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By hand and e-mail

Dear Alan

MOBILE PHONES INQUIRY: MOBILE TERMINATION – ACCOUNTING DEPRECIATION BASED COST ESTIMATES

1. In order to assist with the reconciliation between the cost of mobile termination implied by Oftel's LRIC model and that implied by an analysis of the MNOs' accounting and operational data, Oftel has produced a supplementary module to be used *in conjunction with* the April 02 model delivered to the CC on the 8th of April. This module enables the April 02 LRIC model to calculate the cost of mobile termination based on accounting cost concepts rather than economic depreciation.

2. Oftel's view remains that economic depreciation based cost estimates represent the most efficient means of cost recovery for the MNOs. This is because an economic depreciation algorithm such as the one used in the LRIC model will most closely mimic the effects of a competitive market, providing an appropriate benchmark for regulation.

3. It is important to note that the attached supplementary module is not a "new model" and does not represent an "improvement" upon a model based on economic cost concepts. Rather, it is an add-on to the existing LRIC model, which uses an alternative estimation technique that is valuable because it produces outputs that are more easily comparable with accounting information supplied by the MNOs.

Items provided

4. The supplementary workbooks and documentation have been copied onto the enclosed floppy disk, comprising:

1) The supplementary LRIC model files. These comprise two Excel 2000 workbooks, namely *HCACCAR2.xls* and *Results_Econ_HCA_CCA.xls*. The first of these contains the calculations used to produce HCA estimates, whilst the second produces charts comparing termination charges calculated using each of the various costing methodologies. The model documentation

(see below for description) outlines the ways in which the model's additional functionality works and how results produced using the new module differ from the results produced within the economic depreciation based April 02 model.

2) An MS PowerPoint 97 presentation, *Documentation HCA CCA (April 02).ppt*, which is a set of slides that should be read in conjunction with the model referred to above. It contains an outline of the worksheets contained within *HCACCAR2.xls,* together with a summary of model outputs.

Contrasting the use of economic and accounting cost concepts in the April 02 model.

5. The following text provides an explanation of these differences.

Differences in conceptual approaches

6. The supplementary module enables the LRIC module to produce an estimate of the cost of termination based on three approaches to cost recovery. These are:

- economic depreciation;
- accounting depreciation – Historical Cost Accounting (HCA); and
- accounting depreciation – Current Cost Accounting (CCA), using a Financial Capital Maintenance (FCM) approach.

7. Each of these approaches enables approximately the same total cost recovery over the model's forecast period. The chief difference between them therefore lies in the **timing,** rather than the **amount,** of cost recovery.

Economic depreciation

8. Economic depreciation seeks to mimic the pattern of cost recovery over time in a competitive market by setting annual cost recovery on an asset to be equal to its change in economic value (earning power) during the year. The key characteristics of the economic depreciation approach used in the LRIC model are detailed below:

- Capital costs (including both costs that would be termed "depreciation" and "cost of capital employed" under accounting approaches) are recovered based on the shape of prices in a competitive market. It is important to note that:
    - cost recovery in a given year is positively related to price of the Modern Equivalent Asset (MEA); and
    - unit economic costs (in pence per minute) are modelled as being independent of asset utilisation, so that, where asset utilisation is low, such as, notably, in the early years of an MNO's operation, cost recovery (in £) is delayed until years when asset utilisation is higher.

- Operating costs, rather than being strictly recovered in the year in which they are incurred, are recovered in line with operating cost trends and asset utilisation in a similar manner to capital costs.

Accounting depreciation

9. The key characteristics of cost recovery under an accounting depreciation approach are:

- Capital costs are recovered as the sum of depreciation and the cost of capital employed. Depreciation is calculated as the gross book value of an asset divided by its financial asset life[1], whilst total capital employed is calculated as the firm's weighted average cost of capital (WACC) multiplied by the net book value of it's asset base. Gross and Net Book values are dependent on the asset valuation concept used, ie HCA or CCA, and, in the case of CCA, annual depreciation charges are dependent on the choice of capital maintenance concept used, ie Operating Capability Maintenance (OCM) or FCM;
- Depreciation is *not* deferred from years when utilisation is lower to those when it is higher. Consequently, unit capital costs tend to be inversely related to utilisation; and
- Operating costs are recovered in the year in which they are incurred, meaning that they are inversely related to utilisation. Operating costs are identical under HCA and CCA approaches.

