# Cross Submission on the TSLRIC Model for Designated Interconnection Services

## Commerce Commission Draft Determination 11 April 2005

*A report prepared by Marsden Jacob Associates*
*for TelstraClear*

**Final: 9 June 2005**

**PUBLIC VERSION**

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# 1. Introduction

1. Marsden Jacob Associates (**MJA**) has been requested by TelstraClear to provide comments on selected sections in the Telecom New Zealand (hereafter '**Telecom**') submission related to the Commerce Commission's (hereafter '**Commission**') Total Service Long Run Incremental Cost (**TSLRIC**) model used in the Draft Determination on the Application of Pricing Review for Designated Interconnection Services (11 April 2005).

2. This paper discusses the following sections of the Telecom submission:
   - B: The Commission's Model, section TSLRIC vs. TELRIC;
   - E4: Land and Building Mark-ups and Annex 6;
   - E5: Working Capital; and
   - F: Reasonable Return on Capital.

3. The comments and opinions expressed in this paper are those of MJA and do not necessarily reflect those of TelstraClear.

# 2. TSLRIC vs TELRIC

## 2.1. Introduction

4. The term Total Service Long Run Incremental Cost (TSLRIC) is basically LRIC[1] where it is made clear that the relevant increment in the service under consideration is the total output of that service. In contrast, TELRIC refers to the increment in costs caused by identifiable elements that are needed in the production of a service.

5. In the following we discuss the comments provided by Telecom[2] on the implications of using TELRIC, how it compares with TSLRIC and if the Commission's approach is inconsistent with TSLRIC as required by the Telecommunications Act. To do this we initially discuss in detail the definition of increment and its implications for the similarity between TSLRIC and TELRIC, before addressing Telecom's specific comments.

## 2.2. Increment definition

6. In principle, there are an infinite number of different sized increments that could be measured. However, it is common to group increments into the following three definitions:

   - a small change in the volume of a particular service;
   - the addition of a whole service; or
   - the addition of a whole group of services.

7. The first definition of the increment is equivalent to a measurable version of marginal cost. The second definition may apply to specific services such as interconnection, local calls, premium-rate calls etc. The third definition includes a group of services, i.e. all the services using the core (or access) network.

8. Under the first definition the size of common costs between the increments will be greatest. As the size of the increment increases (and number of increments decreases) the amount of common costs between them will

[1] LRIC is most frequently used as a generic term for a pricing standard that accords the basic principles of incremental costing. As such TELRIC, LRAIC or TSLRIC are all special cases of LRIC.

[2] Telecom submission para 48 – 52.

decrease. The larger the number of increments, the larger the potential number of combinations of costs between increments that may be shared.[3]

9. The Commission's view is that:[4]

> *"…any TSLRIC of interconnection services should define the increment as the total or whole volume of interconnection service that the access provider produces or is likely to produce."*

10. In addition the Commission notes that:

> *"The total service should in principle include all services that use the assets used by the designated interconnection services. This definition of the total service takes into account the access provider's provision of other telecommunications services, in the sense that these services share costs with interconnection services."*

11. The Commission adopts a definition that combines 'increment' with 'total service'. This suggests that the Commission adopt an increment definition that includes a group of services. Alternatively, it suggests that TSLRIC considers the costs that are caused by the provision of a defined increment of output related to the "total service", where total service includes all services that use the same assets as interconnection, and hence a group of services.

12. This approach is confirmed by the use of TSLRIC in Australia. For the fixed network TSLRIC model used by the ACCC, the increment is defined as being the whole of Telstra's inland PSTN and ISDN service together with its leased line (or 'private circuit') service. The ACCC has therefore adopted an increment definition based on a group of services.

13. Hence we have two predominant increments in a TSLRIC framework:

- the core network increment where the main cost driver is the traffic; and
- the access network increment where the main cost driver is the number of subscribers.

