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Report prepared for New Zealand Airports Association

# The distance between the "allowed rate of return" and the "cost of capital"

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16 March 2016



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# 1. Introduction

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The Commerce Commission (the Commission) recently published advice from Professor Yarrow on WACC estimates for information disclosure purposes in the airports sector.<sup>1</sup> Professor Yarrow advised the Commission, amongst other things, to draw a clear distinction between the “allowed rate of return” for airports, and the “cost of capital”. He reminds the reader that older theoretical work on the economics of rate of return regulation concluded that estimates of an allowed rate of return should typically be higher than estimates of the cost of capital.

This report considers the advice of Professor Yarrow and is structured into three sections.

Section 2 describes the distinction between the “allowed rate of return” and the “cost of capital” raised by Professor Yarrow. This section outlines the problems the distinction would address, and risks that arise where regulators do not make a clear distinguish between these two measures; this includes the risk of distorting investment decisions and making the regulatory processes more difficult to understand. When referring to information disclosure for airports we use the term “acceptable rate of return” rather than “allowed rate of return” to distinguish the information disclosure regime applied to airports from price control of energy and telecommunication networks, except where the phrase ‘allowed rate of return’ is in a direct quote.

Section 3 reviews the theoretical reasons provided by Professor Yarrow why the acceptable rate of return should be distinguished from the cost of capital and why the rate of return would typically be higher than estimates of the cost of capital. This section confirms that the ‘older’ theoretical literature cited by Professor Yarrow remains valid today.

Section 4 concludes the report with a discussion on how Professor Yarrow’s insights can be incorporated within the overall approach adopted by the Commission in its Emerging Views paper.<sup>2</sup>

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<sup>1</sup> Professor Yarrow, *Responses to questions raised by the Commerce Commission concerning WACC estimates for information disclosure purposes in the airports sector*, 19 February 2016.

<sup>2</sup> Commerce Commission, *IM Review – Professor Yarrow report and emerging views on the airport WACC percentile*, 19 February 2016.

## 2. The distinction between the “allowed rate of return” and the “cost of capital”

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### 2.1 The problem identified by Professor Yarrow

A key problem highlighted by Professor Yarrow is the risk the Commission may conflate two distinct, but inter-related, tasks it conducts in applying the airport information disclosure regulations.<sup>3</sup> The two exercises are:

- Acquiring and publishing information provided by airports for the purpose of assessment (i.e. the Commission’s role in requiring disclosure).
- Interpreting that information to arrive at a judgement of that information (i.e. the Commission’s role of assessing those disclosures).

Professor Yarrow observes that conflating the two tasks risks blurring the conceptual distinction between the acceptable rate of return and the cost of capital, as has occurred elsewhere in regulatory practice:

*The conceptual distinction between the allowed rate of return and the cost of capital appears to have been lost in more recent regulatory practice, in which the arithmetical calculations link allowable revenues to WACC estimates.<sup>4</sup>*

Losing the conceptual distinction between the acceptable rate of return and the cost of capital produces at least two forms of regulatory problem. The first problem arises where regulators place too much focus on one set of numbers – an estimate of WACC – which can lead to attempts to constrain the profitability of regulated entities to a level that is no higher, or not much higher, than the estimated WACC. The second problem arises when regulators attempt to address the first problem by amending the estimate of WACC rather than turning their minds to the acceptable rate of return.

#### 2.1.1 Limiting profitability to WACC

Professor Yarrow suggests that a result of losing the distinction between acceptable return and cost of capital is that too much weight is placed on one set of numbers, estimates of the cost of capital, and too little weight is placed on the contextual factors that can influence the interpretation of disclosed information.<sup>5</sup> This imbalance is problematic because:

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<sup>3</sup> Yarrow (2016), pp 19-20.

<sup>4</sup> Yarrow (2016), pp 11.

<sup>5</sup> Yarrow (2016), p 20.



