capital expenditure from 2017-18 are due to the nature of the dredging work changing and the associated equipment having higher operating costs
- rail capital expenditure includes additional expenditure compared to 2017-18, such as expenditure related to planning processes.[56]

The port also provided additional information on its internal oversight of the capital investment program (including top-down assessments of capital expenditure) and its approach to preparing business cases.

We consider that the level of information provided in the port's response should be mirrored in the port's tariff compliance statement. This is reflected in our Statement, where we outlined some of the information we expect the port to include in its tariff compliance statements in demonstrating

[55] Port of Melbourne, *2018-19 Tariff Compliance Statement: General Statement*, May 2018, p. 8.

[56] Port of Melbourne, *Response to Essential Services Commission Information Request # 2 16 August 2018 CONFIDENTIAL*, pp. 6-11.

how expenditures are prudent and efficient.[57] This includes evidence of asset management processes, explanations of procurement and project delivery processes, and explanations of why actual expenditure has differed from forecasts.

Users would be able to better understand the port's capital expenditure forecasts if they had more detail on what is driving changes in forecast capital expenditure.

Operating expenditure

We requested additional information from the port on changes in operating expenditure. The port provided additional information that explained the reason for reductions in forecast expenditure for 2018-19.[58] It also provided a summary of internal audits of whether the port has necessary controls and processes in place.

As noted above, we consider that this level of information should be provided in the port's tariff compliance statements and would also accord with the guidance contained in our Statement. For example, in demonstrating that expenditures were prudent and efficient, the port should outline its forecasting methodology, explanations of step changes in expenditure, and how it accounts for ongoing productivity improvements.[59]

Cost allocation

In the port's tariff compliance statements so far, the port has broadly allocated costs between prescribed and non-prescribed services, but has not allocated costs directly to individual prescribed services. We asked the port whether it has been able to make an allocation of costs to individual prescribed services for 2018-19. The port advised it will assess how costs related to prescribed services can be allocated between these services going forward.[60] The port noted that it is yet to do this task because the current tariffs are based on the TAL rather than the underlying costs.

We encourage the port to consider allocating costs to individual services, as required by the pricing order and as we outline in our Statement.[61] In this regard we note that the pricing order requires costs to be allocated consistently with the cost allocation principles, and that obligation is not dependent on whether tariffs are based on the TAL or underlying costs. The changes in individual

---

[57] Essential Services Commission, *Statement of Regulatory Approach – version 1.0*, December 2017, p. 18.

[58] Port of Melbourne, *Response to Essential Services Commission Information Request # 2 16 August 2018 CONFIDENTIAL*, pp. 12-14.

[59] Essential Services Commission, *Statement of Regulatory Approach – version 1.0*, December 2017, p. 25.

[60] Port of Melbourne, *Response to Essential Services Commission Information Request # 2 16 August 2018 CONFIDENTIAL*, p. 15.

[61] Essential Services Commission, *Statement of Regulatory Approach – version 1.0*, December 2017, p. 26.

costs may be useful information even while under the TAL, especially in the event that the port submits a rebalancing application for tariffs.

Substantiation of asset lives

The port's tariff compliance statement contains the standard and remaining lives of assets listed in its regulatory model and used for the purposes of calculating depreciation.[62]

Asset lives and associated values that are used for regulatory purposes reflect the aggregation of many more asset categories which exist for non-regulatory purposes, for example, as part of a business's asset registers and other accounting systems. It is important to have transparency in how regulatory asset categories, and associated asset lives and values, are determined. Changes in these categories over time, particularly categories used for forecasting purposes versus those for allocating actual capital expenditure, materially affect how depreciation is calculated and can result in windfall gains or losses for regulated businesses.

The port's tariff compliance statement indicated it has used the same categories and lives as per the previous year, with modifications for 'channels' and 'plant' assets.[63]

We understand that the port's asset lives are generally derived from a technical memorandum prepared by engineering firm CH2M. This memo reflected analysis of the port's depreciated optimised replacement cost which informed the 'initial capital asset values' as at 1 July 2016 that the Victorian Government determined in the pricing order. We sought confirmation from the port that its asset lives were still in accordance with a CH2M memo of 20 June 2016, as well as information on changes to the asset classes noted in the tariff compliance statement. The port's response included:

- reasons why the standard lives for plant, buildings and wharves were substantially lower than the CH2M memo. For example, CH2M determined the standard life of buildings to be 57 years, compared to the port's value of 25 years
- a breakdown on how the economic lives of 'plant' have changed, given it has introduced more detailed sub-categories including 'utilities', 'civil' and 'minor capital works'
- information showing how changes in asset categories resulted in a minor increase in depreciation.[64]

[62] Port of Melbourne, *2018-19 Tariff Compliance Statement: Appendix F*, May 2018, p. 19.

[63] ibid.

[64] Port of Melbourne, *Response to Essential Services Commission Information Request # 2 16 August 2018 CONFIDENTIAL*, pp. 20-23.

We consider that further detailed information on the approach taken to asset lives will be required in the port's tariff compliance statements in the future in order to facilitate an assessment of compliance with the pricing order, particularly where asset categories change.

Demand forecasts

We requested additional information from the port regarding the demand forecasts used in its regulatory model. The port engaged a consultant to forecast demand for 2018-19. There were apparent inconsistencies between the figures in the consultant report and those in the port's regulatory model. The port explained these differences and how the values it used in its model reconciled to other figures.

The port has decided to use all the forecasts provided by its consultant for 2018-19. This is a different approach to last year, where the port in some cases used its own figures and compared these to its consultant's forecasts. This mixing of methodology or figures may lead to inconsistencies, and we are also interested in how this change in approach affects the robustness of the demand forecasts.

We generally sought further information from the port on how its consultant derived its forecasts and how it satisfied itself that the forecasts were reliable. As outlined in our Statement, we would expect that the port's forecasts or estimates are transparent, replicable, and are able to be traced back to primary information. If forecasts are based on consultants' reports, these reports should be provided to us with any confidential information clearly identified. We expect the models and data underlying consultants' forecasts to be provided in order for the commission to be able to assess compliance with the pricing order.[65]

In response to our information request, the port stated:

> Section 6.1 of the General Statement and Appendix H describe the methodology applied by BIS to forecast volumes for each cargo type. BIS Oxford methodology draws on proprietary databases, models and research which are not made available to PoM.[66]

The port's Appendix H does not provide sufficient information to replicate the results presented in its consultant's report. The general methodology followed by the port's consultant is explained but there is no explanation of the models used in the calculation or those that may have been used to calculate values in the port's regulatory model.[67] This includes how forecasts for the cargo type categories used translate into the different categories used the port's regulatory model.

---

[65] Essential Services Commission, *Statement of Regulatory Approach – version 1.0*, December 2017, p. 15.

[66] Port of Melbourne, *Response to Essential Services Commission Information Request # 2 16 August 2018 CONFIDENTIAL*, p. 17.

[67] Port of Melbourne, *2018-19 Tariff Compliance Statement: Appendix H*, May 2018.

We appreciate that providing the level of detail to fully understand these calculations may be difficult if the consultant's methods are proprietary. However this is a challenge for the port. Specifically, the port will need to consider how it provides us sufficient information to assess whether its demand forecasts are compliant with the pricing order. The pricing order does not offer the port a presumption of compliance if we cannot undertake an assessment because of limited information. We may also consider whether this information could be obtained in response to an information determination issued by the commission under clause 9 of the pricing order.

Appendix A Issues raised in our interim commentaries

Issue	Commission views in 2017 commentary	Commission views in 2018 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.
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

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.
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.
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.
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.
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.

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'.
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.
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.
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'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.
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.

Appendix B Approaches used by Synergies in estimating the port's WACC

Element	Approach for 2017-18	Approach for 2018-19
WACC formulation	Pre-tax nominal as required by the Pricing Order	No change
one or a combination of well-accepted approaches	PoM presented its views on the meaning of well-accepted in the context of the Pricing Order	Based on engagement with the ESC and the ESC's published SoRA, PoM believes the majority of the 2017-18 TCS is aligned with the view of the ESC. However, this section considers and responds to the guidance provided by the ESC in the SoRA regarding the requirements of the Pricing Order on well-accepted.
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 ESC's commentary (new total comparison set of 51 entities)
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
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

SL CAPM		No change to approach, but there has been a slight decrease in the risk-free rate and market risk premium
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
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 comparators 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.
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 MRP methodologies	No change to methodology, estimates updated for additional year of data. Wright MRP adjusts in line with changes in risk-free rate.
Black CAPM		No change to approach. Estimate is identical to SL CAPM estimate due to equity beta of 1.00.
Zero beta premium	SFG Consulting (2014). Cost of equity in the Black Capital Asset Pricing Model, 22 May	No change
Fama-French Model		Marginally higher than the 2017-18 estimate. A decrease in the HML beta has been offset by increases in the MRP and SMB betas. We have made a slight adjustment to our methodology to improve the robustness of the estimates for companies from countries without country-specific factors. Further details are provided in Chapter 9.

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
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
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
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
Notional credit rating	BBB	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%
Debt raising costs	PwC (2013), p.6	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

Source: Synergies, *Determining a WACC estimate for Port of Melbourne*, May 2018, pp. 3-4.

Appendix C Detailed considerations on the port's WACC estimate

The port engaged a consultant (Synergies Economic Consulting) to estimate its WACC. The port adopted Synergies' advice in its entirety in submitting its tariff compliance statement. While we refer to Synergies' report throughout this appendix, we have taken Synergies' estimates, analysis and all statements to be adopted by the port.

We have concerns with the port's reliance on the Fama French model

To estimate the port's return on equity, Synergies combined the results of three models with equal weights. These three models were the Sharpe-Lintner CAPM (SL CAPM), the Black CAPM and the Fama French three-factor model (FFM). Synergies stated that these three models would likely support a return on equity estimate commensurate with the requirements of the benchmark efficient entity and the pricing order.[68] Synergies suggested that its estimate is reliable, as it combines three well accepted approaches that have parameters estimated using large datasets.[69]

While all Australian economic regulators use the SL CAPM to estimate the return on equity, they have not constructed estimates using outputs of the Black CAPM or FFM. Instead, regulators have often considered various sources of information when determining a final point estimate from the SL CAPM to account for identified weaknesses with that model. Synergies' application of the FFM produces notably higher results than its estimates of the SL CAPM and Black CAPM and has resulted in a higher overall return on equity estimate for the port.

In Synergies' submission, there is no discussion of the consideration of the FFM in the Australian context, where regulators have noted that it is unreliable on empirical and theoretical grounds and so rejected its use. It is notable that Synergies has not mentioned the analysis and conclusions of the Australian Energy Regulator (AER) and the ERA (including where the decisions of these regulators relating to the FFM have not been found to be in error on appeal) even though it has undertaken considerable effort in identifying numerous and apparently positive examples of the FFM's use by international regulators, as well as its consideration by the Independent Pricing and Regulatory Tribunal (IPART). Our examination of Australian regulatory decisions and of Synergies' own datasets, in light of the high return of equity produced by its application of the FFM, causes us significant concerns.

If the port continues to place partial reliance on the FFM in future tariff compliance statements, we would expect it to acknowledge and address these concerns.

---

[68] Synergies, *Determining a WACC estimate for Port of Melbourne*, May 2018, p. 59.

[69] ibid., p. 85.

What is the Fama French model?