14. While assets are still shared[5] between increments under this definition it effectively eliminates a large proportion of costs that are common between

[3] More increments and common (and shared) costs will also increase the complexity in allocating these costs. It is also for this reason that larger increments are often preferred in a regulatory setting as this increases transparency and minimises complexity. It is also for the reason the FCC in the United States has chosen to implement an element based approach rather than a service based approach; we discuss this in more detail below.

[4] Implementation of TSLRIC Pricing Methodology for Access Determinations under the Telecommunications Act 2001, Principles Paper, 20 February 2004. p 9

services that otherwise would have arisen if a more narrow definition of increment where adopted[6].

15. TELRIC refers to the increment in costs caused by identifiable elements that are needed in the production of a service, like switching or transmission between switches. To TELRIC is added an appropriate allowance of common costs.

16. This notion of TELRIC exists in the context of the FCC proceedings implementing the US Telecommunications Act of 1996, which requires that prices to lease network elements to entrants be based on cost. The FCC position is that prices of such leases be determined using TELRIC.

17. The FCC considered an important difference between TSLRIC and TELRIC to be TELRIC's avoidance, in large part, of the difficult process of allocating joint and common costs.

18. When the increment is defined for a specific service there are significant costs which are joint and common. In comparison the degree of common costs between network elements is much smaller. The TELRIC approach therefore avoids any 'arbitrary' allocation of joint and common costs. However, as we have discussed above when a broad (or large) increment approach is used the amount of joint and common costs are reduced in a TSLRIC approach. In practice the element-based approach and TSLRIC therefore yield the same or very similar cost estimates for large increments (and when both methodologies are implemented appropriately and consistently).

19. The use of TELRIC has been widely debated in the United States and the term has taken on a fairly specific interpretation implicitly including important costing decisions such as optimisation and choice of technology.[7] These issues are separately considered and defined by the Commission. In this respect it is inaccurate for Telecom to assert that the Commission uses a TELRIC model, rather it is our view that the Commission's model accurately may be termed a TSLRIC model using an element based approach. We consider that such an approach will provide a cost estimate of interconnection that is consistent with the definition of TSLRIC in Schedule 1 of the Telecommunications Act.

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5 For example, the line card is allocated to the access increment. However, the line card is situated and takes up space in the exchange building where there is also transmission and switching equipment. Building costs are therefore shared between the two increments.

6 For example a small change in the volume of a service or the addition of a particular service.

7 A scorched node definition is assumed where the Incumbent Local Exchange Carrier's (ILEC) existing wire centres are taken as given, construction of a bottom-up based on the most efficient, least cost, available technologies to provide the element in question using those wire centres, etc.

## 2.3. Specific comments

20. Telecom believes the Commission's model is deficient for the following reasons:

- some costs, such as the cost of administering the interconnection service are treated as common;
- some common costs, such as network operating common costs are excluded under a TELRIC approach as they cannot be allocated to elements; and
- allocations of common costs in TELRIC and TSLRIC models will be different for elements that are partly incremental and partly common.

21. In terms of the first bullet point we agree that costs that can be identified as being directly and unambiguously related to the service in question, be allocated solely to that service. One way of doing this is by adding an interconnection specific mark-up to the final cost of the interconnection service. In the current version of the model it our understanding that interconnection specific costs are included within a more general mark-up for overheads. While such a methodology is certainly possible, transparency in the model would be increased and the potential for error reduced if interconnection specific costs are added directly to the services in question.

22. Regarding the second bullet point it is unclear what Telecom is implying. The TELRIC approach does not exclude cost items that cannot be allocated to elements. The element-based approach seeks to apportion the costs of providing telecommunications services into network elements. Some of these costs will be direct, others indirect and some common or joint. The total cost of an element will include some common costs elements even though they may not be allocated directly to the element, but are allocated using a mark-up approach.

23. If Telecom can identify common costs that are excluded or not picked up, i.e. there are costs items that the Commission has omitted, then this should be documented and identified in order for the Commission to evaluate this claim. However, no costs should be excluded simply because the approach is TELRIC or an element approach in general.