*The WACC by and of itself is not an appropriate benchmark for setting a threshold at which profits might reasonably be judged to be excessive.<sup>6</sup>*

Rather:

*Any assessment exercise should properly take account of a range of relevant factors, which it is reasonable to expect will be brought to the attention of the Commission by the airports themselves, as part of any information disclosure exercise.<sup>7</sup>*

Attempting to limit profitability to an estimate of WACC has, Professor Yarrow reminds us, less theoretical or conceptual basis than is generally appreciated (this literature is discussed further below):

*Seeking to constrain profitability (via an information disclosure regime) to a level no higher, or not much higher, than the estimated WACC will tend to skew a business's anticipated probability distribution of rates of return on capital. The theoretical or conceptual basis for doing this is much less solid than it may appear at first sight. The underlying point is that AEEMPs can occur across a wide range of economic circumstances, not just when the contextual circumstances are favourable for high profitability.*

A focus on estimates of the cost of capital can result in adverse outcomes by unintentionally distorting investment decisions:

*To illustrate the sort of thing that can happen, consider an investment project under contemplation which is at the high risk end of the investment opportunities spectrum. If the project is added to the business plan, the spread of the returns distribution of the business as a whole will be increased. However, if regulatory policy is targeted simply at the upper end of the profitability spectrum, addition of the project will tend to increase the risk of regulatory intervention. The result could be a bias against more risky, possibly more innovative, projects: policy intended to target market power succeeds in reducing the mean rate of return, but may do so by creating unintended distortions in investment.*

*Similar points apply when the relevant cost of capital estimate (for the business as a whole) turns out, inadvertently, to be an underestimate: investment in low risk projects may still be profitable, but higher risk investments may become unprofitable.<sup>8</sup>*

Therefore, if one number, an estimate of the cost of capital, is to be used it must be used with great care:

*The application of great care is therefore required when using the WACC as an indicator of reasonable price levels under an information disclosure regime, particularly when the assessment is made on an ex ante basis. The forecasting information disclosed by businesses is generally focused most on a 'central' forecast and, in practice, it can be exceedingly difficult to incorporate regulatory risks into such a forecast any very explicit way.<sup>9</sup>*

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<sup>6</sup> Yarrow (2016), p 20.

<sup>7</sup> Yarrow (2016), p 20

<sup>8</sup> Yarrow (2016), pp 6-7.

<sup>9</sup> Yarrow (2016), p 6.

## 2.1.2 Distorting estimates of WACC

Professor Yarrow considers that the loss of the distinction between the “allowed rate of return” and the “cost of capital”, and the problems which can arise from a reliance on estimates of the cost of capital, has led to the practice of regulators “aiming off”; that is, setting WACC estimates that err on the generous side, rather than explicitly setting the acceptable rate of return at a level higher than the cost of capital:

*As discussed, the loss of the distinction (familiar to our predecessors) between the allowed rate of return and the cost of capital serves to encourage the practice of “massaging” cost of capital estimates (or other estimates) in order to meet the adding up constraints whilst reaching what a regulator considers to be a sound final determination.<sup>10</sup>*

This approach of adding increments to the WACC has, in Professor Yarrow’s view, made the process of setting the WACC less transparent and difficult for the Courts to understand:

*Although the effects of ‘aiming off’ on business incentives may be similar to those of setting an allowed rate of return above the cost of capital, I think that this is a loss because the practices involved tend to be less transparent, not least to Courts who might be asked to pass judgments on how decisions are reached. The processes involved may or may not rely on implicit ‘know how’, but either way may appear arbitrary for want of any explicit examination underpinnings in more formal economic reasoning. And if the underlying reasoning has been lost, it becomes difficult to for a Court to understand the basis for the practice.<sup>11</sup>*

## 2.2 Solution proposed by Professor Yarrow

Professor Yarrow’s proposed solution to these problems is for the Commission to:

- Reinstating a valid distinction between the acceptable rate of return and the cost of capital.<sup>12</sup>
- Clearly distinguishing between the exercises of disclosing, and assessing, information from airports.<sup>13</sup>

### 2.2.1 Cost of capital and information disclosure

Estimates of cost of capital are relevant for the first distinct exercise (disclosing), as the cost of capital is an estimate of an input cost. Professor Yarrow suggests the Commission should collect information from airports and publish its views on the relevant cost of capital, with no further judgements added:

*Given these points, in my view the purpose of s53A would be best served by publication of the regulator’s views on the relevant cost of capital, with no further judgements added. That*

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<sup>10</sup> Yarrow (2016), p 20.

