



FINAL REPORT - PUBLIC VERSION

Mobile Termination - Review of Commerce Commission's Modelling

Submitted to

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1. INTRODUCTION AND EXECUTIVE SUMMARY

1.1. INTRODUCTION

1. The Commerce Commission has issued its draft report on regulation of mobile termination (MT) rates (dated 18 October 2004), recommending regulation.
2. The Commission's draft report includes a cost benefit analysis (CBA) of the impact of MT regulation (see chapter 5). In our view, this CBA is incomplete, as it omits analysis of the impact of MT regulation on the subscription and origination sides of the mobile market. The separate report being filed by Professor Jerry Hausman addresses this critique in more detail.
3. The main purpose of this report is to review the Commission's CBA, on the assumption that it is appropriate to limit the analysis to the impact of regulation on fixed-to-mobile (FTM) transactions.
4. A secondary purpose of this report is to briefly respond to the Commission's discussion of mobile prices and penetration in the UK against the background there of MT regulation.

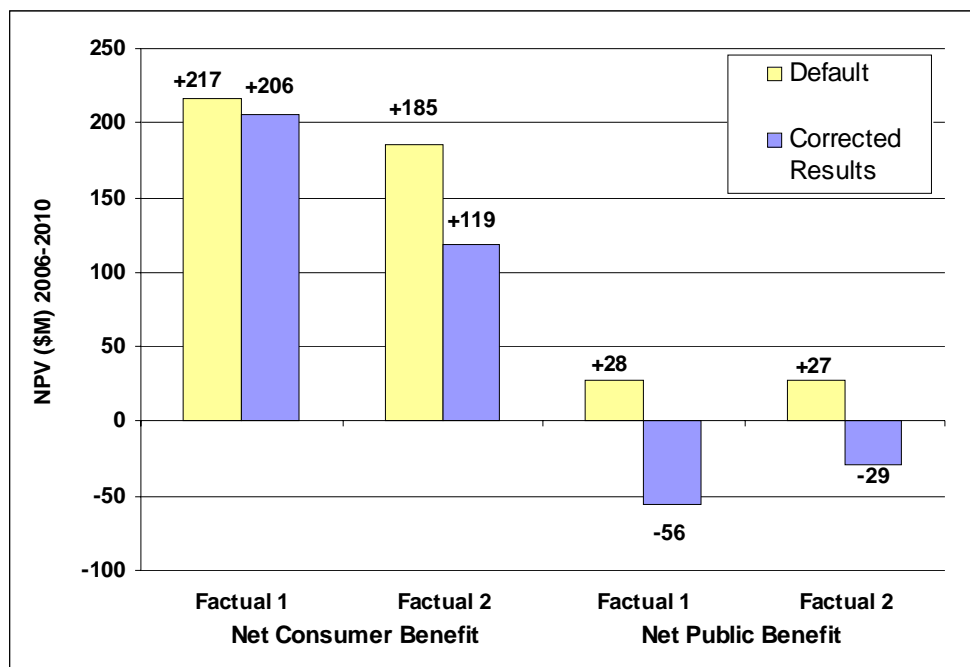
1.2. EXECUTIVE SUMMARY

1.2.1. Review of Commission's Modelling

5. We have reviewed in detail the Commission's CBA methodology and Excel spreadsheet model. We have five key concerns with the Commission's approach:
 - The Commission's modelling of prices and pass-through is ad hoc and inconsistent with the historical relationship between the FTM and MT prices;
 - The Commission's methodology for estimating indirect costs of regulation is inappropriate, and is applied inconsistently;
 - The Commission's FTM elasticity assumption is too high (in an absolute sense);
 - The Commission fails to account for the dynamics of the FTM demand curve. MT regulation would reduce the demand for FTM calling, and we demonstrate that a very small reduction in FTM demand would eliminate the claimed net benefits of MT regulation; and

- The Commission inappropriately treats a surplus transfer from producers to consumers as a benefit of regulation. If the Commission nevertheless chooses to adopt this approach, then it is forced to consider the incidence of the benefits – we show that about 70 percent of these accrue to businesses rather than residential consumers.
6. Correcting for the first three critiques (along with several smaller errors) results in the adjusted net consumer and public benefit NPVs set out in Figure 1, which are compared with the ‘default’ NPVs resulting from the Commission’s original model.
 7. The corrected model results in a negative public benefit for MT regulation. This result is driven by, among other things, consistent application of the Commission’s methodology for estimating the indirect costs of regulation. Uncorrected, the Commission’s methodology implies that the indirect costs of regulation depend on whether or not the Commission counts surplus transfers as a benefit of regulation. However, the cost of regulation is ultimately tied to its effect on the behaviour of market participants e.g. their investment in lobbying activity or the timing and amount of investment in new assets. The cost of regulation is not related to whether the Commission counts transfers as benefits or not. Accordingly, we consider that the indirect costs of regulation should be unchanged by whether or not the claimed benefit of regulation is limited to allocative efficiency.