24. Telecom's final critique is that the allocations of common costs in TELRIC and TSLRIC models will be different and refer to a paper by Gans and King (2003), who discuss the differences between the two approaches. In terms of the simple theoretical examples provided in that paper we agree with conclusions of the two authors. However, they are specifically related to the

framework within they operate and imply a narrow definition of the service increment. The importance of the size of the increment to results reached is not discussed. When the increment is large, for example the entire core network, differences between the approaches are muted.

25. Gans and King also note that practical implementation of TELRIC is likely to have significant influence on the cost estimates. In particular, when products are omitted from the analysis there is a danger that the evaluated incremental cost will not be the true incremental cost but will include common costs associated with excluded products.[8] We agree that it important that the Commission carefully consider how costs are shared and how dimensioning of some network elements may be influenced when other increments are not directly modelled. Failure to do so may result in the final cost estimate being overestimated.

[8] Gans and King (2003), *Comparing TSLRIC and TELRIC*, A Report on behalf of AAPT Ltd, 23 July, p 18

# 3. Land and Building Costs

26. In our recent submission on the Designated Interconnection Service[9] we have commented on land and building costs and suggested a methodology for calculating them based on Telecom data. In annex 6 of the Telecom submission Telecom summarises how land and building costs were estimated by their consultant PwC in their original TSO call cost model.

27. Unfortunately, Telecom only provides a summary or extract of the methodology used to calculate the costs, making it difficult to evaluate the methodology in detail. Based on our reading of the annex we provide a number of observations below. Some of these might be adequately dealt with, but without more detailed information on the methodology and calculations we have not been able to assess whether this is the case.

28. First, Telecom states that existing areas were reviewed to determine how much they would be reduced by if they were only required to house modern equipment for operating PSTN. While care should be taken to adjust land and building values for inefficient vacant space, it is also necessary to take account of sharing of common site costs. Telecom allocates property costs to three major cost categories: switching, transmission and access. If Telecom has adjusted sites to only include PSTN related costs, common site costs may be exaggerated. Sites will include other cost categories such as data transmissions. Hence, since common site costs are largely invariant or fixed, the cost categories switching, transmission and access are likely to be allocated a larger share of common site costs since there are less cost categories to share these costs across. Without the underlying calculations it has not been possible for us to evaluate whether common site costs are correctly accounted for. However, with the detailed Telecom calculations an inspection of the specific allocation keys and dimensioning of the optimised sites should allow the Commission to evaluate this.

29. Second, Metro, Rural and Suburban use 100% of the model base cost, while urban sites are assumed to be valued at 80% of the base cost. It is unclear why urban sites are treated differently, although there may be good reasons for doing so.

30. Third, a single cost per $m^2$ is applied for buildings (and building fittings) when property areas measure less than 30 $m^2$. We believe there are considerable economies of scale in size and hence a more detailed approach may be desirable.

[9] MJA (2005), *Comments on the TSLRIC model for Designated Interconnection Services*, 23 May, Section 6.

31. Fourth, the results of the Telecom exercise suggest that land costs account for a relatively large share of total costs. Based on our review of Danish and Swedish models we are concerned that land costs are excessive. We would expect them to have a lower share of total costs, although we note that the categorisation of costs by Telecom seems to differ from that of the other models we have investigated. [10]

32. Finally, Telecom seems to suggest that there are significant extra costs of seismic bracing. However, it is unclear what impact this has on total costs. We acknowledge that this is a legitimate country specific cost item that should be recovered.[11] Compared with the estimates from Denmark and Sweden that we have provided this is an additional cost not incurred in those jurisdictions. However, without detailed information from Telecom it is not possible to evaluate the cost impact of strengthening exchange buildings.

33. In terms of the MJA estimates provided in our previous submission we note that these did not include standby generators. Hence our estimates based on the Danish and Swedish models are therefore slightly underestimated compared with the Telecom figures.