<sup>11</sup> Yarrow (2016), p 11.

<sup>12</sup> Yarrow (2016), p 20.

<sup>13</sup> Yarrow (2016), p 20.

*would involve specification of such parameters of the probability distribution of the WACC as might feasibly be estimated.<sup>14</sup>*

Professor Yarrow does not appear to favour publishing a point estimate of WACC, suggesting that this should only be done if legislation or administrative expediency requires:

*If legislation or administrative expediency requires a point estimate, this would amount to a single estimate of central tendency (estimate of the mean, median or mode), but additional information on parameters such as the estimated variance, upper and lower bounds, 5th and 95th deciles, skewness, etc. would be of value and would merit publication if considered sufficiently reliable.<sup>15</sup>*

If a point estimate must be published, Professor Yarrow does not see merit in publishing a single point WACC estimate that diverges from the mid-point of a range or a chosen measure of central tendency – in the context of information disclosure and a clear conceptual distinction and separation between the information disclosure exercise itself and the judgments that might subsequently be made in the light of information disclosed.<sup>16</sup>

## 2.2.2 Rate of return and interpreting the disclosures

The conceptually separate rate of return is relevant for the second distinct exercise of the Commission; interpreting the information provided by airports to assess whether the purpose of Part 4 of the Commerce Act is being met. As noted by Professor Yarrow, the legislation does not force a link between the cost of capital and the regulatory assessment of what might be excessive. Hence, there is no legislative constraint on the Commission from reinstating ‘a valid distinction between the allowed rate of return and the cost of capital’.<sup>17</sup>

Nor is there any legislative requirement to deem any returns in excess of the cost of capital to be ‘excessive’:

*What is and what is not excessive is left to judgments that can be made on the basis of all the relevant factors that might reasonably be taken into account.<sup>18</sup>*

Hence, the Commission can reinstate the valid conceptual distinction between the cost of capital and rate of return, and consider any divergences between the expected or actual rate of return and the acceptable rate of return within an evaluation which fully considers all of the relevant circumstances. In such an assessment, a divergence between the expected or outturn rate of return and the acceptable rate of return would be only one of many factors considered and there is no conceptual reason to give it more weight than other considerations:

*It cannot be over-emphasised that a given difference between profitability and the cost of capital, i.e. one which is independent of relevant factual circumstances at a given time,*

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<sup>14</sup> Yarrow (2016), p 21.

<sup>15</sup> Yarrow (2016), p 21.

<sup>16</sup> Yarrow (2016), p 21.

<sup>17</sup> Yarrow (2016), p 20.

<sup>18</sup> Yarrow (2016), p 20.

*cannot reasonably be taken to be the basis for a judgement that profits are excessive for Part 4 basis ... The extent of any such divergence is one factor of relevance in an assessment, but it is only one of many, and there is no particular reason to give it a privileged position...<sup>19</sup>*

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<sup>19</sup> Yarrow (2016), p 20.

## 3. Rationale for distinguishing rate of return from cost of capital

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### 3.1 Regulation involves economic costs that need to be traded off against its benefits

Professor Yarrow reminds the reader that the theoretical rationale for distinguishing between the “allowed rate of return” and the “cost of capital”, as well as the reasons why the acceptable rate of return will generally exceed the WACC, was provided by Professor Klevorick (1971) 45 years ago:

*...older work on the economics of rate of return regulation distinguishes between the allowed rate of return, used in determining allowed prices or revenues, and the cost of capital, with the former being typically higher than the latter. A theoretical rationale for both the distinction between the two concepts and for the relativity in their values was provided by Professor Klevorick.<sup>20</sup>*