HCA

10. Under HCA, assets are valued based on the price paid by the firm at the time of purchase, i.e. gross book value (GBV). Annual depreciation charges are therefore set equal to (GBV ÷ AL), where AL is the length of the asset's financial lifetime. The annual cost of capital employed is equal to (NBV × WACC), where NBV is the net book value, ie GBV less the sum of accumulated depreciation.

CCA

11. Under CCA, assets are valued based on the price the firm would be obliged to pay in order to replace them with a modern equivalent asset, i.e. the Gross Replacement Cost (GRC). Under FCM, annual depreciation charges are calculated as [(GRC ÷ AL) + HL], where HL is holding loss, ie the decline in GRC in the year.[2] The annual cost of capital employed is equal to (NRC × WACC), where NRC is the net replacement cost of an asset, ie GRC less accumulated depreciation.

Differences in cost estimates

Calculation approach

12. Under an economic depreciation based approach total costs of a voice only network for 25% market share operator in 2005/06 are calculated as indicated in Figure 1.

[1] In the LRIC model, financial asset lives are currently assumed to be identical to those implied by the economic depreciation algorithm (although this assumption can be varied).

[2] If the GRC increases over time, there is a holding gain, which is subtracted from annual depreciation.

Figure 1 - Total network costs calculated using economic depreciation (£m at 2005/06 prices)

	Economic depreciation
Annualised opex	614
Annualised capex	449
Total economic cost	**1,063**

13. Under an accounting depreciation approach total costs are calculated as indicated in Figure 2:

Figure 2 - Total network costs calculated using accounting depreciation measures (£m at 2005/06 prices)

	HCA	CCA
Operating costs	480	480
Accounting depreciation	256	231
Cost of capital	194	142
Total cost	**930**	**852**

14. Figure 1 and Figure 2 demonstrate that, in 2005/06, total costs are highest using economic depreciation, lower under HCA, and lowest using CCA.

Differences in cost recovery profiles over time.

15. As suggested above, the key difference between cost estimates implied by the different cost recovery principles lies in the timing of cost recovery since each approach yields the same discounted revenue over time. The following principles are key in analysing these differences:

- Economic depreciation tends to defer costs relative to accounting (HCA and CCA) depreciation based approaches due to low asset utilisation in early years. This means that costs recovered will tend to be lower under economic depreciation than under accounting deprecation in early years when utilisation is low, and higher in later years, when utilisation is high;

- Costs under CCA differ from HCA costs because of the existence of MEA price trends which tend to:

  (i) increase annual depreciation charges relative to asset values due to holding losses; and
  (ii) decrease asset values (and hence the level of annual depreciation charges) over time due to the cumulative impact of MEA prices.

16. Which, in a given year, of HCA and CCA cost is the higher depends critically on several factors. First, there is the MEA price trend in that year, which, other things being equal, tends to mean that CCA cost is higher than HCA cost due to increasing holding losses. Second, there is the average age of assets, since, other things being equal, costs will be lower under CCA than HCA if there have been past declines in

MEA prices (holding losses) during the asset's lifetime (which would have had the effect of bringing forward cost recovery to those earlier years). With falling MEA prices the impact of these effects is to bring forward cost recovery, i.e. CCA costs would tend to be higher than HCA costs in early years when assets are relatively new, and lower in later years.

17. Bearing the above factors in mind, the differences in the unit costs of termination provided using accounting and economic depreciation based methodologies are shown for a 900MHz network in Figure 3 and for an 1800MHz network in Figure 4. These figures illustrate the differences in the profiles of cost recovery alluded to previously.