34. In the table below we have recalculated our estimates including common site costs[12] and an allowance for generators (or back-up power) allocated solely to switching. The switching mark-up is a percentage of direct switching equipment costs (gross replacement costs). In addition we have calculated a transmission cost mark-up. This mark-up is percentage of direct transmission equipment costs (incl. infrastructure related costs).

[10] Our examination of the Danish model suggests that a land mark-up would be in the order of 0.5% or less. This compares to the Commission's mark-up of **[ ] CCRI**. However, we note that land costs are likely to vary considerably between countries and also by area.

[11] We note the CostQuest have submitted values from the US. In this respect we note that values are sourced from the West Coast where we would expect buildings to be strengthened due to the hazard of earthquakes.

[12] Common building-related costs (or site costs) include site security, power supply units, site preparation and air conditioning.

**TABLE 1: BUILDING AND LAND COST (COMBINED) SWITCHING AND TRANSMISSION MARK-UP INCL. COMMON SITE COSTS IN DANISH AND SWEDISH HYBRID COST MODELS[13]**

| | Danish Model | | Swedish model | |
|---|---|---|---|---|
| | Switching | Transmission | Switching | Transmission |
| Remote subscriber units | 24.2% | 3.5% | 15.3% | 6.5% |
| Local Exchange | 18.6% | 16.3% | 5.9% | 7.9% |
| Tandem Exchange | 39.2% | 19.4% | 10.9% | 5.4% |
| Weighted average | **24.0%** | **4.5%** | **15.1%** | **6.5%** |

Source: MJA analysis of Danish Hybrid Model public version 1.3 (2005) and Swedish Hybrid Model public version 2.1

35. Compared with the figures in our previous report the weighted average[14] mark-ups have increased by approximately 1 percentage point. These mark-ups are lower than the Commission's mark-up of **[ ] CCRI** for switching and **[ ] CCRI** for transmission. The inclusion of back-up power does not alter our previous conclusion that the Commission's mark-ups may be overstated.

[13] Compared to the figures submitted in our previous submission, we have also made a number of amendments to our calculations. The overall of effect of these changes has been to increase our estimated switching cost mark-up estimates for both Sweden and Denmark. The increases are therefore not due to the addition of back-up power alone.

[14] As weights we have used the number of different type of exchange.

# 4. Working Capital

36. When there is a delay between paying out cash for inputs and receiving cash for outputs, a stock of cash (working capital) is required at the beginning of trade to be able to cope with this delay from operations. As indicated in the Telecom submission, working capital may also include other items such as stock of network spare parts, other current assets and liabilities etc.[15] Cash or working capital is tied up in the running of the business until trading ceases. Hence working capital imposes an opportunity cost.

37. In our view, the cost of working capital is a legitimate cost item and should be included in the estimate of efficient forward-looking costs. However, it is essential that working capital costs are calculated based on efficient operator assumptions (i.e. efficient debtor days, creditor days, cash-management, engineering stores levels etc.).

38. Further, we would expect that the total working capital items of the various network elements and network services to be minimal, and not a significant element of the total asset base. Indeed LRIC models within telecommunications often assume that the cost of working capital is negligible or even zero.

39. In the following we:

- review the comments provided by Telecom related to working capital costs;
- provide an alternative (and simple) framework used in other jurisdictions to estimate the extent of working capital costs; and finally
- review international experience in this area.

## 4.1. Specific comments

40. Telecom provides a reasonable qualitative breakdown of different components making up working capital costs. However, no numbers are provided to support the Telecom calculation of working capital costs of 0.75% of investment cost.[16] Without the specific quantitative details of the Telecom calculation it is difficult to provide detailed comments.

[15] Working capital may be calculated as the current assets less current liabilities:
*Working capital = Stock + Debtors + Cash – Creditors*

[16] Telecom does not explicitly state what these investment costs refer to. We presume that they are gross core network investment.

Nevertheless, based on the information provided we highlight a number of issues and potential concerns below.

41. First, when estimating the total amount of working capital in each cost category, the main rule should be that it should only be the amount that would be required by an efficiently run fixed network telecommunications provider that should be included (as proxied by the TSLRIC estimate). Accounting data does not necessarily reflect the necessary working capital of an efficient telecommunications provider. For example an adjustment of operational cost may influence the level of working capital as will more efficient management of debtors, creditors, and current assets.