Klevorick (1971) developed a simple model to determine the level at which regulators should set the allowed rate of return to induce the regulated firm to act in a manner most conducive to the well-being of society. At the time Klevorick published his paper, the prevailing model of a regulated firm had been specified by H Averch and L Johnson.<sup>21</sup> This model is mostly remembered these days for the so-called ‘Averch–Johnson effect’: this is the proposition that where the allowed rate of return of a regulated entity exceeds its cost of capital, the entity has an incentive to over-invest – that is, to “gold plate” - to increase profits.<sup>22</sup>

However, the model possessed a more general, and uncomfortable feature, for regulators. It shows that even if the regulator were on target and set the allowed rate of return equal to the market rate faced by the firm, the firm’s input levels, output level, and prices are indeterminate. With the allowed rate of return equal to the market rate, the firm is constrained to make at most zero profit. Hence, any capital, labour, output combination which yields zero profit might constitute an optimal position for the firm, but the combination chosen by the firm need not be optimal from society’s perspective. For example, the firm might still chose to over capitalise, for instance, to increase its total return.<sup>23</sup>

The analysis of cost-of-service regulation by Klevorick and subsequent authors shows the various possible adverse consequences that can arise from the interventions by regulators in price setting processes. These adverse consequences include:

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<sup>20</sup> Yarrow (2016), p.11.

<sup>21</sup> Averch, H. & L.L. Johnson (1962).

<sup>22</sup> See for example the entry in the New Palgrave Dictionary of Economics, at [http://www.dictionaryofeconomics.com/article?id=pde2008\\_A000186](http://www.dictionaryofeconomics.com/article?id=pde2008_A000186)

<sup>23</sup> Averch, H. & L.L. Johnson (1962).

- Excessive costs generally, because the regulated firm's expectation that any reduction in costs, including from innovation, will lead quickly to a reduction in the allowed price implies that there will be only weak incentives for such cost reduction.
- Excessive costs due to 'over capitalisation', to expand the capital base from which allowed profits are calculated (by application of the allowed rate of return on capital).
- Gold plating of service quality which is capable of expanding demand, the costs of which will be recovered from a higher regulated price.
- Distortions in tariff structures (where the detail of price structures is left unregulated) – for example, peak prices may be set unduly low (relative to offpeak prices) in order to increase demand at the peak so as to justify additional investment and (hence) additional allowed profit.<sup>24</sup>

As Professor Yarrow observed in his 2008 paper, this is not an exhaustive list, but there is a common principle at work in each example. It is that an intervention by a regulator to fix or influence a price changes the incentives faced by the regulated firm when making all those other business decisions that are not directly controlled by regulation.

Klevorick extended the Averch Johnston model to account for some of these incentive effects using and “applied welfare economic analysis” – that is, including as an objective “social welfare” (i.e. the “well-being”, or “welfare”, of the community) relative to what it would be if the area now regulated were uncontrolled. The results of Klevorick's analysis questioned the conventional view that the allowed or acceptable rate of return for a regulated firm always should be equated to its market cost of capital. His paper outlined the circumstances where the “optimal” fair market rate of return will differ from the WACC:

*It may seem somewhat counterintuitive, at least at first glance, that a regulated monopoly which operates in an otherwise purely competitive world and which produces with efficient input proportions when its allowed rate of return equals the market cost of capital should ever be permitted a rate of return in excess of that market cost of capital.<sup>25</sup>*

More generally, once it is recognised that government intervention, including the threat of rate of return regulation, inevitably involves economic costs, the reasons why the “optimal” acceptable rate of return will differ from the WACC become more obvious. These deviations are what is typically described as a “second best” approach to reducing those economic costs (since the “first best” option of avoiding those costs by not intervening may not be desirable).

Indeed, these economic costs increase the closer the allowed rate of return is set to the cost of capital:

*Rate of return regulation has the feature of giving rise to a tendency to over-investment (“over capitalisation”) that serves to increase costs, which in turn serve to increase the level of allowed prices. Crucially, the resulting cost inflation effects are greater the closer the allowed rate or return is set to the cost of capital. The mathematics is clear enough,*

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<sup>24</sup> This list is taken from Professor Yarrow, *Report on the Impact of Maintaining Price Regulation*, prepared for The Australian Energy Markets Commission, January 2008.