Eugene Fama and Ken French developed their model in response to empirical evidence that the SL CAPM does not effectively explain actual stock returns. In their research, Fama and French found that two firm characteristics, small firm size and high book-to-market ratio, were associated with higher stock returns and improved the explanatory power of asset pricing models for ex-post stock returns. The findings of Fama and French were based on empirical testing of historical stock returns and a range of explanatory variables. In particular, Fama and French concluded that the two variables (the 'value' and 'size' premiums) adequately explained the cross-section of average returns for a certain dataset of historical US stock returns.[70]

The FFM effectively extends the SL CAPM to include these additional characteristics (through 'small-minus-big' and 'high-minus-low' factors respectively) and estimates the return on equity using the following equation:

$$Return\ on\ equity_{FFM} = Risk\ free\ rate + \beta_{mkt}(Market\ risk\ premium) + (\beta_{value} * HML) + (\beta_{size} * SMB)$$

where:

- β_{mkt} is the 'market excess returns beta'
- β_{value} is the 'high-minus-low factor beta'
- β_{size} is the 'small-minus-big factor beta'
- HML is the expected value premium, which is the average return on two value portfolios minus the average return on two growth portfolios
- SMB is the expected size premium, which is the average return on three small portfolios minus the average return on three big portfolios.

In the FFM, the risk free rate and market risk premium estimates are the same as those used in the SL CAPM. As a result, the FFM produces similar results to the SL CAPM when the value premium and size premium are set at zero.[71]

The Fama French model has limited use outside of academia

As part of its justification that the FFM is 'well accepted'[72], Synergies identified 'several examples of regulators applying or considering the use of the FFM'.[73] Synergies also outlined the usage of

---

[70] Fama, E. & French, K., 'Common risk factors in the returns on stocks and bonds', *Journal of Financial Economics*, vol. 33(1), February 1993. p. 4.

[71] The results are not identical as the SL CAPM market beta arises from a regression of asset returns on the market return, while the FFM market beta arises from a multiple regression of asset returns on market returns and two other portfolio returns.

[72] We refer to 'well accepted' in the context of clause 4.3.1 of the pricing order.

the FFM in academia and financial practice. While these examples provide context to the FFM, we are particularly interested in the model's application in a regulatory context to estimate the benchmark return on equity.

The FFM is not used by any Australian regulator

Synergies provided one example of an Australian regulator expressing a 'willingness to consider implementing the FFM in the future.'[74] This regulator, IPART, stated that it would 'monitor the FFM over the next five years to examine how it would perform if we adopted it instead of the SL CAPM in our WACC method'[75]. Synergies stated that IPART's views lend credence to the implementation of a multi-model approach to estimating the return on equity.[76] This is not an example of a regulator 'applying or considering the results of the FFM'. IPART has maintained the use of the SL CAPM as its return on equity model and did not find sufficient evidence to replace this model.[77]

Synergies appears to overstate instances of the use of the FFM by international regulators

Synergies referred to some international examples of the FFM's use (such as the New Zealand Commerce Commission considering the use of FFM as a cross-check[78]), as well as its use in some state-based regulatory processes in the USA. Our observations on these are as follows:[79]

- The examples involving the Public Utilities Commission of Nevada and Mr Knecht do appear to reflect use of the FFM for the relevant decisions
- Synergies stated that Professors Myers and Franks consider the FFM is to be an 'appropriate' model. This reflects the advice of these academics and not views or decisions of the NZ Commerce Commission.
- Synergies used similar examples when referring to expert witnesses; Mr Paul Moul, Mr Paul Hunt and Mr Gary Hayes. These individuals are not regulators and are not applying the FFM in a regulatory context.
- Synergies stated that the UK Competition Commission (UKCC) used the FFM in a liquefied petroleum gas inquiry. The UKCC used the FFM in order to address a claim that a 'small company premium' be added to the WACC. The UKCC used the FFM to conclude that this

---

[73] Synergies, *Determining a WACC estimate for Port of Melbourne*, May 2018, pp. 75-78.

[74] ibid., p. 75.

[75] IPART, *Review of our WACC method: Final report*, February 2018, p. 98.

[76] Synergies, *Determining a WACC estimate for Port of Melbourne*, May 2018, p. 75.

[77] IPART, *Review of our WACC method: Final report*, February 2018, p. 98.

[78] Synergies, *Determining a WACC estimate for Port of Melbourne*, May 2018, p. 75.

[79] ibid., pp. 75-78.

premium was not statistically significant.[80] Synergies states that this should not detract from this being an example of FFM being adopted in a regulatory setting.[81] We disagree. This is not an example of a regulator using the FFM to set a regulated return on equity. That the UKCC found the FFM's parameter estimates to be not statistically significant is similar to several other examples listed by Synergies, which we explore below.

- The US Federal Energy Regulatory Commission (FERC) supported the use of a size adjustment to the CAPM for New England Transmission Owners[82] and the Midcontinent Independent System Operator[83]. However, in its determinations, the FERC did not specifically apply the FFM.

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. Synergies explicitly notes this practice is 'consistent with the underlying rationale of the FFM' rather than use of the FFM.[84] Further below we note it is also common practice for Australian regulators to use the SL CAPM with some adjustments and cross checks, rather than adopt an alternative model for estimating the cost of equity.

Finally, Synergies notes that '(i)n the 344 independent expert reports that we interrogated, we have not located any formal application of the three-factor Fama-French Model as it is employed in the PoM WACC report.' This is a significant finding in that it does not appear to support Synergies' claim that the FFM is 'well accepted' by financial practitioners, and also highlights that the FFM can take various forms. The variability in how the FFM is applied gives rise to concerns on theoretical and empirical grounds as explored further below.

Australian regulators have recognised issues with the SL CAPM but do not use the FFM

All Australian regulators currently rely on the SL CAPM either alone or as a 'foundation model'[85] to estimate the return on equity for regulated businesses. While Australian regulators discussed issues with the SL CAPM (such as a downward biased estimates for low-beta firms), in some cases these have been accounted for when determining inputs to the SL CAPM rather than using

---

[80] UK Competition Commission, *Market investigation into supply of bulk liquefied petroleum gas for domestic use*, 29 June 2006, Appendix K, p. K12.

[81] Synergies, *Determining a WACC estimate for Port of Melbourne*, May 2018, p. 76.

[82] US Federal Energy Regulatory Commission, *Opinion No. 531-B: Order on rehearing*, 150 FERC 61,165, March 2015, p. 64.

[83] US Federal Energy Regulatory Commission, *Opinion No. 551: Order on initial decision*, 156 FERC 61,234, September 2016, p. 74.

[84] Synergies, *Determining a WACC estimate for Port of Melbourne*, May 2018, p. 80.

[85] For example, the AER uses the SL CAPM but has regard to the Black CAPM when setting the equity beta. However it has recently signalled diminished confidence in the robustness of the Black CAPM when determining the value of beta. See AER, *Draft rate of return guidelines: explanatory statement*, July 2018, p. 178.

the FFM. No Australian regulator has moved away from the SL CAPM in favour of the FFM or any other return on equity model. Professor Kevin Davis, in a report for the AER in 2011, stated his view that there is a lack of general agreement on the superiority of alternative asset pricing models to the CAPM.[86]

Currently, IPART makes adjustments to its estimation of equity betas to partly correct for the downward bias of the SL CAPM.[87] IPART implements the Vasicek adjustment, which gives a higher weight to more precisely estimated equity betas and lower weight to estimated equity betas with higher standard errors.[88] IPART chose not to use the Black CAPM to address downward bias of the SL CAPM in favour using the Vasicek adjustment.[89] IPART was of the view that the adjusted equity beta estimates sufficiently accounted for the known downward bias of the SL CAPM.[90]

The AER does not make a specific adjustment to the SL CAPM, but does consider other information when determining the final return on equity point estimate.[91] In particular, the AER uses estimates from a number of models to inform its SL CAPM estimates, including the Black CAPM and the Dividend Discount Model, as well as profitability analysis, financeability analysis and RAB multiples.[92] The practice of 'cross checking' inputs to and outputs of the SL CAPM, is adopted by other regulators including the ERA[93] and Queensland Competition Authority (QCA)[94] and is intended to overcome shortcomings in parameter estimation and in mechanistically applying the SL CAPM.

The main weakness Synergies identified with the SL CAPM is that it produces downwardly biased estimates of the rate of return for low-beta entities. We note that this issue does not appear to be especially relevant for the moment as Synergies has estimated that the port does not have a low beta.

The AER noted that the use of the Black CAPM is an alternative model to the SL CAPM and is not the only method to address low-beta bias.[95] The AER stated that its consideration of the Black CAPM is not related to low-beta bias and is instead to 'capture possible market imperfections that

---

[86] Davis, K., *Cost of equity issues: A report for the AER*, 16 January 2011, p. 5.

[87] IPART, *Review of our WACC method: Final report*, February 2018, p. 96.

[88] ibid.

[89] ibid.

[90] ibid., p. 97.

[91] AER, *Draft rate of return guidelines: explanatory statement*, July 2018, p. 174.

[92] ibid., pp. 178-181.

[93] ERA, *Rate of Return Guidelines - Meeting the requirements of the National Gas Rules*, December 2013, pp. 22-23.

[94] QCA, *Draft decision - Aurizon Network's 2017 draft access undertaking*, December 2017, pp. 125-133.

[95] AER, *Draft rate of return guidelines: explanatory statement*, July 2018, pp. 275-276.

may lead to actual returns to differ from expected returns'.[96] The AER noted some shortcomings of the Black CAPM, such as that it is not empirically reliable, it is not widely used and does not meet the AER's assessment criteria well.[97]

The AER does not give any weight to low-beta bias in its rate of return guidelines, partly due to:

- ongoing academic debate on the existence of low-beta bias
- the existence of a number of explanations (such as economic conditions) that do not imply a bias in equity beta).

The AER also noted that it is not clear that low-beta bias exists on an ex-ante basis or is accounted for by investors and market practitioners on an ex-ante basis.[98]

In relation to low beta bias, Professor Davis suggested it is not possible to make inferences about whether the SL CAPM produces downwardly biased estimates for low-beta firms. In particular, Professor Davis is of the opinion that:[99]

- the theoretical assumptions of the SL CAPM do not necessarily lead to downwardly biased estimates of the rate of return for low-beta firms
- the empirical evidence does not clearly demonstrate a low-beta bias of the SL CAPM.

In addition, Professor Davis suggested that the use of the Black CAPM to address low-beta bias has limited empirical significance and does not resolve the problems of the SL CAPM.[100]

The FFM appears to have theoretical issues

Synergies stated that its FFM estimate is higher than those for the SL CAPM and Black CAPM, reflecting the incorporation of the two additional risk factors that, along with systematic market risk, explain investors' expected return on equity for the benchmark efficient entity.[101]

A number of Australian regulators have raised concerns with the theoretical basis for the FFM's risk factors. Specifically, while these factors have been identified through empirical methods to explain ex post equity returns, how they explicitly or implicitly affect investors' perceptions of risk is not well understood.

---

[96] ibid., p. 278.

[97] ibid., p. 282.

[98] ibid., p. 277.

[99] Davis, K., *Cost of equity issues: A report for the AER*, 16 January 2011, p. 21.

[100] ibid., pp. 9 & 21.

[101] Synergies, *Determining a WACC estimate for Port of Melbourne*, May 2018, p. 111.

In its 2013 and 2018 rate of return guideline reviews, the AER stated that the FFM could not be used to inform any input parameter estimates in its foundation model due to its lack of clear theoretical foundation.[102]

The ERA, in the context of a 2016 decision on the Dampier to Bunbury Natural Gas Pipeline (DBNGP), also noted that the FFM is 'empirically unstable due to the fact that the model is not developed on a robust theory'.[103]

The ERA raised a similar view on the theory of the FFM in its 2015 final decision on ATCO Gas' access arrangement for gas distribution.[104] Specifically, the ERA stated that there is no strong theoretical basis to support the inclusion of the size and value risk factors in the return on equity estimation.[105] The ERA considered that the FFM risk factors were selected based on data exploration and were not guided by any economic theory.[106] The ERA noted that the introduction of the Fama French five-factor model has placed the validity of the value premium in doubt, based on Fama and French suggesting the value premium appears redundant for explaining average returns in this new model.[107]

On appeal, the Australian Competition Tribunal did not find that the ERA made any error in its determination relating to the FFM. In particular, the Tribunal considered that it was not unreasonable for the ERA to be concerned over the theoretical foundations of the FFM, due to the empirical facts of the model not being generally agreed.[108]

The FFM has been found to produce unreliable empirical results

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. Regulators have also found that the results of the FFM are dependent upon the methodology chosen, and the robustness of the FFM risk factors in explaining Australian data has been questioned.