42. No information is provided on how Telecom has accounted for the efficient operator assumption in TSLRIC, although Telecom in the discussion of Provisions seems to acknowledge that this is an issue that needs separate consideration. Telecom states:[17]

> *"Provisions: It is not clear what provisions would be relevant to a greenfields operator of the type envisaged by the regulator."*

43. Hence it would seem that considerations related to a greenfield telecommunications provider have been made, although no explicit indication of this has been made in cost categories other than Provisions. If existing working capital costs are efficiently incurred this would need to be documented.

44. Second, only working capital that is related to Telecom's network (wholesale) may be included, since the cost of interconnection is a wholesale cost. No working capital related to retail debtors and creditors should be included. It is not clear whether this is accurately reflected in the Telecom estimate.

45. Third, working capital, which is calculated on the basis of accounting data at a certain point in time, may not be representative. This problem may partly be solved by calculating the working capital at different points in time and then taking an average. The approach used by Telecom seems to be a hybrid of actual and budget numbers. Without more specific information in this area it is difficult to assess.[18]

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17 Telecom New Zealand (2005), *Submission in respect of the Commerce Commission's Draft Determination on the Application for Pricing Review for Designated Interconnection Services*, 26 May, p.52

18 We note that the cash requirements approach seems fairly detailed and forward-looking in nature. However, without access to the underlying assumptions and relationships it is not possible to evaluate the approach.

## 4.2. An alternative approach[19]

46. The prudent amount of working capital may be estimated using a bottom-up modelling technique. The required level of working capital may be calculated as:

$$\frac{DD \times sales}{days\ in\ a\ year} + cash - \frac{CD \times trade\ creditor\ related\ costs}{days\ in\ a\ year}, \qquad (1)$$

where

- *DD = debtor days; and*
- *CD = creditor days.*

47. In the formula above stock is assumed to be negligible[20] and debtor days and creditor days refer to the weighted average. As stated above, only working capital, which is related to the provider's network (wholesale), may be included.

48. Sales will be the sales revenue of network services. Here the revenue from Telecom may be used. As an alternative or crosscheck total annualised costs may be used as proxy, since they will equal the level of sales revenue if rates are set correctly.

49. Determining the prudent level of cash to be held as working capital will depend on attitudes to risk and the perceived cost to a telecommunications provider suffering a cash flow crisis. One simple way of accounting for cash is to estimate a percentage increase in net debtor days.[21]

50. Assuming total annualised costs are used as a proxy for total the revenue and an increase in debtor days is used as a proxy for cash, the debtors and cash part of Formula (1) above may be rewritten:

$$\sum_{i=1}^{n} \frac{DD_{\mathbf{i}} \times DW_i}{365} \times TC \times (1 + \Delta DD) \qquad (2)$$

where

- *$DW_i$ = is the weight assigned to the debtor i (a percentage of total annualised costs); and*

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19 The formula presented in this section are largely sourced from the Danish and Swedish LRIC modelling process, where the presented methodology was used to calculate an efficient working capital surcharge. The approach in these jurisdictions is also similar (although more detailed and robust) to that documented by Oftel in the report 'Long run Incremental Costs: The Bottom-up Network Model' Version 2.2 March 1997.

20 In the Telecom submission (p. 52) they indicate that the "*quantity and value of such items is very small*", hence would seem to be reasonable assumption for a telecommunications provider with the size and scope of Telecom.

21 In the Oftel model this is referred to as a contingency requirement.

- *TC = total annualised costs.*

51. We note that some services are paid for in advance (will have negative debtor days) and others are paid for in arrears (will be a positive number of days).