<sup>25</sup> Klevorick (1971), p 144.

*although the result is counter-intuitive and consequently liable to neglect in the practical conduct of regulation.<sup>26</sup>*

While there are differences between simple rate of return regulation and price cap regulation and further differences again with information disclosure, the implication of Klevorick's analysis is there is a trade-off for the Commission to consider:

*Other things equal, a lower allowed rate of return will have a direct (arithmetical), downward effect on allowed prices. However, other things are not equal: a lower allowed rate of return (for any given cost of capital) will put upward pressure on costs (and hence prices) as a result of over-capitalisation.<sup>27</sup>*

These results are, of course, consistent with the results of both the:

- General theory of the second best, as developed by Lipsey and Lancaster (1956), which indicate that once there is one source of distortion in the economy, it is no longer in the community's best interest for the government to seek to achieve all of the other "first order" conditions for optimal social welfare. Rather, "second best" policies can be implemented that generate a higher level of welfare for the community; and
- Extensive literature that has developed regarding "optimal" government intervention in the presence of other "unremovable" distortions. This includes the early work by Ramsey (1927) and Boiteux (1956) on optimal taxation and pricing, as well as Diamond and Mirlees (1971).

## **3.2 Expected value of investment will exceed its costs**

The existence of the economic costs of regulation is not the only reason to expect that an airport's anticipated rate of return on its investments will exceed the WACC for those investments. Indeed, even if it was possible to design, implement and administer an information disclosure regime for airports that imposed no economic costs on the nation as a whole, it is still reasonable to expect that each airport will anticipate that they will derive a rate of return from each of their investments that will exceed the WACC for those investments.

Professor Yarrow explains this result with specific reference to anticipated returns from investment.<sup>28</sup> Most firms face a downward sloping 'investment demand curve' – as the cost of capital reduces, firms would be willing to invest more as additional investment becomes profitable at the lower cost of capital.

With a downward sloping demand curve (and assuming for simplicity that all investment has similar risk characteristics), the efficient level of investment by the firm is determined by the condition that the net present value (NPV) of the marginal project is zero at the market cost

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<sup>26</sup> Yarrow (2016), p 11.

<sup>27</sup> Yarrow (2016), p 11.

<sup>28</sup> Yarrow (2016), p.12.

of capital. This means that the infra-marginal projects – the approved projects which were not marginal, must expect to achieve a return that is higher than the market cost of capital. This in turn means that the investment of the firm as a whole must, at least on an expected basis, expect to achieve a return higher than the market cost of capital. As Professor Yarrow observes:

*However, looking at the NPV of the investment programme as a whole on an ex ante basis, the downward slope of the investment function implies that the NPV of the investment programme as whole will be NPV positive. That is, anticipated profitability will tend to be above the cost of capital.<sup>29</sup>*

There is, of course, no guarantee that a business will actually derive this additional net profit or “surplus” from its investments in the capital assets required for their operations. Indeed, some of the investments undertaken by a business may turn out to generate a net loss. However, as noted by Professor Yarrow, an investor will still expect to derive a positive net benefit from its investment programme – anticipated returns should be expected to exceed estimates of the market cost of capital.

### 3.3 Other potentially relevant considerations

Professor Yarrow’s report notes a number of other potentially relevant considerations raised in submissions as to why the anticipated rate of return might legitimately exceed the WACC. These additional reasons (which are just some of the reasons why anticipated returns might validly be higher than the WACC) include the adverse effects that regulation, or the threat of regulation, can have on innovation (i.e. by reducing the incentive to innovate and adapt, thereby reducing “dynamic efficiency”); the existence of asymmetries arising from truncation of probabilistic distributions of future rates of return; and the “option values” associated with investments (e.g. the benefits that investors derive from an investment as a result of having the ability to expand their supply of additional services at some future date at little additional cost). As Professor Yarrow observes, these reasons have been raised in previous submissions to the Commission.