Figure 3 – Comparison of accounting and economic depreciation based marked up termination estimates, 1993/94 to 2009/10

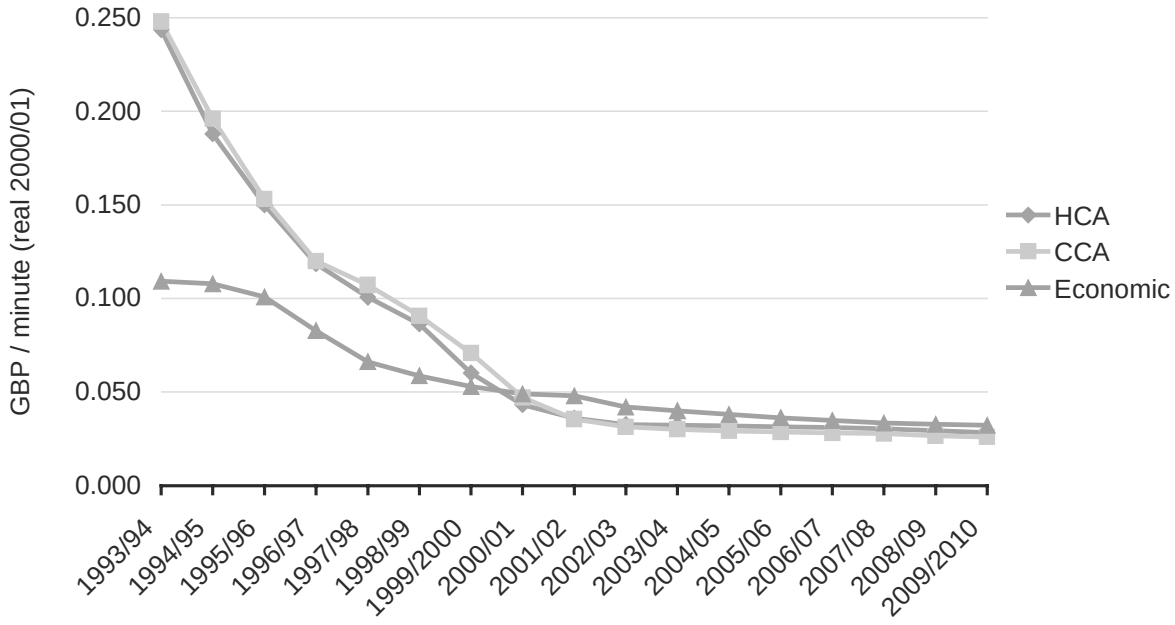
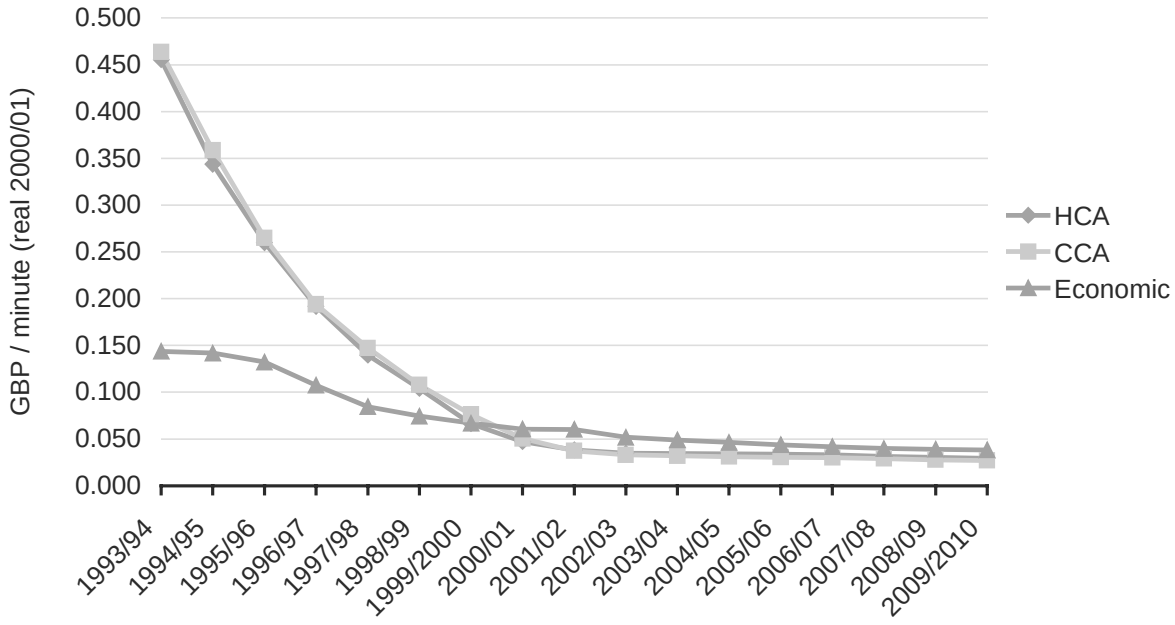