---

[102] AER, *Explanatory statement rate of return guideline (appendices),* December 2013, pp. 22-23 and; AER, *Draft rate of return guidelines: explanatory statement*, July 2018, p. 41.

[103] ERA, *Draft decision on proposed revisions to the access arrangement for the Dampier to Bunbury Natural Gas Pipeline 2016-2020: Appendix 4 rate of return*, December 2015, p. 158.

[104] ERA, *Final decision on Proposed Revisions to the Access Arrangement for the Mid-West and South-West Gas Distribution Systems*, June 2015, p. 612.

[105] ibid.

[106] ERA, *Draft decision on proposed revisions to the access arrangement for the Dampier to Bunbury Natural Gas Pipeline 2016-2020: Appendix 4 rate of return*, December 2015, p. 227.

[107] ibid.

[108] Australian Competition Tribunal, *Application by ATCO Gas Australia Pty Ltd [2016] ACompT 10*, 13 July 2016, para. 668.

Synergies listed a number of academic studies that suggest the FFM provides a better explanation of observed stock returns than the SL CAPM, including for Australian datasets.[109] As described in Synergies' report, these studies provide mixed evidence on the reliability of the FFM:

- Gaunt (2004) found that size was the major factor
- Gharghori et al (2009) and O'Brien et al (2010) found that both size and book to market were important
- Brailsford et al (2012) found clear evidence for only the value effect
- Abhakorn et al (2013), Chiah et al (2016) and Huynh (2017) found evidence for only the value effect.

We note these results are inconsistent, and the most recent studies do not appear to provide clear evidence in support of the size effect.

Synergies noted that past studies of the FFM in the Australian market have yielded inconclusive results, which may be due to 'data issues'.[110] Synergies stated that the Brailsford et al study (2012) addressed these issues and produced FFM estimates using Australian data that reconciled with US studies.[111] As noted above, Brailsford et al found the value premium was statistically significant, while the size premium was not.

The Brailsford et al study has been relied on by other regulated entities in proposing reliance on the FFM. The ERA, in its 2015 final decision for ATCO Gas, decided against relying on the Brailsford et al study. The ERA did not agree with ATCO's consultants that one study is superior to others.[112] In the subsequent review of the ERA's decision by the Australian Competition Tribunal, the Tribunal accepted that the ERA considered the latest available research before rejecting the use of the FFM.[113]

Synergies also noted that the most recent studies employ a five-factor model, rather than the three-factor model it uses in its submission.[114] Synergies also reviewed a number of independent Australian financial expert reports, where around 30 per cent of reports made ad hoc adjustments to the SL CAPM, although none formally used the three-factor FFM.[115] Synergies is not clear on

---

[109] Synergies, *Determining a WACC estimate for Port of Melbourne*, May 2018, pp. 72-74.

[110] ibid., p. 71.

[111] ibid.

[112] ERA, *Final decision on Proposed Revisions to the Access Arrangement for the Mid-West and South-West Gas Distribution Systems*, June 2015, p. 224.

[113] Australian Competition Tribunal, *Application by ATCO Gas Australia Pty Ltd [2016] ACompT 10*, 13 July 2016, paras 679-680.

[114] Synergies, *Determining a WACC estimate for Port of Melbourne*, May 2018, p. 73.

[115] ibid., pp. 79-80.

how often the financial expert reports use value and size premiums compared to other ad hoc adjustments.

Australian regulators have found that the FFM has empirical issues in a regulatory context

The ERA has conducted research on the various attempts to apply the FFM in Australia using Australian data. The ERA noted that the ranges of the high-minus-low and small-minus-big risk premium were too large to confirm the presence of these risk factors when using the FFM in Australia.[116] The ERA noted that a fundamental issue with the application of the FFM in Australia is the adoption of different approaches to portfolio formation, which can lead to different conclusions.[117] The ERA suggested that there is no strong theory to guide the method of portfolio formation due to the inherent empirical nature of the types of studies the FFM has been used in.[118]

The ERA also recognised that the FFM is dependent on empirical justification (the systematic observance of the FFM risk premia).[119] The ERA noted that because these risk premia are not systematically observed in the Australian market, there is no reasonable basis for this model to be applied in Australia.[120] The ERA further justified its rejection of the FFM's value and size premium in its 2015 final decision for ATCO Gas:[121]

- the 2012 Brailsford, Gaunt and O'Brien study (as relied on by ATCO's consultants) concluded that the size premium is not priced in Australia. A number of the academic studies referenced by Synergies in its submission suggest a similar finding for the size premium.[122]
- in Fama and French's most recent five factor model, they conclude that the value premium has become redundant in explaining average returns.

The AER has similarly dismissed various proposals to rely on the FFM for a range of reasons, including:[123]

- the FFM's empirical implementation is relatively complex and opaque

---

[116] ERA, *Final decision on Proposed Revisions to the Access Arrangement for the Mid-West and South-West Gas Distribution Systems*, June 2015, p. 232.

[117] ibid., p. 616.

[118] ibid.

[119] ibid., p. 612.

[120] ibid.

[121] ibid., p. 226.

[122] Synergies, *Determining a WACC estimate for Port of Melbourne*, May 2018, pp. 72-75.

[123] AER, *Draft decision: AusNet Services gas access arrangement 2018 to 2022 – Attachment 3: rate of return*, July 2017, pp. 3-204 to 3-205; AER, *Final Decision APA VTS gas access arrangement 2018 to 2022 - Attachment 3 – Rate of return*, November 2017, pp. 3-180 to 3-188.

- there appears to be no consensus on the appropriate factors and methodological choices for the FFM
- the FFM is sensitive to the choice of factors and methodology, creating a potential for bias and regulatory gaming
- there is no agreed 'best' methodology for applying the FFM and there are no clear objective grounds to distinguish the 'best' studies of FFM estimates.

In IPART's 2018 review of its WACC methodology, it noted some shortcomings with the FFM, including that the empirical evidence on the impact of firm size on equity returns had not been stable over time in Australia.[124]

We have identified what appear to be methodological issues with Synergies' application of the FFM

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. The underlying analysis used for Australian stocks refer to the market portfolio, a HML portfolio, and an SMB portfolio which are all Australian. By contrast, the portfolios chosen for foreign companies are local in respect of the market portfolio and (for some countries) global in respect of the HML and SMB portfolios.[125] This tends to suggest that the FFM model does not have a theoretical base, and is therefore open to defining parameters in ways that are incompatible with any theoretical framework. That is, Synergies' use of global data occurs in those cases where Professor French's database lacks data for the country in question rather than because of any guiding principle. A lack of strong theoretical foundation could undermine confidence in the model in the case (as applies here) of conflicting evidence on observed statistical relationships.[126]

We also have some observations regarding Synergies' choice of data. Synergies did not explain why it used data from Professor French's database for all foreign markets but not for Australia.[127] Regarding Australian data, Synergies' estimate of the MRP in the FFM (and SL CAPM) is based on the same historical data used by Australian regulators (spanning the years 1883 to 2017). However data used to estimate the risk premiums for HML and SMB in the FFM are from 1986 to 2017.[128] No explanation is offered for this difference, however presumably reflects the computational burden of constructing the HML and SMB portfolios back to 1883. The result is a

---

[124] IPART, *Review of our WACC method: Final report*, February 2018, p. 98.

[125] Synergies, *Determining a WACC estimate for Port of Melbourne*, May 2018, p. 168.

[126] Australian Competition Tribunal, *Application by ATCO Gas Australia Pty Ltd [2016] ACompT 10*, 13 July 2016, para. 668.

[127] Synergies, *Determining a WACC estimate for Port of Melbourne*, May 2018, p. 168.

[128] Port of Melbourne, *Information Request (IR) # 1 - Supporting data for Synergies 2018-19 WACC report*, Fama French datafiles, 22 June 2018.

much less reliable estimate of the HML and SMB premiums. We are not aware of there being a method to estimate the HML and SMB premiums that is substantially different to that used by Synergies.[129]

Related to this, the SMB premium estimated by Synergies is 1.93 per cent.[130] This annual value is derived from monthly observations that produced a premium estimate of 0.16 per cent, with a standard error of 0.15 per cent, meaning the premium estimate is not statistically significant.[131] This is consistent with most of the Australian empirical studies cited by Synergies (referred to above) failing to find clear evidence of the size effect.

Sensitivity of Synergies' results to changes in method

Synergies changed how it has applied the FFM from last year. As a result, Synergies' return on equity estimate from the FFM increased from 15.12 per cent to 15.51 per cent. Synergies' explanation of this change is as follows:

> The HML beta is lower, but the MRP and SMB betas have increased. We have made a slight adjustment to our methodology for companies from countries without country-specific factors. Last year, in such instances, we regressed the company's return on global factors from the Ken French database. This year, we have retained the global estimates for the HML and SMB returns, but the market returns for the MRP factor are now based on the given company's local index. As such, the market beta estimate more closely resembles the beta estimate for the CAPM.[132]

The net result of these changes appears small. However the changes in the overall FFM cost of equity attributed to the coefficients for the 'market' and 'growth' risk factors are large and offsetting. We do not have any context to determine whether these changes 'result in a more robust and stable estimate over time' as claimed by Synergies.[133] We are concerned that an apparently slight change in methodology can result in such large changes in some of the FFM's component estimates, as shown in Table 3. This mirrors concerns raised by other regulators about the opacity of the FFM's methodology and its sensitivity to choice of data sources.

---

[129] For example, the MRP can be estimated using several methods including examining historical excess returns as well as via dividend growth models or survey data, whereas these types of alternatives do not exist for estimating the HML and SMB premiums.

[130] Synergies, *Determining a WACC estimate for Port of Melbourne*, May 2018, p. 109.

[131] Port of Melbourne, *Information Request (IR) # 1 - Supporting data for Synergies 2018-19 WACC report*, Fama French datafiles, 22 June 2018. The mean of the monthly premium is 0.160 per cent with a standard error of 0.146 per cent, which produces a t-statistic of 1.1.

[132] Synergies, loc. cit.

[133] ibid., p. 168.

Table 3 Change in Synergies' FFM return on equity estimate

FFM input	2017	2018	contribution to change in return on equity
Risk free rate	2.81%	2.74%	-0.10%
Market premium	7.77%	7.71%	-0.07%
Size premium	1.77%	1.93%	0.03%
Growth premium	6.05%	6.10%	0.02%
Asset beta market	0.620	0.740	1.72%
Asset beta size	0.111	0.162	0.17%
Asset beta growth	0.202	0.079	-1.37%
Synergies FFM pre-tax equity return	**15.12%**	**15.51%**	**0.39%**

Source: Commission analysis of Synergies' data

Observations on the Black CAPM

The port's Black CAPM estimate for the cost of equity matches that for the SL CAPM because the beta is 1. Because the port's overall cost of equity reflects the averaging of the results of three models, its use of the Black CAPM has no immediate impact, however we have found one particular concern as to its application.

Synergies' estimate for the zero beta premium is 3.34 per cent per annum. This estimate is derived from a 2014 study by SFG, using data for 1994 to 2014, which Synergies considered to be the best available in Australia without further explanation.[134] We could not find any information on the reliability of this estimate in the SFG study, which is a concern. SFG listed estimates and associated standard errors for a different estimation process, which yielded an estimate of the premium of 0.238 per cent per four weeks (or 3.14 per cent per annum), with a reported 90 per

[134] ibid., p. 167.

cent confidence interval of -0.40 to 0.88 per cent.[135] That is, this estimate is not statistically significant. We assume the zero beta premium relied on by Synergies is also not statistically significant, which raises questions as to the use of this estimate.