52. The total trade creditor related costs should include costs of wages, electricity and other payments to suppliers, such as support contracts and equipment suppliers. This information should be available from Telecom. Alternatively creditor costs can be determined using the TSLRIC model, i.e. as the total costs of the business, when the cost of capital is set to zero. Since the equipment suppliers' costs (annual capital expenditure) is approximately equal to the depreciation and electricity, wages and other supplier costs may be regarded as related to operational cost, the total annual cost when cost of capital is set to zero may be used as a proxy for creditor costs.

53. Applying these simplifications, creditor related costs may be written as:

$$\sum_{j=1}^{m} \frac{CD_j \times CW_j}{365} \times TC_{CoC=0} \qquad (3)$$

where

- $CW_j$ *= is the weight assigned to creditor j; and*
- $TC_{CoC=0}$ *= Total costs excluding a return on capital.*

54. The bottom-up formula for calculating the required level of working capital can therefore be summarised as follows:

$$\sum_{i=1}^{n} \frac{D_i \times DW_i}{365} \times TC \times (1+\Delta DD) - \sum_{j=1}^{m} \frac{C_j \times CW_j}{365} \times TC_{CoC=0} \qquad (4)$$

55. The total working capital value is multiplied by the cost of capital to get the cost of working capital.

56. We note that working capital may have a lower return than the return used for capital investment. This is possible since some of the working capital could be used to obtain a return from (say) short-term bank deposits. Hence applying the same return value for working and investment capital will potentially result in an over-estimate of the cost of working capital.

## 4.3. International experience

57. In terms of international experience we have surveyed a number of countries with publicly available information on incremental cost models:

- *Australia*: The Australian Competition and Consumer Commission does not apply a working capital surcharge in their TSLRIC model for Domestic PSTN Originating and Terminating Access.
- *Denmark*: The Danish hybrid LRIAC model does not explicitly contain working capital costs. However, these may be inferred from a description of common cost items in the model documentation. For core service the working capital cost mark-up applied to service costs is 0.9%. For access services it is -1.6%. Converted to gross investment terms (and hence in form comparable to the estimate of Telecom) this is 0.2% and -0.4% respectively.
- *Sweden*: The Swedish model makes an allowance for working capital costs. However, based on empirical evidence from TeliaSonera's top-down model the cost of working capital has been set to zero.
- *United Kingdom*: Oftel applied a working capital cost of 1.5% to network services in their 1997 estimate of the LRIC of interconnection services. The 1.5% was applied to annualised cost. As a percentage of gross investment we estimate the surcharge to be 0.4%.

58. To summarise, experience in other jurisdictions suggest that working capital costs are likely to be smaller than those suggested by Telecom. Further, it is important to recognise that different services will have differing working capital costs. In particular we note that a negative working capital cost allowance was made in Denmark.

## 4.4. Summary

59. We have highlighted a number of issues and concerns related to the calculation of working capital costs and particularly the Telecom approach. These are:

- the estimate used should reflect the amount of working capital that would be required by an efficient fixed network telecommunications provider;
- only working capital related to wholesale activities should be included; and
- care should be taken when using accounting data as it may not be representative.

60. Without access to the actual numbers used by Telecom it is difficult to comment on the suggested figure of 0.75%. However, international experience suggests that it might be excessive. We have also provided a brief

outline of a methodology that should enable to the Commission to cross-check the figure provided by Telecom.

61. Finally, we note that it is our understanding that the TSO model does not include an allowance for working capital costs. To ensure consistency between the models a separate TSO working capital cost (which should be expected to differ from that of the designated interconnection service) should be calculated and accounted for if an allowance is made in the TSLRIC model. Note also to the extent that some of these working capital costs are accounted in the TSO model that adjustments will be necessary to eliminate double counting of costs.

# 5. Reasonable Return on Capital

62. The Telecom section on the reasonable return on capital is structured in the following way:

- limitations on the Capital Asset Pricing Model (CAPM);
- estimating the asset beta for CAPM; and
- the term of the risk free rate.

63. We comment on each section in the following.

## 5.1. Limitations on the CAPM

64. Telecom argues that the CAPM will produce an estimate of the cost of capital that is biased downwards, i.e. it will underestimate the required return on capital. Further, the Commission should "*do more than assert all possible fixes to the CAPM's acknowledged deficiencies and biases are ad hoc and arbitrary*"[22].