Figure 4 – Comparison of accounting and economic depreciation based marked up termination estimates, 1993/94 to 2009/10



18. Three broad trends are easily discernible from the above Figures. These are:

- Economic cost is, due to the effect of utilisation, lower than accounting costs in early years (before 2000/2001) and higher thereafter, including in the period of the proposed charge control;

- At the beginning of the modelled period, economic costs and accounting costs are significantly further apart for 1800 MHz operators than for 900 MHz operators. This effect occurs because of the very low utilisation levels observed in 1800MHz networks in the early to mid 1990s.

- The HCA and CCA cost trends are generally quite close together. This is because the steep growth of the demand for capacity over the years has meant a significant volume of new assets being purchased each year, as indicated by the continuing relatively low average asset age shown in Figure 6.

- CCA costs are slightly higher in the first few years, then CCA costs are more noticeably higher from 1996/97 to 2000/01, with HCA costs being slightly higher thereafter. This pattern can be explained by identifying the following stages:

    - In the first few years, the effect of MEA price declines and therefore holding losses, dominates the effect of ageing assets having significantly lower book values since most assets are relatively new. This means that CCA costs are slightly higher than HCA costs.
    - From 1996/97 to 2000/01, an increase in the rate of MEA price declines (see Figure 5) dominates the effect of ageing assets, not least because the rapid network expansion in these years means that the asset base remains relatively new on average (see Figure 6). This means that CCA costs are more noticeably higher than HCA costs.

- From about 2001/02 onwards, decelerating price declines (see Figure 5), together with an ageing asset base (see Figure 6) mean that HCA costs are lower than HCA costs.