Furthermore, it does not appear that there is any methodology for estimating the zero beta premium that is substantially different to that used by SFG, and this adds to the difficulties of obtaining a reliable estimate for this parameter.

The port's MRP estimate is materially higher than recent decisions

Synergies' estimate of the MRP is 7.71 per cent. This is significantly above the value used by all other Australian regulators, and is due to Synergies placing material reliance on the 'Wright' approach, which has limited support.

As noted by Synergies, regulators have developed a range of measures to estimate the MRP. Synergies adopted the 'Ibbotson' approach in examining historical excess returns to derive an MRP estimate of 6.56 per cent. Synergies also used the 'Wright' approach, which generated an MRP of 8.86 per cent. It considered both the Ibbotson and Wright approaches are 'well accepted', thus placed equal (50 per cent) weighting on each to derive an MRP of 7.71 per cent.

The Wright approach is not widely relied on by Australian regulators. Where it has been used, regulators have noted that evidence supporting its core premise is mixed. Recent publications from the AER and ERA express fresh concerns in light of this evidence. Our view is that the Wright approach now has very limited support, and the weighting Synergies placed on this approach is the primary reason why its MRP estimate is significantly above that otherwise used in Australian regulatory decisions. We expect the port to consider the reliability of the Wright approach and more recent regulatory sentiment in future tariff compliance statements.

We have not examined Synergies' reliance on historical excess returns, and note that Synergies did not explain its method or data sources in its report. The value it assigns to this approach is 6.56 per cent. Recent regulatory determinations derive estimates ranging from 5 per cent to 6.5 per cent from historical excess return data, reflecting different methods, sampling periods and data sources.[136] That Synergies' estimate is at the high end of this range may partially explain its higher overall MRP estimate when combined with the Wright approach estimate. The port should consider providing more transparency on how this value has been derived in future tariff compliance statements.

---

[135] SFG, *Cost of equity in the Black Capital Asset Pricing Model - Report for Jemena Gas Networks, ActewAGL, Networks NSW, Transend, Ergon and SA Power Networks*, May 2014, Table 3, Panel D.

[136] See for example AER, *Draft rate of return guidelines: explanatory statement*, July 2018, pp. 209-215; and ERA, *Draft Decision on Proposed Revisions to the Access Arrangement for the Western Power Network - Appendix 5 Return on Regulated Capital Base*, May 2018, pp. 21-29.

What is the market risk premium?

The MRP is an input to the CAPM used to estimate the cost of equity for a particular asset. The CAPM states that the return required by investors for investing in a particular asset (denoted with subscript 'i' in the equation below) is the risk-free rate plus a risk premium commensurate with the systematic, non-diversifiable risk associated with that asset.

$$Return\ on\ equity_i = Risk\text{-}free\ rate + (MRP\ \times Beta_i)$$

The MRP represents the minimum return above the risk-free rate that equity investors would require in order to invest in a diversified portfolio containing all assets in the economy. Beta is a measure of the non-diversifiable ('systematic') risk associated with the particular investment. That is, the MRP is the premium that investors would require to compensate them for an investment of average risk, and beta is a scale factor that indicates whether the investment in question has more or less systematic risk than average.

In a regulatory setting, and unlike beta and gearing, the MRP is a market-wide parameter and is less dependent on industry or jurisdictional specific factors. An exception to this is the assumed investment horizon, which can sometimes differ between regulatory decisions. That is, expected returns over a shorter time horizon can be higher or lower than over longer time horizons.

The MRP is not directly observable and is a forward-looking estimate. Values across regulatory decisions reflect different views on what observable data is relevant, as well as how this data changes over time.

There is a reasonable degree of consistency across regulators in identifying the data sources that could be relevant for estimating the MRP, and the strengths and weaknesses of each. There is less consistency in how these data sources are used in setting the MRP. Australian regulators tend to consider the following data sources in estimating the MRP:

- long-run averages of historical excess market returns
- the difference between a long-run historical market return and the prevailing risk-free rate i.e. the 'Wright' approach
- dividend growth models (DGMs) or dividend discount models (DDMs)
- surveys of academics and finance practitioners
- independent expert valuation reports
- other data sources such as dividend yields, 'implied' volatility and credit spreads.

Some data are used directly in calculating the MRP value, others are used as 'cross checks' or to guide the use of judgement, while some are discounted entirely. There are also some variations in the construction of estimates or ranges of estimates from each individual data source.

In spite of these variations and differences in data sources, the MRPs underlying the recent decisions represented in Figure 2 in the main body of this commentary are approximately between 6.5 per cent and 7.0 per cent. Exceptions to this range include the AER's recent draft WACC guidelines (6 per cent[137]) and IPART (7.6 per cent[138]).

Overview of Synergies' MRP analysis

Synergies had regard to approaches adopted by financial practitioners, academics and Australian regulators. It examined the following sources of information[139]:

- historical excess returns
- the 'Wright' approach
- recent decisions by Australian regulators
- approaches used internationally
- DGMs/ DDMs
- survey evidence.

From this information, Synergies concluded that it was clear that the majority of regulators have acknowledged the limitations of relying solely on the 'Ibbotson' approach of examining historical excess returns, and that a range of bodies have explicitly or implicitly adopted the Wright approach in formulating the MRP.[140] It considered that DGMs are arguably also a 'well accepted' approach however only relied on them as a cross-check rather than in deriving an MRP value. It calculated an MRP value by taking the simple average of values derived from historical excess returns and the Wright approach. Synergies considered the resulting value of 7.71 per cent was below that determined recently by IPART 'once account is taken of the higher risk-free rate assumed in its approach'.[141]

What is the 'Wright' approach?

The Wright approach (named after the Professor Stephen Wright, who first proposed the method in Australia[142]) assumes that the expected real return on equity for the market as a whole is relatively

---

[137] AER, *Draft rate of return guidelines: Explanatory statement*, July 2018, pp. 42-46.

[138] IPART, *WACC Biannual Update*, February 2018, p. 2. The value of 7.55 per cent is the average of the 'current' and '10 year' MRP as at 31 January 2018, reflecting IPART's approach to deriving WACC values.

[139] Synergies, *Determining a WACC estimate for Port of Melbourne*, May 2018, pp. 96-105.

[140] ibid., p. 105.

[141] ibid.

[142] Wright, S., *Review of risk free rate and cost of equity estimates: A comparison of UK approaches with the AER*, October 2012.

stable. Under the CAPM framework, this means that any fluctuations in the risk free rate must be offset by corresponding changes in the MRP. The Wright approach can be represented as:

$$MRP = Expected\ market\ return - Risk\text{-}free\ rate$$

It posits that the expected real return on equity is constant and therefore an unbiased estimate of the real expected market return can be estimated by the long-run average return on the market. The MRP is then estimated by converting this estimate of the expected real return on equity to the nominal rate using an inflation forecast and then deducting the current nominal risk-free rate. A strict application of the Wright approach means that the MRP will vary inversely, and perfectly, with the risk-free rate.

This contrasts with examining historical excess returns. This approach seeks to estimate the MRP ex post by subtracting the risk free rate from observed market returns each year over very long periods (e.g. 50 to 100 years). These 'excess' returns can inform the ex ante or expected MRP where it is assumed that investors expect historical returns to be repeated into the future. The validity of this assumption depends on whether the MRP is 'stable' over time.

The Wright approach is an alternative method of using this historical data and gained prominence in regulatory discussions following the global financial crisis. Over this time, market analysts observed a 'flight to safety' from risky assets to safe assets like highly rated government bonds. This drove up the price and depressed yields on these bonds and other less risky assets. In contrast to heightened market uncertainty at the time, regulators were characterised as essentially setting a 'fixed' MRP because of their heavy reliance on historical excess returns. When combined with historically low risk free rates in a CAPM framework, this 'fixed' MRP resulted in regulated returns on equity that were argued to be implausibly low and not reflective of required returns over the forward investment horizon.

The 'stability' of the MRP versus the expected market return is a key area of investigation and contention associated with the Wright approach.

Our observations on the Wright approach

Synergies' 50 per cent weighting on the Wright approach suggests it considers this approach to be as equally 'well accepted' as historical excess returns. Synergies considered the following constitutes explicit or implicit adoption of the Wright approach to the formulation of the MRP[143]:

- comments from the Governor of the Reserve Bank of Australia in 2015, observing a divergence between market earnings and sovereign bond yields
- the ERA's October 2017 rail WACC update, where it partially relied on the Wright approach

[143] Synergies, *Determining a WACC estimate for Port of Melbourne*, May 2018, pp. 98-102.

- comments by the QCA in its December 2017 draft decision for Aurizon to have greater regard to the Wright approach in its determinations
- comments from Ofgem's consultants, including Wright himself, that there was limited evidence to suggest that falls in the prevailing risk free rate should translate into falls in expected market returns
- comments from the US Federal Energy Regulatory Commission that reductions in US Treasury bond yields do not provide a reliable or consistent metric for tracking changes in the return on equity
- analysis undertaken by the Alberta Utilities Commission in 2011 that the market return on equity changes by less than the risk-free rate
- comments from McKinsey in 2014, who relayed its discussions with practitioners who have taken a 'longer term view' and not lowered their hurdle rates in light of the lower (risk free) rates prevailing at the time.

Of these instances, only the QCA and ERA were cases of a regulator using the Wright approach in estimating the MRP for a regulated benchmark entity.

The QCA's draft decision for Aurizon involved an implicit reliance on a wide range of data sources. In one part of its assessment, it derived a weighted mean of MRP estimates using a 'credible' set of weights, consistent with its assessment of the strengths and weaknesses of each data source. In this set, the Wright approach was given 15 per cent weighting.[144] Of the Wright approach, the QCA noted that 'even though available empirical evidence in the Australian context supports more stability in the MRP relative to the return on equity, this evidence is not determinative'.[145] While its position appears somewhat equivocal, the QCA stated it was having more regard to estimates from the Wright approach than previously. The QCA's earlier 2016 final decision for DBCT expressed some doubt about the inverse relationship between the risk free rate and the MRP as suggested by the Wright approach. It noted that 'no proof has been offered by stakeholders for this contention, and it is doubtful that it can be conclusively proven in any case.'[146]

The ERA's 2017 rail WACC update involved a clear reliance on the Wright approach. Its MRP estimate was calculated as follows:

- a value of 6.9 per cent was derived from historical data, namely the mid-point of values from the Ibbotson approach (5.39 per cent) and the Wright approach (8.32 per cent)
- a value of 7.2 per cent was derived from forward-looking DGM estimates

---

[144] QCA, *Draft Decision - Aurizon Network's 2017 draft access undertaking*, December 2017, p. 83.

[145] ibid., pp. 82, 493.

[146] QCA, *Final Decision – DBCT Management's 2015 draft access undertaking*, November 2016, p. 79.

- within the range of 6.9 to 7.2 per cent, a value at the high end of this range was selected, partly reflecting a greater weight afforded to the Wright approach.[147]

This 2017 update implemented the approach determined in the ERA's 2015 WACC review for rail entities. Here it considered that there was statistical evidence to support a mean reversion of the market return on equity.[148] This was in line with the Wright approach i.e. deducting the prevailing risk free rate from the long run (stable) market return on equity could provide a sound estimate of the MRP.

The ERA has recently withdrawn its support for the Wright approach. In its May 2018 draft decision for Western Power (also reflected in its June draft WACC guideline for gas networks), the ERA noted theoretical and empirical concerns with the Wright approach. Specifically, the prior analysis that led the ERA to support the Wright approach was examined on behalf of the AER. This new analysis identified several issues with the ERA's statistical tests. Further concerns were raised by the AER's advisers regarding the lack of theoretical support and evidence in the Australian context to support the Wright approach.[149] Given these issues the ERA concluded that it will not rely on this approach when estimating the MRP.[150]

In considering the views of its advisors, the AER's June 2018 draft WACC guideline indicates it has diminished confidence in the robustness of the Wright approach.[151] Prior to this, the AER had only considered the Wright approach in assessing the reasonableness of the overall return on equity and not in estimating the MRP.[152]

To our knowledge, the only other Australian regulator to have considered the Wright approach is the Independent Competition and Regulatory Commission (ICRC). It referred to evidence considered previously by the QCA, ERA and AER regarding the contradictory evidence and lack of consensus about the relationship between the MRP and risk free rate that underpins the Wright approach.[153] The ICRC did not use this approach.