65. Even if we accept that the current Brennan-Lally CAPM framework underestimates the WACC compared with other alternative models, there are indicators that point in the other direction.[23] For example, the current framework used by the Commission is based on the domestic closed economy version of the CAPM even though it is recognised that the New Zealand economy is open (and increasingly so) and that this will result in a lower cost of capital.[24]

66. With regards to the failure of the Commission to consider alternative models and the suggested inappropriateness of the CAPM framework we note that:

- the validity of alternatives to CAPM has been widely debated in the finance literature[25] and to our knowledge no consensus has emerged on whether or not alternative models provide 'as good as' or better estimates of the cost of capital. Alternatives to the CAPM are therefore often only used as a cross-check on the CAPM;

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22 Telecom New Zealand (2005), ibid, p. 56

23 Telecom claims (paragraph 175, Telecom submission) there is sufficient theoretical and empirical evidence to determine that a rate of return using CAPM will produce an estimate that is biased downward, however, no evidence is provided to support their case.

24 See for example, Commerce Commission (2003), *Determination for TSO Instrument for Local Residential Service for period between 20 December 2001 and 30 June 2002,* December 2003, p 43

25 See for example [viewed 8 June] http://library.dfaus.com/articles/explaining_stock_returns/, where an overview of the Fama and French debate sparked by their 1992 article *The Cross-Section of Expected Stock Returns* in the Journal of Finance 47.

- the CAPM is widely used across the private sector, finance institutions and utility regulators and to our knowledge CAPM is the only model used by regulators in the telecommunications sector.;
- available alternatives to the CAPM include non-linear models, multi-factor models, dividend growth models and accounting based returns.[26] However, no matter which approach is chosen, it can be argued it suffers from theoretic and/or practical problems. For example, Arbitrage Pricing Theory introduces additional explanatory factors that will tend to increase complexity and debate;
- in terms of the Fama French study it is unclear which study Telecom is referring to (the reference to which Telecom are referring is to not publicly available). However, in previous submissions PwC have referred to Fama and French (2004)[27] and concluded that a 2% premium should be added to the WACC. As discussed in MJA (2004)[28] it is our view the conclusions reached in that study are not sufficient to argue that a reliance on CAPM will significantly underestimate the WACC. Such a claim must be subject to thorough scrutiny and additional testing. The results presented by Fama and French (2004) are similar to previous results that led them to develop a three factor model[29]. As stated above the validity of such models has been widely debated and no consensus has emerged on whether they are more appropriate to use than the traditional CAPM. Likewise various academics have disputed the Fama and French approach to testing the validity of the CAPM;[30] and
- alternatives to CAPM and their robust application in a regulatory environment is often hampered by the limited availability of independently collected data over an extended period. For example, the number of sources of systematic risk would be increased by an application of Arbitrage Pricing Theory (APT)[31], requiring additional information separate from that used in a CAPM framework and

[26] For further discussion of these approaches see, e.g. Wright, Mason and Miles (2003) or Brealey and Myers (2000).

[27] Fama, Eugene F. and French, Kennth R., (2004), The Capital Asset Pricing Model: Theory and Evidence", first draft August 2003, latest draft January 2004, In this study Fama and French conclude among others things that a positive relation between beta and average return as predicted by the CAPM is absent.

[28] MJA (2004), Further Comments on the TSO Cost of Capital, TSO Draft Determination 2002 / 2003, 21 September

[29] See for example Fama, Eugene F., and Kenneth R. French (1993), "Common risk factors in the returns on stocks and bonds", *Journal of Financial Economics*, 33, pp 3 - 56.

[30] See for example evidence provided to UK Competition Commission in its analysis of "The cost of calls to Mobiles", 2003 p 198 for a brief overview.

[31] The APT starts by assuming that there are n factors which cause asset returns to systematically deviate from their expected values.

unlikely to be readily available or at best far less developed than that needed for the CAPM.