Figure 5 - Weighted (by assets deployed) average price decline, 900 MHz operator

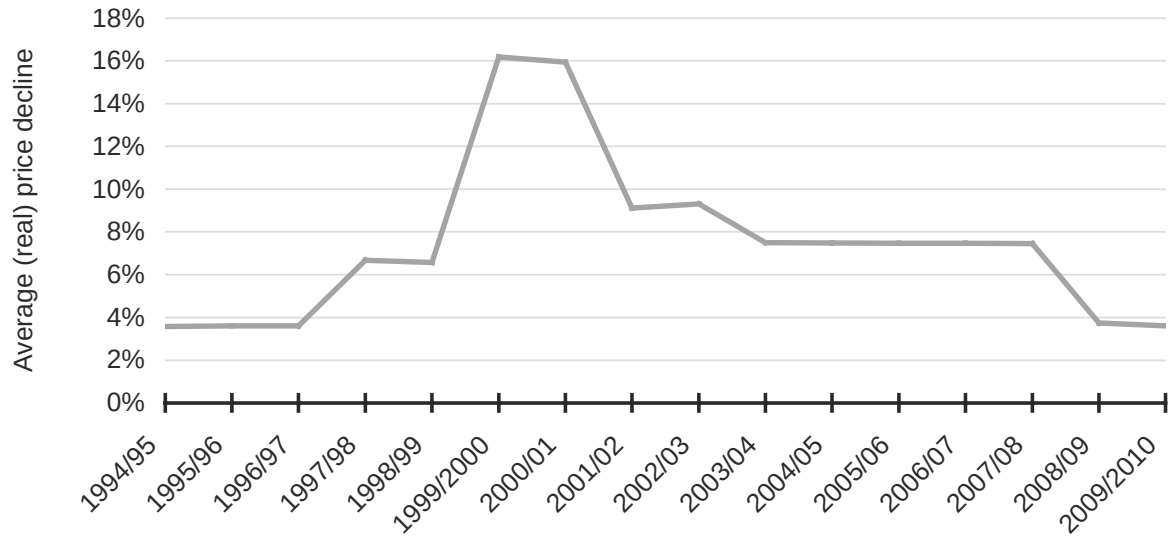
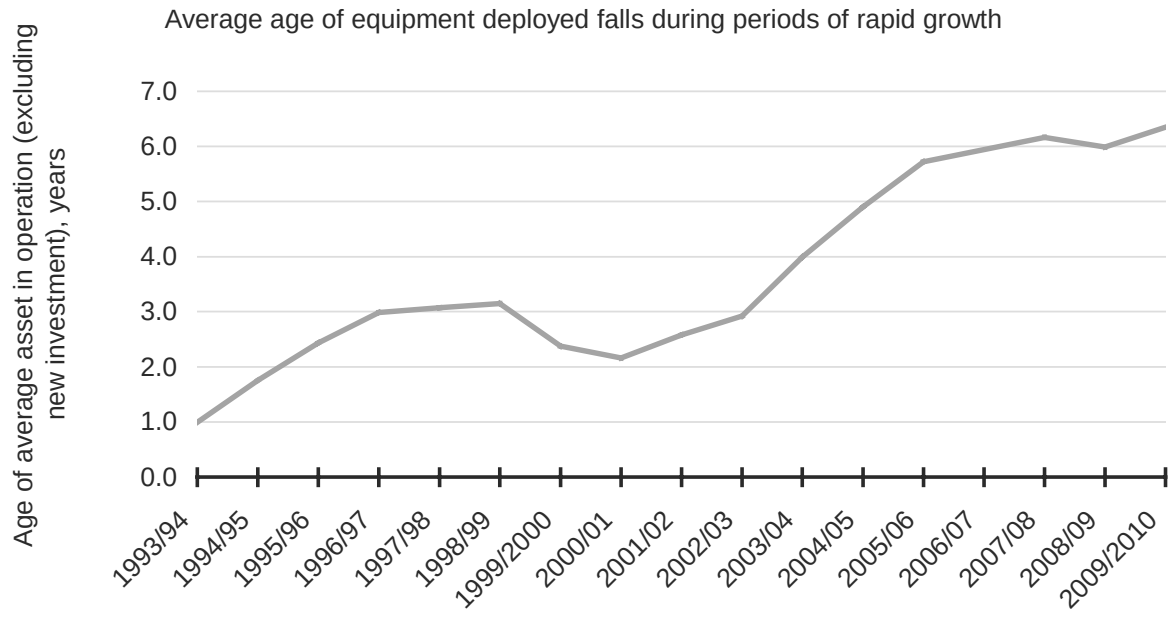


Figure 6 – weighted (by GRC) average age of asset base, 900MHz operator



19. The trends described above are, broadly, observed for both 900MHz and 1800MHz networks.

Other points

Level of costs before 2000/01

20. The following point should be borne in mind when considering the *level* of the cost paths in the years prior to 2000/01. It was first set out as follows by Oftel in *Costs of Termination in the Last Four Years*, 29 January:-

- "A large proportion of the costs of the network depend on the capacity required to serve the given traffic demand. Capacity is dimensioned on the demand in the busy hour, the period of peak demand. Whilst the total volume of minutes in past years is known from Oftel's Market Information statistics, the volume of busy hour minutes is known with less certainty, and therefore depends on a parameter within the LRIC model, namely the proportion of that traffic which occurs in the busy hour.