The evidence considered by the AER and the ERA, and qualifications by the QCA noted above, contrast to Synergies' assertion that '(t)he post-GFC evidence supports the Wright approach to the

---

[147] ERA, *Determination on the 2017 Weighted Average Cost of Capital for the Freight and Urban Railway Networks, and for Pilbara railways*, October 2017, pp. 16-18.

[148] ERA, *Review of the method for estimating the Weighted Average Cost of Capital for the Regulated Railway Networks – Final decision*, September 2015, pp. 131-135.

[149] ERA, *Draft Decision on Proposed Revisions to the Access Arrangement for the Western Power Network - Appendix 5 Return on Regulated Capital Base*, May 2018, pp. 41-2; ERA, *Draft Explanatory Statement for the Rate of Return Guidelines (2018),* June 2018, pp. 106-107.

[150] ibid.

[151] AER, *Draft rate of return guidelines - Explanatory Statement*, July 2018, pp. 179.

[152] ibid., pp. 234-235.

[153] ICRC, *Final report - Regulated water and sewerage services prices 2018–23*, May 2018, p. 107.

determination of the MRP.'[154] Notably, Synergies did not refer to any of the evidence considered by these regulators, which directly addressed (including through statistical testing) the stability of the MRP relative to the cost of equity. Synergies' reference to post-GFC evidence is based on comments by the Governor of the Reserve Bank of Australia. We consider these comments are more equivocal than Synergies suggests, are not based on any statistical analysis and refer to a fairly limited historical time series, compared to datasets spanning over 100 years that are the standard in examining the relationships between these variables.

Our observations on the value of Synergies' MRP estimate

Methodological issues aside, and as noted above, most Australian regulatory decisions on the MRP are currently around 6.5 per cent to 7 per cent, with those published in the last 6 months at the lower end or below this range. Synergies' estimate of 7.71 per cent is higher than all determinations, including IPART's value of 7.55 per cent.[155]

Synergies noted that its estimate is below IPART's 'effective' MRP value of 8 per cent. This effective value is above IPART's actual value because of 'the higher risk free rate assumed in its approach (approximately 40 basis points).'[156] Synergies provided no further explanation for this adjustment. This adjustment may reflect a desire to account for the difference between IPART's 'midpoint' risk free rate and its 'current' risk free rate. Specifically, IPART's 'midpoint' risk free rate may not be suitable for comparison because it combines the current prevailing risk free rate (typically used in regulatory determinations and hence relevant for comparisons) and a long-run average rate. However the difference between IPART's midpoint and the current risk free rate in its February 2018 WACC update is 60 basis points, not 40 basis points as quoted by Synergies. Regardless of this difference, it is not clear why this should result in any corresponding adjustment to the MRP. The port may wish to clarify why and how IPART's MRP should be converted into an 'effective' value if it wishes to rely on such a value in future tariff compliance statements.

The Wright approach was neither considered nor relied upon by IPART in its WACC review. IPART's MRP (whether 7.55 per cent or Synergies' higher 'effective' value) mostly reflects IPART giving 50 per cent weighting to forward-looking measures of the MRP, which produce estimates that are materially higher than historic measures. Almost all of IPART's forward-looking measures are variants of the DGM, which are treated with caution by other regulators and by Synergies:

---

[154] Synergies, *Determining a WACC estimate for Port of Melbourne*, May 2018, p. 98.

[155] IPART, *WACC Biannual Update*, February 2018, p. 2. The value of 7.55 per cent is the average of the 'current' and '10 year' MRP as at 31 January 2018, reflecting IPART's approach to deriving WACC values.

[156] Synergies, op. cit., pp. 100 & 105.

> ….our view is that MRP estimates based on forward-looking approaches, while theoretically appealing, tend to be significantly less stable when compared to historical approaches. For this reason, we have not applied a forward-looking MRP derived using the DDM.[157]

Indeed, no other Australian regulator places as high a weighting as IPART on DGM measures because they are highly sensitive to the assumptions and specific model used.

In essence, the relatively high MRP values produced by both IPART and Synergies reflect the weighting on DGMs by the former and on the Wright approach by the latter. In the context of the uncertainties in estimating the MRP, it is possible that different approaches could still produce a reasonable outcome, and that Synergies' and IPART's values corroborate one another. However, we consider that the similarly high MRPs produced by IPART and Synergies reflect their reliance on methods that other regulators have found to have serious shortcomings.

Conclusion on Synergies' MRP estimate

We note that ERA's and AER's WACC reviews are still progressing and the role and validity of the Wright approach (and of DGMs) is an area of ongoing discussion. The QCA is now the only Australian regulator that appears to place any reliance on the Wright approach as an input to estimating the MRP, and the extent of this reliance will be confirmed in its final decision for Aurizon expected later this year. We expect the port to reflect on these developments and the overall reasonableness of its MRP estimate in future compliance statements.

The port's methods for estimating beta and gearing have shortcomings

The estimate of gearing determines the ratio of debt to equity in the WACC calculation. The higher the level of gearing, the more weight is given to the cost of debt in the WACC calculation. Gearing also influences the equity beta value within the CAPM, with the level of gearing positively correlated with the value of the equity beta.

Synergies estimated the port's gearing by assessing the gearing of selected comparators (used to approximate the risk profile of the benchmark efficient entity). The gearing levels for Synergies' 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.[158] By comparison, the majority of the regulatory decisions outlined in Table 2 (earlier in this paper) assume a benchmark gearing level of between 50 and 60 per cent.

Synergies estimated an asset beta of 0.7, which translates to an equity beta of 1.0 when combined with benchmark gearing of 30 per cent. As discussed above in the context of the MRP, beta

---

[157] ibid., p. 104.

[158] ibid., p. 39.

measures the non-diversifiable or systematic risk associated with the particular investment. Like gearing, beta is also calculated with reference to a set of comparator firms with similar risk characteristics. An equity beta of 1.0 implies that the port has the same risk as the average firm in the market.

Regulators have tended to use lower asset betas in combination with higher levels of gearing than that used by Synergies. We have some concerns with Synergies' relatively higher asset beta, as it is a contributor to the port's overall WACC estimate, which as discussed above also appears high.

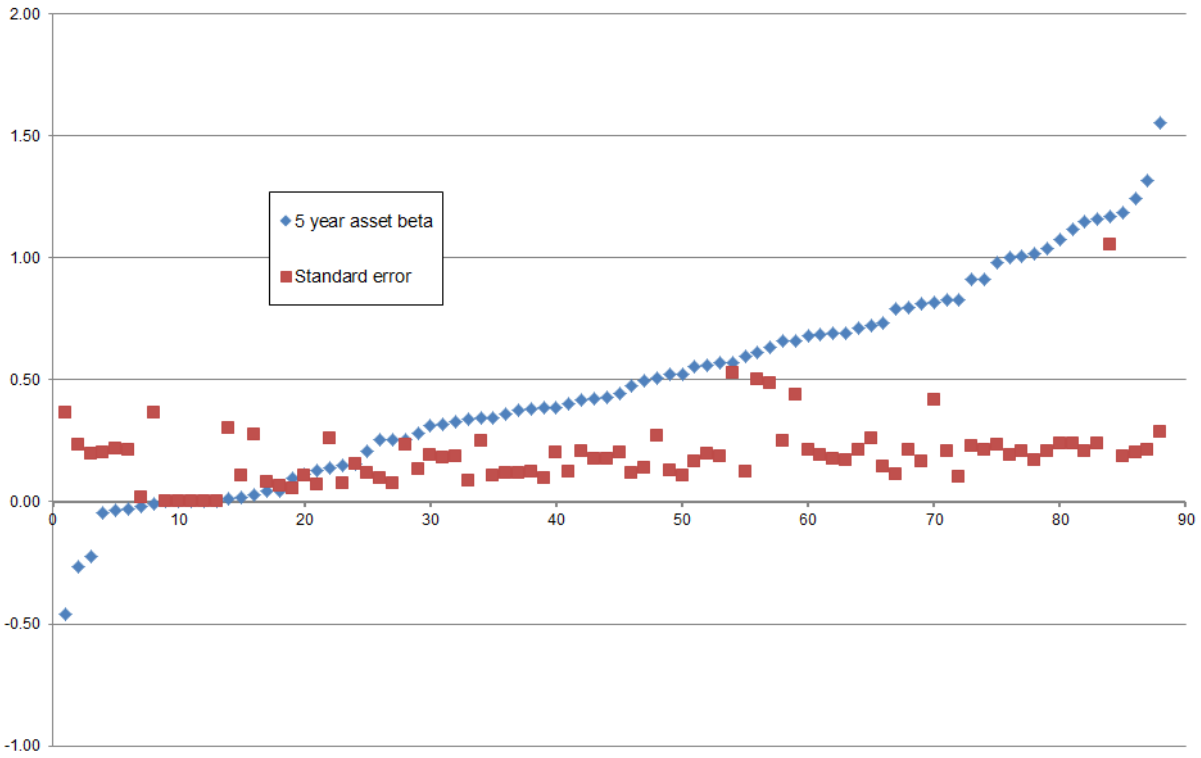
Synergies' beta estimate may reflect the presence of upward bias because of the exclusion of firms with particular statistical properties. The estimates of beta and gearing may also reflect potential shortcomings in Synergies' examination of risk characteristics when selecting comparator firms. We expect the port to consider these points in addressing our observations on the reasonableness of the WACC estimate in future tariff compliance statements.

Exclusion of firms with statistically insignificant betas

Synergies' analysis excludes 31 comparator firms because their beta estimate was negative or not statistically significant. We are concerned that excluding these firms may have introduced an upward bias in the resulting estimate derived from the remaining firms. This is because some potential comparator firms will have low systematic risk. The beta estimates for these firms will be closer to zero, but in statistical terms not be significantly different from zero (suggesting the estimate is not reliable). Firms with higher systematic risk but the same statistical confidence in their beta estimate would still be included in Synergies' list of firms.

This is illustrated in Figure 4 below, which plots the five year asset beta estimates and associated standard errors for the firms included in Synergies' analysis as well as those excluded on statistical grounds. It illustrates that the level of statistical confidence in the beta estimates does not change over the range of beta values, which are plotted in numerical order.

Figure 4 5 year asset betas and standard errors for included and excluded firms



Source: Commission analysis using Synergies' data.

Analysis of systematic risk and the impact of regulation

The choice of comparators with similar risk characteristics is central to the estimation of gearing and beta. We outlined our views on the relevant risk characteristics of the port's prescribed services in our Statement, including that comparator firms should provide services that:

- relate primarily to the provision of wharfage and channel access
- are provided by a port that predominantly derives revenue from services to container cargo, with a smaller share of bulk and non-bulk cargo
- are provided by a port in Australia
- are unlikely to face significant competition in the short to medium term.[159]

We acknowledge Synergies' comments about the challenges of establishing a comparator set given there are no publicly listed firms that have all of these characteristics.[160] Synergies undertook a 'first principles' analysis of the extent to which a firm's net cash flows are sensitive to movements

[159] Essential Services Commission, *Statement of Regulatory Approach – version 1.0*, December 2017, p. 21.

[160] Synergies, *Determining a WACC estimate for Port of Melbourne*, May 2018, p. 6.

in the general economy. It stated that such an analysis 'can inform an assessment of where beta might sit within a range'.[161] The seven specific factors it considered are:

- the nature of the product/ customer, including availability of substitutes and income elasticity of demand
- pricing structure
- duration of contracts
- market power
- nature of regulation
- growth options
- operating leverage.