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<sup>29</sup> Yarrow (2016), p 12.



## 4. Implications for the Commission’s approach

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### 4.1 Commission’s emerging views

In its Emerging Views paper the Commission set out its views on airport WACC percentile as follows:

- There may be legitimate reasons why an airport’s returns may be above or below its mid-point estimate of the cost of capital.
- The current specification of a WACC percentile range is likely to have placed too much emphasis on the upper limit of the range (75th percentile) when assessing airport profitability.
- The importance of the mid-point as the starting point for assessing airport returns has been confirmed by the High Court and airports should be required to provide justification for any divergence from that mid-point.
- The Commission considers that this approach is best applied in the IMs by providing a mid-point estimate together with information on its probability distribution (e.g. publication of a standard error term).<sup>30</sup>

As phrased, the Commission’s Emerging Views appear to diverge from the advice of Professor Yarrow in several important regards for reasons which are not explained in the Emerging Views paper.

The language adopted by the Commission appears to risk conflating the distinct tasks of information disclosure and interpreting the information disclosed. While the Commission acknowledges the distinction made by Professor Yarrow between the cost of capital and the acceptable rate of return, this distinction seems to have been lost when the Commission summarises its approach.

As Professor Yarrow observes, “things would go more easily” if the two stages, information disclosure and interpretation, were more clearly distinguished.

### 4.2 Information disclosure

Estimates of cost of capital are relevant for the first distinct exercise (disclosing), as the cost of capital is an estimate of an input cost. There is no legislative requirement for the Commission to publish a point estimate, and no obvious administrative expediency from doing so.<sup>31</sup>

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<sup>30</sup> Commerce Commission, Emerging Views Paper, 19 February 2016, paragraph 28.

<sup>31</sup> Yarrow (2016), p 21.

There may be some administrative expediency from retaining the existing IM unchanged. This range at least provides interested parties with an interval, the 25th to the 75th, in which there is a 50% probability of the interval enclosing the true WACC. We find it difficult to understand how the purpose of information disclosure can be achieved when it is more likely than not that the range that the Commission requires to be published does not enclose the true WACC (as would occur if the Commission required a narrower range than the 25th to 75th interval to be published).

A better approach, however, might be to publish WACC estimates at regulator percentile estimates (e.g. every 5th percentile).<sup>32</sup> This would allow interested parties to understand the interval within which WACC would fall for a given confidence that the interval contains the true WACC. An interested party seeking to understand the WACC interval using the normal choice of confidence coefficient adopted for sampling, for instance, would consider the 95% or 99% confidence interval.

### 4.3 Interpreting the information disclosures

For the second distinct exercise of the Commission, interpreting the information provided by airports to assess whether the purpose of Part 4 of the Commerce Act is being met, the Commission would, following Professor Yarrow's recommendation, consider the rate of return. As noted by Professor Yarrow, the legislation does not force a link between the cost of capital and the regulatory assessment of what might be excessive.

Professor Yarrow offers the Commission guidance in assessing an airport's rate of return (ex ante or ex post):

- The starting point for the assessment should not be the cost of capital, as indicated by the Commission in its Emerging Views paper, but an assessment of whether an airport's forecast or actual rate of return is efficient and reasonable, informed by the relevant circumstances; as explained by Professor Yarrow the acceptable rate of return would typically be higher than the Commission's estimate of the cost of capital (for the reasons outlined in section 2 above).<sup>33</sup>
- Divergences between the estimated rate of return and outturns (actual or expected) should be assessed in an evaluation which considers all of the relevant circumstances for that divergence.<sup>34</sup>
- In such an assessment, a divergence between the expected rate of return and outturns should be only one of many factors considered and there is no conceptual reason to give it more weight than other considerations.<sup>35</sup>

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<sup>32</sup> The Commission raises this approach at paragraph 19 of its Emerging Views paper.

<sup>33</sup> Yarrow (2016), p 11 - 12.

<sup>34</sup> Yarrow (2016), p 20.

<sup>35</sup> Yarrow (2016), p 20.

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