67. To summarise, it is therefore unclear that an alternative methodology will provide a better or more reasonable estimate of the cost of capital. Indeed it is likely that an alternative to the CAPM will introduce additional uncertainty and arbitrary decisions into the determination of a reasonable return on capital. In our view, the CAPM is an appropriate framework in a regulatory environment.

## 5.2. Estimating the asset beta for CAPM

68. Telecom provides the following critique of the Commission's analysis of the asset beta:

- there is no justification for applying less weight to European data;
- no consideration is given to the Lally-Swidler methodology;
- the Commission continues to rely on the ACCC PSTN asset beta although it is fundamentally flawed; and
- no beta segmentation analysis has been conducted;

69. In terms of European data it is unclear to us why Telecom suggests less weight is put on European data. In our view the approach adopted by the Commission attempts to take account of the largest pool of data possible.

70. Regarding the "Lally-Swidler" methodology and issue of industry weight in the market portfolio against which betas are defined, we acknowledge that that this may distort results. However, given the large sample of countries in the Commission's analysis any adjustment is difficult and the effect uncertain.

71. In terms of the ACCC beta value, the critique raised by PwC in their paper was:[32]

- the opinion of another regulator does not constitute proper market evidence;
- evidence on US RBOC's relied on by the ACCC is not appropriate in the context of the TSO in New Zealand;
- estimates by OFTEL are used twice; and

[32] PwC (2004), *Comments on the TSO Cost of Capital estimate in the "Draft Determination for TSO Instrument for Local Residential Service for period between 1 July 2002 and 30 June 2003"*, 13 August

- IPART figures include Telecom and are inconsistent with the Commission's use of the domestic CAPM. We are unable to comment on this last point as we do not have access to the primary data source.

72. We do not agree that information from other regulators does not constitute valid evidence. It is important to understand the underlying reasoning for any regulatory decision as this may affect the way in which the information should be used. However, it is not appropriate to simply declare evidence from other regulatory jurisdictions invalid or irrelevant. This is particularly problematic when information is from a jurisdiction that is likely to have the largest similarities to that of New Zealand. Likewise, we do not agree that an outright dismissal of the US RBOC data to be appropriate. Although there are key differences in the TSO regime and US regime this is much less so in the case of the regulation of interconnection services. Regarding the inconsistency in using estimates twice, we acknowledge that this has the potential of biasing results. However, even if the Commission elected to eliminate the OFTEL estimate it is unlikely to affect the ACCC estimate, as it is in the upper range of the range selected by the ACCC.

73. To summarise, we do not regard the ACCC estimate to be fundamentally flawed. Indeed we are surprised that Telecom elects to place such great weight on the inappropriateness of the ACCC estimate when it is only one of many estimates making up the relevant range of estimates in the Commission's analysis.

74. With regard to a decomposition of Telecom's asset into different (service) components we agree that this is desirable. Although the output from such an analysis will be uncertain, this is the case for any method when beta is not directly observable. Nevertheless, such analysis is likely to provide additional insight into the value of beta for interconnection services and therefore improve the beta estimate used.

## 5.3. Term of the risk free rate

75. The term of the risk-free rate has been widely discussed in previous Commission determinations for the TSO and it has been agreed that the term of the risk-free rate should reflect the length of the regulatory period.[33]

76. Telecom claims that this is inconsistent with the use of the concept of long-run cost and application of the tilted annuity. Without more detailed

[33] See for example, Commerce Commission (2003), *Determination for TSO Instrument for Local Residential Service for period between 20 December 2001 and 30 June 2002,* December 2003, p 46

arguments supporting these claims it is difficult to comment. However, in terms of the use of a long run perspective implied by a TSLRIC framework and the choice of maturity for the risk-free rate, we note that the TSLRIC framework is used in a regulatory setting to determine a price and not to evaluate the value of the Telecom. When this is the case, it is appropriate to match the maturity of the risk-free rate to that of the regulatory period.