The analysis contained in Attachment D of its report is limited to characteristics of the Port of Melbourne. As discussed below, we consider that such an analysis could have also been applied in examining potential firms for inclusion in the comparator set used for beta estimation.

A key issue with Synergies' first principles analysis is that it finds the nature of regulation is unlikely to have any mitigating impact on the port's systematic risk. Its primary reason is because the port is 'likely to have its revenues significantly affected by levels of economic activity throughout the lease period'.[162] Synergies also notes that regulatory risk could be avoided through diversification, and the port has not and is never likely to have long term take or pay contracts in place, which could mitigate revenue variations due to changes in economic activity.[163]

These points do not support Synergies' finding that the nature of regulation has no impact on the port's systematic risk. While the port's revenues may indeed be significantly affected by levels of activity, Synergies does not examine how elements of the regulatory regime will alter this relationship. The avoidance of 'regulatory risk' and absence of take or pay contracts also have no bearing on whether other elements of the regulatory regime affect systematic risk.

In a separate report, Synergies has noted that regulation in the form of price and revenue caps, by affecting a firm's exposure to volume risk, affects systematic risk.[164]

Synergies finding that the regulatory regime has no impact on the port's systematic risk contrasts to the views of regulators when examining separate but similar regimes. For example, the AER[165]

---

[161] ibid., p. 174.

[162] ibid., pp. 179-180.

[163] ibid.

[164] Synergies, *The Rate of Return to Apply to ARTC's Hunter Valley Coal Network: Update*, October 2016, p. 74.

[165] AER, *Draft rate of return guidelines - Explanatory Statement*, July 2018, pp. 104-112.

and QCA[166] have both noted that regulation tends to reduce systematic risk relative to unregulated firms. Some of the elements identified by the AER that are also present in the port's regulatory regime include:

- the periodic resetting of prices to align with revenue requirements. Noting this is currently constrained by the TAL, the effect of this in reducing the port's risk is likely to be greater than other regulatory regimes as the pricing order allows the port to choose the length of the regulatory period without constraints.[167] The port has so far chosen regulatory periods of one year given uncertainties affecting expenditure forecasts, including new investment strategies, user preferences and service standards.[168]
- the ability of the port to enter into direct contracts with users which could involve fixed amounts rather than volumetric charges that characterise its reference tariff schedule
- tariff rebalancing, including the ability to introduce new tariffs, which allow the port to reduce its reliance on volumetric charges if it chooses
- prescribed asset values that are 'rolled forward', which significantly reduces the risk of asset stranding
- indexation of prices and the asset base by CPI, which protects against inflation risk.

Consistent with the findings of other regulators, the presence of regulation will, all else being equal, lower the systematic risk of the benchmark efficient entity providing the port's prescribed services compared to the same entity operating in an unregulated setting. We would expect Synergies to reconsider how regulation affects the port's systematic risk and whether it should place weight on regulated entities in its benchmark comparator set in the future.

The merits of including airports and rail

As noted above, Synergies applied its first principles analysis to the port for the purposes of considering where its equity beta might sit relative to other comparators.[169] Synergies also stated this analysis formed the basis of its decision to include listed airports and railroads in its sample of comparator firms.[170] Its justification for including airports and railroads is limited to the following statements:

---

[166] QCA, *Draft decision - Aurizon Network's 2017 draft access undertaking*, December 2017, pp. 75; 92-94.

[167] For example, the National Electricity Rules require regulatory periods to be at least five years, and the National Gas Rules contain a 'general rule' for five year periods.

[168] Port of Melbourne, *2018-19 Tariff Compliance Statement: General Statement*, May 2018, p. 14.

[169] Synergies, *Determining a WACC estimate for Port of Melbourne*, May 2018, p. 94.

[170] ibid., p. 6.

> We have also included freight railroad companies in our sample as there are a number of publicly listed firms in this sector with similar infrastructure characteristics and demand drivers to ports. Additionally, major city airports have similar infrastructure characteristics to ports given their (albeit more limited) exposure to domestic cyclical economic conditions, as well as from an operating leverage (high fixed costs in their total cost base) and investment perspective. The strong fixed capital cost and associated cash flow risk exposures represent close comparators from a gearing and beta perspective.[171]
>
> …
>
> Freight railroads (in particular, North American Class I railroads) are considered a primary comparator set due to their freight-focussed business model, strong market position and below rail infrastructure services.
>
> Additionally, we included airports in the sample. Despite having different demand drivers to ports, (less driven by cyclical economic drivers), they were close comparators to ports in their core aeronautical infrastructure-related service.[172]

We consider a more methodical application of the factors affecting systematic risk in comparative industries is justified. If not these factors, Synergies could have explored the relevance of airports and railroads with respect to other factors it outlined for the benchmark efficient entity.[173] The choice of airports and rail appears to be based on them being 'freight focused'. In this context, the decision to include airports is questionable, given airports derive a small proportion of revenues from freight.[174] Even so, and as noted by Synergies, the correlation between demand for aeronautical infrastructure-related services and general economic activity is different than for port services, but is presumed to be immaterial without any analysis.

The sufficiency of comparators in ports and marine services

Synergies stated that 'the ESC noted the need for trade-offs when sourcing comparators from other sectors (such as rail and airports).'[175] This misrepresents the view in our Statement, which was that the port may need to use comparator firms that supply services which do not meet the

[171] ibid., p. 50.

[172] ibid., p. 91.

[173] ibid., p. 49.

[174] Europe Economics, *Critique of Commerce Commission's Asset Beta Analysis*, July 2010, p. 14; Airports Council International 2013, *Air Cargo Guide 2013*, p. 9.

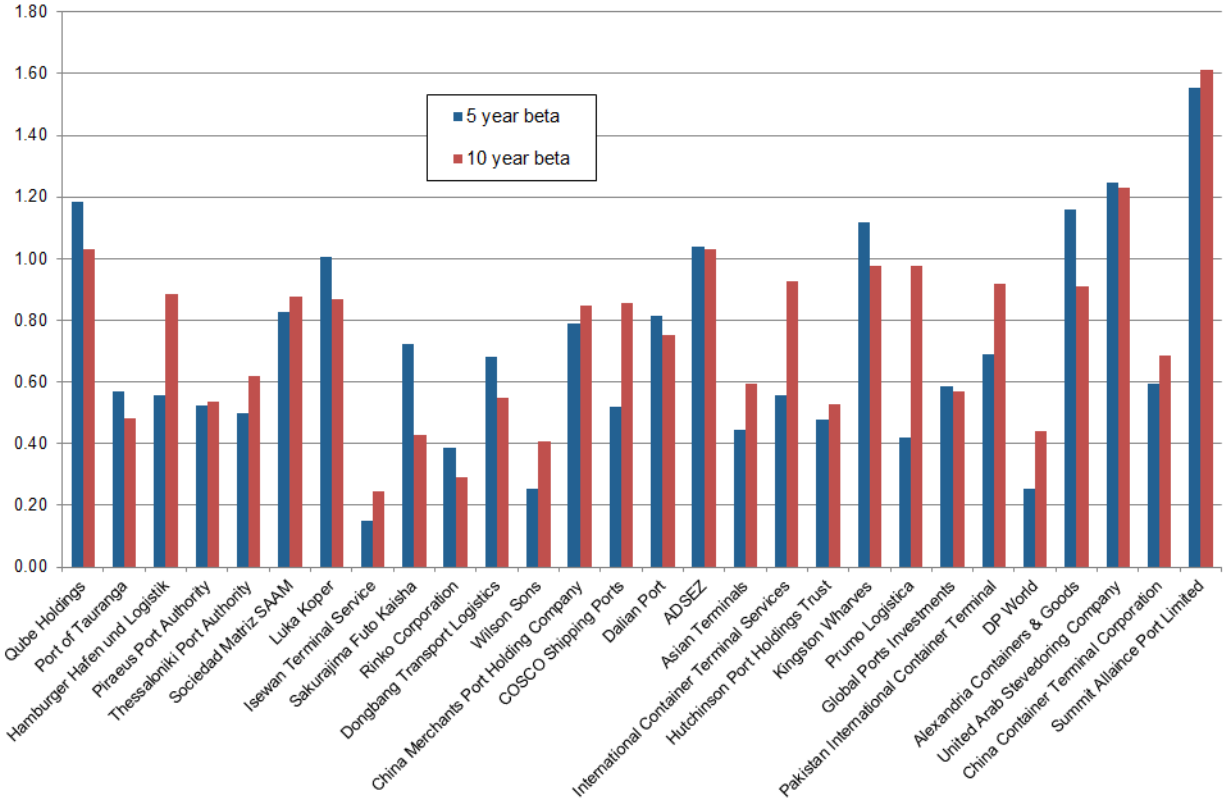
[175] Synergies, op. cit., p. 47.

characteristics we outlined.[176] Synergies appears to have traded off these characteristics for the sake of broadening its data set. Synergies stated:

> …in practice, there are few listed port entities that provide comparable services to construct a sample that reliably estimates a benchmark gearing ratio and equity beta for the BEE. Hence, this has required us to identify transport entities outside of the Australian and international port sector with a comparable risk profile to PoM's Prescribed Services.[177]

Synergies found 28 comparators in the 'marine ports and services' category that it regarded were suitable for inclusion. The 5 and 10 year asset betas are contained in Figure 5 below. It is not apparent from Synergies' analysis that a reliable beta estimate cannot be derived from these firms, including the subset of eleven firms that are identified as port owners or operators.

Figure 5 10 and 5 year asset betas for 'marine ports and services' firms



Source: Commission analysis using Synergies' data.

[176] Essential Services Commission, *Statement of Regulatory Approach – version 1.0*, December 2017, p. 21.

[177] Synergies, op. cit., p. 49.

Synergies stated:

> …many of the entities in the Marine Ports and Services category operate primarily as terminal operators or stevedores and do not provide the core infrastructure service that PoM provides.
>
> Further, whilst terminal operators and PoM may have similar market exposure, terminal operators generally have lower fixed capital costs and higher variable costs within their total cost base than a landlord port such as PoM. As discussed in our first principles analysis, this means that these terminal operators' earnings will be less sensitive to sales volumes than PoM.
>
> Consequently, whilst PoM's risk profile is not identical to several of these businesses, there is a strong overlap in market exposure and demand drivers between the entities comprised within the Marine Ports and Services classification and PoM, which warrants their inclusion in our comparable companies set.[178]

In terms of Synergies' first principles analysis, concerns about the presence of terminal operators and stevedores in this sample relates to one of the seven factors examined (i.e. operating leverage). The extent to which this factor is dominant in determining the port's systematic risk is not clear.

Overall it appears that Synergies has widened its dataset with the implicit aim of producing a more reliable result, with minimal consideration of whether the included firms reflect comparable risk. As outlined above, the presence of regulation will reduce the systematic risk of the benchmark efficient entity in the port's context relative to unregulated firms providing the same services. Synergies point regarding the port's operating leverage relative to comparator firms may or may not offset this effect.

Potential issues in using international comparator firms

Synergies noted challenges in finding suitable comparator firms in Australia and the need to refer to international comparators.[179] While we understand the reasons for this approach, we have identified a number of drawbacks in using beta estimates for international firms.

These estimates reflect the industry composition of the particular index used to approximate the market portfolio against which covariance of a firm's returns are measured. That is, the observed variability of a foreign firm's returns relative to the market index of its country may not accurately reflect how those returns would vary against the market index in the country where regulated

[178] ibid., p. 50.

[179] ibid.

services are provided i.e. in Australia. The returns for each market portfolio will also reflect the degree of leverage underlying that portfolio which may differ between countries. Other factors to consider (that are more relevant to gearing estimates) are differences in taxation and bankruptcy arrangements in different countries.

Other regulators have faced the challenges of not being able to draw on many, or any, comparator firms in Australia and in the same industry as the benchmark entity.