- The value of this parameter for 2000/01 is set at 10% as part of the 'scorched node' calibration exercise, which ensures that the network design in the model derives about the same number of base station sites as the operators actually have in their networks. For further details of this exercise, see paper 5v attached to Oftel's submission of 22 January 2002, *Model Recalibration with Q2 and Q3 data*, Analysys draft working paper. In the absence of direct evidence from operators, it is estimated that the value of the parameter in 1998/99 and 1999/2000 was 11%. However, it is known that over this period there was rapid growth in mobile take-up by residential customers, who generally have greater demand in evening and weekend periods than in the daytime. It is likely that this had the effect of flattening the traffic profile across the day, ie in the period 1998-2000 reducing the proportion of total traffic that occurred in the busy hour. It may be, therefore, that the value of this parameter was larger than 11% in 1998/99 and 1999/2000 [and in earlier years]. To illustrate the significance of this point, if, for example, the true value in 1998/99 was 14% rather than 11%, then the LRIC+ figure for 900 MHz operators in that year would increase from 8.0 pence per minute (ppm) to 9.8 ppm.[3]

- This possible understatement of costs only applies to the years before 2000/01. It is not an issue for subsequent years, because the scorched node calibration means that the model contains appropriate parameter values for the proportion of traffic in the busy hour in such years."

21. The proportion of traffic in the busy hour has a significant impact on the level of HCA and CCA costs. This enables a high level reconciliation to be undertaken between the model's HCA figures and the "public interest benchmark" from the previous inquiry undertaken by the CC in 1998 (Cellnet and Vodafone, December 1998), which was based on HCA information.

[3] The percentage increase in LRIC+, 22%, is only slightly less than the proportional increase in the value of the parameter from 0.11 to 0.14, ie 27%.

22. The CC's public interest benchmark in 1997/98 was 12.98 ppm. In deriving the charge control the CC set out forecasts of public interest benchmarks for 1998/99 and 1999/00. However, since the figures for these latter two years were subject to forecast error, it is more appropriate to consider the public interest benchmark in 1997/98. The figure of 12.98 ppm included an allowance of 0.5 ppm for marketing and service provider incentives (relating to the network externality). Subtracting this allowance yields an HCA cost of termination for 900 MHz operators in 1997/98 of 12.48 ppm.

23. The figure in Oftel's model for HCA in 1997/98 in nominal terms is 9.7 ppm. This reflects a parameter value for the proportion of traffic in the busy hour in 1997/98 that is very likely understated at 12%. If the correct parameter value was 15-16%, the difference between the HCA cost figure in the model and the CC's public interest benchmark would be explained.

24. In the interests of facilitating straightforward comparison, in the model supplied to the CC the original parameter values for the proportion of traffic in the busy hour have been retained, ie the same figures as in the Sept01 and April02 models.

Changing the cost path

25. Figure 3 and Figure 4 illustrate that each of the cost recovery mechanisms will yield approximately the same present value. It is clear, therefore, that, since under the existing charge control the past termination charges of the MNOs have been based on an accounting depreciation cost path, a change to the economic depreciation cost path in 2002/03 would benefit the MNOs. In effect it would allow the recovery of costs deferred from earlier years (due to low utilisation), which is the reason why the economic depreciation path currently lies above the accounting cost paths. However, in the past, MNOs' charges have been based on an accounting depreciation rather than economic depreciation cost path. It can therefore be argued that the recovery of such costs has already been allowed for in those earlier years, because low utilisation does not lead to deferral of cost recovery in accounting approaches.

26. Oftel has based its proposed charge controls for the next four years on the economic depreciation cost path because it seeks to reflect costs in a competitive market and so provide more appropriate price signals. However, the analysis above suggests that basing future charges on this approach leads to the double recovery of some costs – once in the past through HCA-based charges, and again in the future through charges based on economic depreciation.

Other

27. In the course of its further work, Oftel has identified a few areas in which very minor modifications to the algorithms in the LRIC model could be made. But, since these do not have a material impact on estimates of termination cost, either individually or collectively, we propose not to modify the algorithms, in order that they remain as per the April 02 model.

28. We would be happy to discuss in greater detail the accounting depreciation based cost estimates and how they might be used in reconciliation work. But please do not hesitate to contact me if you have any queries regarding the above.

29. We will be making this letter and the attached supplementary module publicly available.

Yours sincerely

Selena Bevis

CC Julian Rose