In dealing with this challenge for rail entities, the ERA did not compile a large dataset across different countries and industries. Rather, a limited set of comparators was selected following detailed consideration of relative risk characteristics, with importance placed on firms residing in Australia or a similar developed country. For example, the ERA's approach for Brookfield Rail involved the selection of eleven comparators from the United States, Canada, Australia and New Zealand.[180] More recently in the case of energy, the ERA considered that it was preferable to limit its sample to only four comparator firms than to include international comparators that may have fundamentally different risks.[181]

The QCA, in the case of Aurizon, referred to a relatively large number of international comparators in its draft decision. The comparator firms were largely limited to the same countries as those for the ERA as mentioned above. The QCA's decision involved a comprehensive first principles assessment on the basis of factors similar to those as identified by Synergies, supported by quantitative analysis of different industry returns relative to GDP growth.[182] The QCA's decision is notable as it found that rail businesses in North America were not appropriate comparators, while regulated energy and water businesses were.[183]

These examples underline how a more comprehensive assessment of comparable risk might assist Synergies in overcoming the apparent lack of suitable comparators. We note that Synergies, in examining the overall reasonableness of its WACC estimate, made some detailed observations on risk for rail entities, i.e. ARTC Interstate and Pilbara Railways.[184] While these firms are not listed, such detailed analysis of a limited number of firms may be preferable to Synergies' approach of drawing observations from firms across three different industry classifications in around 30 different countries.

---

[180] ERA, Review of the method for estimating the Weighted Average Cost of Capital for the Regulated Railway Networks - Final Decision, September 2015, pp. 28-30.

[181] ERA, *Draft Explanatory Statement for the Rate of Return Guidelines (2018)*, June 2018, p. 31.

[182] QCA, *Draft decision Aurizon Network's 2017 draft access undertaking*, December 2017, pp. 91-120.

[183] ibid., pp. 89.

[184] Synergies, op. cit., pp. 140-144.

The threat of competition

Synergies considered that the port's main differentiator of systematic risk to the average of the sample is the prospect of competition from a second Victorian container port.[185] It stated:

> Whilst clearly not imminent, the prospect of the development of a new port has material implications for PoM with respect to its return on future investments. PoM must make investment decisions across long-term horizons, and any change in demand for services will affect these investment decisions.

As alluded to by Synergies, the port is eligible to be compensated in the event a second port establishes itself in the next 15 years. The 'Port Growth Regime' involves payment to the Port of Melbourne in compensation for trade and associated revenues that are diverted to a second state-sponsored port.[186] This regime was developed by the Victorian Government as part of the lease transaction in reflection of there being greater value in incentivising investment in existing port capacity and deferring 'greenfield' capacity investment for as long as possible.[187]

There are other related provisions in the Port Lease Transaction Act 2016 and the Port Management Act that protect the interests of the port in the advent of a second container port:

- any state-sponsored port operator is constrained in charging prices below a 'competitively neutral price' under section 49V of the Port Management Act.
- The port can also initiate inquiries into the pricing of a state-sponsored port operator under section 49Y of the Port Management Act, which could involve the commission determining minimum prices that operator must charge.
- The port may seek ministerial approval or commission certification of capacity expansions sections 66 and 68 of the Port Lease Transaction Act. Such certified expansions are recognised when determining payments under the Port Growth Regime.

We disagree with Synergies that the Port Growth Regime provisions are a significant barrier to the construction of a second port, and that their expiry after 15 years increases the risk of competition. Prospects for a second port depend on demand growth and the exhaustion of the port's natural container capacity. As noted by Synergies, Infrastructure Victoria's recommendations to the government were that it would not be cost effective for a second major container port to begin

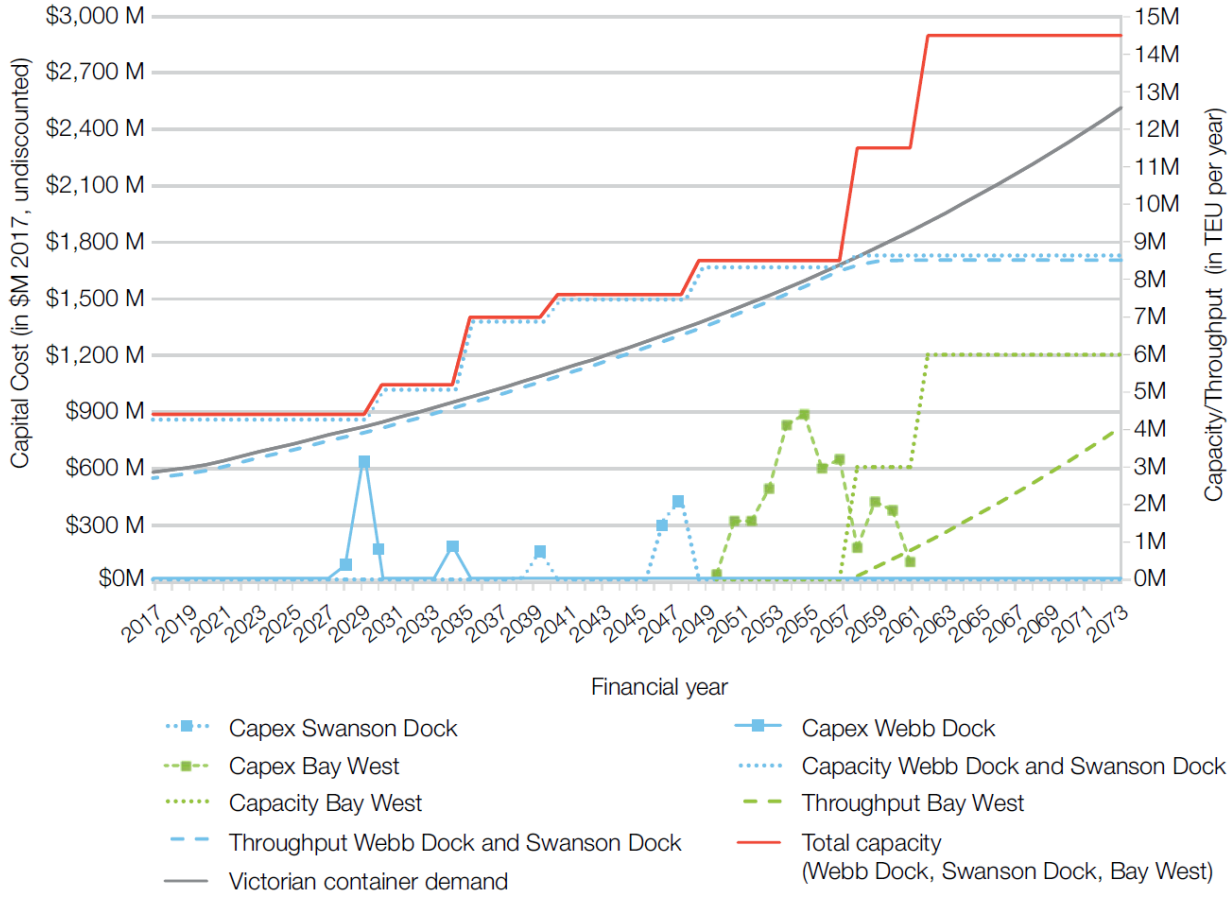
[185] ibid., p. 175.

[186] Port Lease Transaction Act 2016, section 61.

[187] Victorian Government, *Select Committee Inquiry Submission*, September 2015, p. 25.

operations until 2055, following investments that increase the port's capacity to 8 million twenty-foot equivalent units.[188] This is around 40 years into the port's 50 year lease.

Figure 6: Infrastructure Victoria's projections for Port of Melbourne (Webb and Swanson Dock) and second container port (Bay West)



Source: Infrastructure Victoria, p. 167.

In terms of existing competitive pressures, Synergies noted:[189]

> There is clear evidence of contestability given that PoM has lost trade to Adelaide (import containers), Geelong (breakbulk) and Port Botany (agricultural exports). Moreover, PoM competes with Geelong in relation to import crude and refined oil, breakbulk cargo, bulk grain exports, dry bulk import (cement, soda ash and fertiliser). Nevertheless, a significant proportion of PoM's volumes are not contestable, with 87% and 54% of imported and exported containers, respectively, destined for or originating from the Melbourne metropolitan region.

[188] Infrastructure Victoria, Advice on securing Victoria's ports capacity, May 2017, p. 4.

[189] Synergies, op. cit., p. 175.

Overall we consider that the threat of competition is unlikely to materially affect the benchmark rate of return.

The port's gamma estimate is at the lowest end of recent decisions

The port's gamma estimate is based on Synergies combining values from what it views are three different approaches:

- finance theory and market evidence
- regulatory precedent of using a 'market' approach
- regulatory precedent of using a 'non-market' approach.

Use of 'market' and 'non-market' approaches by Australian regulators has been the subject of extensive debate over the last 10 years, including multiple review processes by the Australian Competition Tribunal and Federal Court of Australia. The most recent appeal outcomes and regulatory determinations are based on consideration of a range of evidence, overturning a previous precedent of relying solely on 'market' estimation approaches. We note Synergies' continued preference for relying on a 'market' approach and these matters are likely to be considered further in other regulatory determinations.

The first approach adopted by Synergies produces a value of zero given certain presumptions of investor characteristics, and has never been adopted by Australian regulators. It represents a theoretical extreme which is not supported by evidence, including from the other two approaches Synergies relies on. The port should address these issues in future tariff compliance statements.

What is gamma?

The Australian tax system involves 'dividend imputation'. Income generated by companies is subject to tax at the company level, and is also potentially taxed again when company profits are paid out as dividends to resident equity investors who pay personal income tax. To correct for this potential double taxation, dividends can be paid out with 'imputation' or 'franking' credits attached, which can be used by Australian investors to offset their personal income tax, or to claim a tax refund. Gamma (γ) measures the value of these imputation credits in the context of assessing benchmark tax liabilities and the rate of return in regulatory building block frameworks, including under the port's pricing order.

In a regulatory setting, the impact of tax and imputation credits can be accounted for as a separate building block item or when calculating the rate of return. The port's pricing order requires the latter. In this 'pre-tax' framework, the post-tax return on equity is 'grossed up' to reflect that tax needs to be paid by equity holders out of the returns they receive:

$$WACC_{pre-tax} = \frac{return\ on\ equity_{post-tax}}{(1 - tax\ rate \times (1 - \gamma))} \times \frac{E}{V} + Return\ on\ debt \times \frac{D}{V}$$

…where ‘D’ is the value of the firm’s debt finance, ‘E’ is the value of equity finance and ‘V’ is the total firm value.

The presence of any tax benefit from imputation credits (γ) means that equity investors do not need to be compensated as much when determining their return on equity. That is, equity investors would accept a lower return if they are compensated with imputation credits. A higher value of gamma results in a lower WACC and vice versa.

Gamma can take a value of between zero and one. At one extreme, a gamma value of one means that all imputation credits are paid to shareholders and can be fully redeemed by them. At the other extreme, a gamma value of zero means imputation credits are not paid out or cannot be redeemed.

Estimation of gamma has been particularly contentious in the regulatory setting over the last decade and has been the subject of multiple appeals. A key point of contention has been determining how shareholders ‘value’ imputation credits, namely whether or not this refers to a ‘market’ value.

Synergies’ gamma estimate

Synergies estimated a gamma value of 0.25. In doing so, it gave equal weighting to three approaches:

- finance theory and market evidence
- regulatory precedent of using a ‘market’ approach
- regulatory precedent of using a ‘non-market’ approach.

On the first of these, Synergies considers that academic research analysing market data indicates strong support for a gamma value of zero.[190] This largely stems from the view that the marginal investor is foreign, hence would not be subject to Australian personal income tax and so not benefit from imputation credits. Synergies states that there is ‘also substantial evidence that imputation credits are not considered by independent experts in a valuation context’.[191]

On regulatory precedent, Synergies states that ‘it is reasonable to conclude that there is a well-accepted approach to setting a gamma value in an Australian regulatory context but a well-accepted value for imputation credits is yet to emerge.’[192]

Australian regulators estimate gamma as the product of two values, which can range from zero to one:

---

[190] ibid., p. 130.

[191] ibid., p. 134.

[192] ibid., p. 123.

- the distribution rate or 'payout ratio'. This reflects how much of the dividend imputation credits generated are actually paid out to shareholders. Synergies notes that this value is directly observable from Australian tax statistics and is not contentious, and a value of 0.7 has generally been adopted by Australian regulators.[193]
- the utilisation rate or 'theta'. This has been the subject of extensive debate in Australian regulatory determinations. It reflects the extent to which dividend imputation credits, once paid out, are 'valued' by investors. Data sources include:
  - equity ownership – namely estimating the proportion of domestic investors in Australian equity holdings
  - tax statistics – observing the actual rate of redemption of imputation credits in investor tax returns
  - 'market value' or 'dividend drop-off' studies. These measure the drop in share prices following the loss of entitlement to dividends. The observed price change is then separately attributed to the value of dividend payments and the value of any attached imputation credits.

Synergies takes theta estimates from equity ownership and tax statistics, which it jointly regards as 'non-market' estimates (a value of 0.6 to 0.7), and from market value studies (0.35).

Synergies calculates an overall value of gamma by:

- multiplying its two theta estimates by a payout ratio of 0.7. This produces estimates of gamma from 'non market' and 'market' approaches of 0.455 and 0.25 respectively
- a gamma value of zero is taken from Synergies' view of finance theory and of market practitioners
- These three values are averaged to produce a final gamma value of 0.23, which Synergies rounds up to 0.25.

Our observations on Synergies' gamma estimate

As with the MRP, Synergies' value of 0.25 is in line with the value used by IPART but is materially different from all other recent determinations.

Synergies' gamma value is comparably low because it places material (one third) weighting on a value of zero. Synergies states that it is 'well accepted in the academic literature that the gamma for a security where the marginal investor is foreign should be zero.'[194] We note it would be as equally well accepted that the utilisation rate for a security where the marginal investor is domestic should be one. While both of these observations raise important considerations about how to

[193] ibid., p. 123.

[194] ibid., p. 128.

estimate gamma in a regulatory setting, neither position has ever been relied upon in the regulatory context. That is, they reflect conceptual or theoretical extremes.

Synergies used the conceptual approach adopted by regulators in terms of the market definition underpinning the CAPM. Specifically, the risk free rate and MRP are based on the assumption that the relevant market is closed and domestic, implying that the relevant investor is an Australian resident, but then the estimate of gamma reflects the presence of foreign investors. This is widely known to be inconsistent with a strict, academic application of the CAPM but is done so in the belief that it produces more realistic results.[195] If Synergies were committed to such an application, it should consider its implication on estimates of the risk free rate and MRP.

Synergies' view of what is accepted in the academic literature is also not derived from the principal academic papers relating to gamma, namely Officer[196], Monkhouse[197] and Lally and van Zijl[198] which provide derivations of the model in which gamma appears. None of these papers assert that gamma is zero by reference to empirical evidence. Lally and van Zijl argue that theta should be 1 consistent with the model embodying the assumption that all investors are local residents coupled with the fact that virtually all local investors can fully utilise the credits.[199]

Our other observations on Synergies' approach and estimates are:

- Contrary to Synergies' statement that a payout ratio of 0.7 is not contentious, several regulators have recently highlighted issues in relying on tax statistics and each determined a value of 0.83, namely the AER[200], ERA[201] and QCA[202]. While not explicitly referring to this value themselves, the AER's approach to gamma has been adopted by Office of the Tasmanian Economic Regulatory (OTTER)[203] and the ICRC[204]. The value of 0.83 comes from work

[195] See for example, AER, *Draft rate of return guidelines: explanatory statement*, July 2018, p. 440-1; ERA, *Draft Explanatory Statement for the Rate of Return Guidelines (2018),* June 2018, pp. 28, 150.

[196] Officer, R., 'The cost of capital of a company under an imputation tax system', *Accounting and finance*, May 1994, vol. 34(1), pp. 1-17.

[197] Monkhouse, P., 'The Cost of Equity Under the Australian Dividend Imputation Tax System', *Accounting and Finance*, November 1993, vol. 33(1), pp. 2-18.

[198] Lally, M., and van Zijl, T., 'Capital Gains Tax and the Capital Asset Pricing Model', *Accounting and Finance*, vol. 43(2), May 2003, pp. 187-210.

[199] ibid., p. 197.

[200] AER, *Draft rate of return guidelines: Explanatory statement*, July 2018, pp. 397-399.

[201] ERA, *Draft Explanatory Statement for the Rate of Return Guidelines (2018)*, June 2018, pp. 152-155.

[202] QCA, *Draft decision: Aurizon Network's 2017 draft access undertaking* , December 2017, pp. 167-175.

[203] OTTER, *2018 Water and Sewerage price determination investigation: final report*, May 2018, p. 171.

[204] ICRC, *Final report: Regulated water and sewerage services prices 2018-23*, May 2018, p. 127.

undertaken by Lally using data for the years 2000 to 2013, which has been recently updated for the period 2000 to 2017, resulting in a revised value of 0.88.[205]

- The practice of valuation experts has been considered in regulatory determinations.[206] A main finding (affirmed by the Tribunal[207]) has been that valuation experts may choose to assign no value to imputation credits because of the difficulties in reliably estimating their value, rather than an in-principle or evidence based view that credits have no value to investors. Some surveys of market practice have found that valuation experts do assign some value to imputation credits.[208]
- Academic studies of the 'market' value of imputation credits have been considered extensively in regulatory proceedings. Concerns around the quality of these studies led the Australian Competition Tribunal to commission a 'state of the art' dividend drop-off study.[209] This was completed by Professor Stephen Gray, who co-authored four of the six academic papers referred to by Synergies.[210] These and similar academic studies, when considered in depth, do not support Synergies' assertion that it is well accepted in the academic literature that gamma should take a zero value.[211]
- Synergies overlooked other studies that would support theta estimates that are higher than the value of 0.35 it relies on.[212]
- We consider that Synergies misrepresents current regulatory sentiment in stating that 'regulators' positions on gamma remain mixed', and it is 'clear that regulatory precedent involves two distinct approaches', namely the 'market' value approach to estimating theta and those that also have regard to 'non market' evidence.[213]

---

[205] Lally, M., *Estimating the Distribution Rate for Imputation Credits*, June 2018, p. 9.

[206] AER, *Explanatory Statement Rate of Return Guideline (Appendices),* December 2013, pp. 179-180; ERA, *Final Decision on Proposed Revisions to the Access Arrangement for the Dampier to Bunbury Natural Gas Pipeline*, October 2011, p. 139.

[207] Australian Competition Tribunal, *Application by DBNGP (WA) Transmission Pty Ltd (No 3) [2012] ACompT 14,* July 2012, para. 225.

[208] Truong, G., Partington, G. and Peat, M., 'Cost-of-capital estimation and capital-budgeting practice in Australia', *Australian Journal of Management*, vol. 33(1), June 2008, pp. 95–121; KPMG, *Corporate finance: Valuation practices survey*, April 2013, pp. 26–28.

[209] Australian Competition Tribunal, *Application by Energex Limited (No 2) [2010] ACompT 7,* October 2010, para. 146.

[210] Synergies, *Determining a WACC estimate for Port of Melbourne*, May 2018, pp. 128-130.

[211] ibid., p. 128.

[212] Walker, S. and Partington, G., 'The Value of Dividends: Evidence from Cum-Dividend Trading in the Ex-Dividend Period', *Accounting and Finance*, vol. 39(3), December 1999, pp. 275-296; Cummings, J. and Frino, A., 'Tax Effects on the Pricing of Australian Stock Index Futures', *Australian Journal of Management*, 2008, vol. 33(2), December 2008, pp. 391-406.

[213] Synergies, op. cit., p. 127.

Regulatory precedent and the 'market' approach

By presenting values from regulatory determinations since 2010, Synergies overlooks the important effect of appeal outcomes on regulatory decisions. That is, the 2010 decision by the Australian Competition Tribunal effectively established a precedent for the 'market' approach and a gamma value of 0.25.[214] Importantly, this decision left various issues unresolved[215] that have now been examined in more recent decisions, notably by the Federal Court[216] and others by the Tribunal[217]. The latter two decisions overturn the gamma value of 0.25 in favour of the AER's approach, which places primary weight on the utilisation approach leading to a higher value for gamma.

As listed by Synergies, IPART is now the only regulator adhering to the 'market' approach in the wake of these appeal outcomes. IPART's justification for maintaining this approach should be considered carefully, given its framework reflects the same Officer WACC formulation as used by other regulators:[218]

> Under IPART's framework, gamma is the amount by which the total allowed return on equity is reduced to reflect the imputation credits that investors will receive. As such, it must reflect the market value of credits relative to dividends and capital gains. This suggests that the market value interpretation is appropriate.

We note that Synergies considers that, because other WACC parameters are based on 'market' values, gamma should also be estimated on the basis of 'market' based approaches. It also considered that reliance solely on 'market' information is more compatible with the concept of the marginal investor, which it considers is a more realistic interpretation of price setting in financial markets.[219]

A key issue considered in the recent Tribunal and Federal court decisions has been whether the Officer WACC framework, including more detailed derivations by Monkhouse and Lally and van Zijl, defines theta as a 'market' value. Related to this are arguments around whether prominence should be given to the marginal investor, and whether estimates produced by dividend drop off

---

[214] Australian Competition Tribunal, *Application by Energex Limited (No 2) [2010] ACompT 7,* October 2010.

[215] Australian Competition Tribunal, *Application by Energex Limited (No 2) [2010] ACompT 7,* October 2010, paras 149-150; Australian Competition Tribunal, *Application by Energex Limited (Gamma) (No 5) [2011] ACompT 9*, May 2011, paras 44-45.

[216] Federal Court of Australia, *Australian Energy Regulator v Australian Competition Tribunal (No 2) [2017] FCAFC 79*, May 2017, paras 753–4; Federal Court of Australia, *SA Power Networks v Australian Competition Tribunal (No 2) [2018] FCAFC 3*, Jan 2018, paras 52–66.

[217] Australian Competition Tribunal, *Application by SA Power Networks [2016] ACompT 11*, 28 October 2016; Australian Competition Tribunal, *Application by ActewAGL Distribution [2017] ACompT 2*, 17 October 2017.

[218] IPART, *2018 WACC review final report*, February 2018, p. 82.

[219] Synergies, op. cit., p. 126.

studies are consistent with the Officer framework and valuation by the marginal investor.[220] Synergies does not appear to have raised any arguments not already considered in these decisions. However, as has been the case with estimating gamma in a regulatory setting, these arguments are likely to evolve and new data introduced over time which will affect our consideration of these matters in the future.

Conclusions on gamma

We consider that the aforementioned regulatory decisions and appeal outcomes have been comprehensive, and reflect the accumulation of evidence and expert views including from academia and financial practice. Therefore, they provide considerable guidance on what might be regarded as acceptable in the context of setting regulated rates of return at the present time.

While the value of 0.25 may have been supported in light of particular positions held during the course of recent debates, we consider that there is significantly less support for such a value now. In any case, Synergies' lower gamma value is partly due to reliance on a presumption that only foreign investors are relevant when determining the value of imputation credits, which has not been supported in the regulatory context. The port should also consider more recent decisions on the value of the payout ratio in preparing future tariff compliance statements.

[220] See for example: Australian Competition Tribunal, *Application by SA Power Networks [2016] ACompT 11*, 28 October 2016, paras 139-159; Australian Competition Tribunal, *Application by ActewAGL Distribution [2017] ACompT 2*, 17 October 2017, paras 300-342.