Figure 1: Default and Corrected Results



8. The assumptions about competition implicit in Factual 1 cause us to place very little weight on this part of the model. We see our modified Factual 2 as providing a more accurate description of the costs and benefits of regulation. We note, however, the results of our Factual 2 model still overestimate the net benefits of regulation because the model continues to ignore the problem described in the fourth bullet point above, and of course it ignores the other welfare costs of MT regulation.

1.2.2. The Initial UK Experience

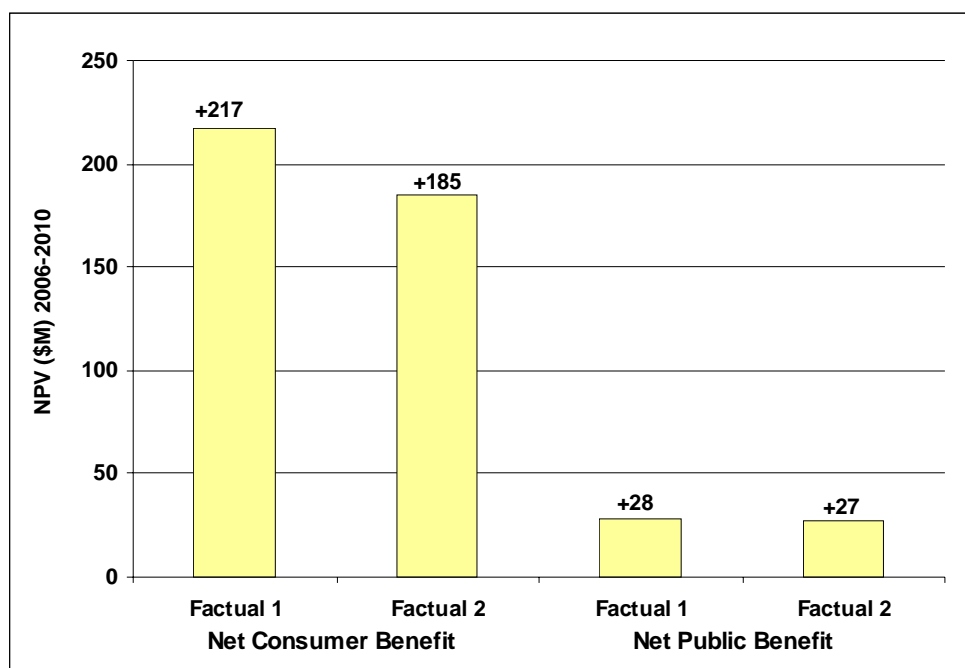
9. UK retail mobile prices had been falling significantly over 2002 and the start of 2003.
10. The UK Competition Commission estimated that, absent MT regulation, retail mobile prices would continue to fall by around 5.5 per cent a year and that the impact of regulation would be to slow the fall to around 3 per cent a year.
11. In fact, the evidence indicates that mobile prices have stopped falling since the initial 15 per cent real reduction in MT rates - indeed mobile prices including handset prices appear to have increased. This evidence is consistent with the “waterbed” effect occurring.
12. It is too early to determine the impact of the 30 per cent reduction that was introduced in September 2003.

2. REVIEW OF COMMISSION'S MODELLING

2.1. THE COMMISSION'S METHODOLOGY

13. The MT rate is a marginal cost input into a FTM service. Accordingly, we would expect a regulated drop in the MT rate to lead to a lower FTM price, with the impact depending on the level of pass-through. (As noted above, we would expect a regulated drop in the MT rate to have other effects as well, but the Commission's analysis focuses only on the FTM impact).
14. Diagram 4 on page 63 of the draft report depicts the Commission's approach. For each year of the analysis, the Commission develops a counterfactual (P_0) and factual (P_1) FTM price, with the latter depending on the former and on the assumptions about the counterfactual and factual MT rates. (The Commission actually uses two factuals, which we explain in more detail below). From these and assumptions about the initial quantity of FTM calls, elasticity of FTM calls, and regulatory costs, the Commission is able to calculate the net gains in total surplus (its "public benefits" approach) and the net gains in consumer surplus (its "consumer welfare" approach) arising from MT regulation.
15. Figure 2 sets out the Commission's results, which we will henceforth refer to as the Default.

Figure 2: Default Results



16. The Commission's model is built in Excel, and we have reviewed the model in detail.

2.2. SENSITIVITY TESTING

17. Sensitivity testing of the Commission's CBA model reveals that the Commission's estimated benefits of regulation are most sensitive to assumptions about:

- The regulated MT rate; and
- FTM elasticity.

These results are illustrated in Figure 3,

18. Figure 4, Figure 5 and Figure 6. Because these parameters are the most sensitive, we discuss them more fully below.

Figure 3: Net Consumer Benefit NPV: Factual 1

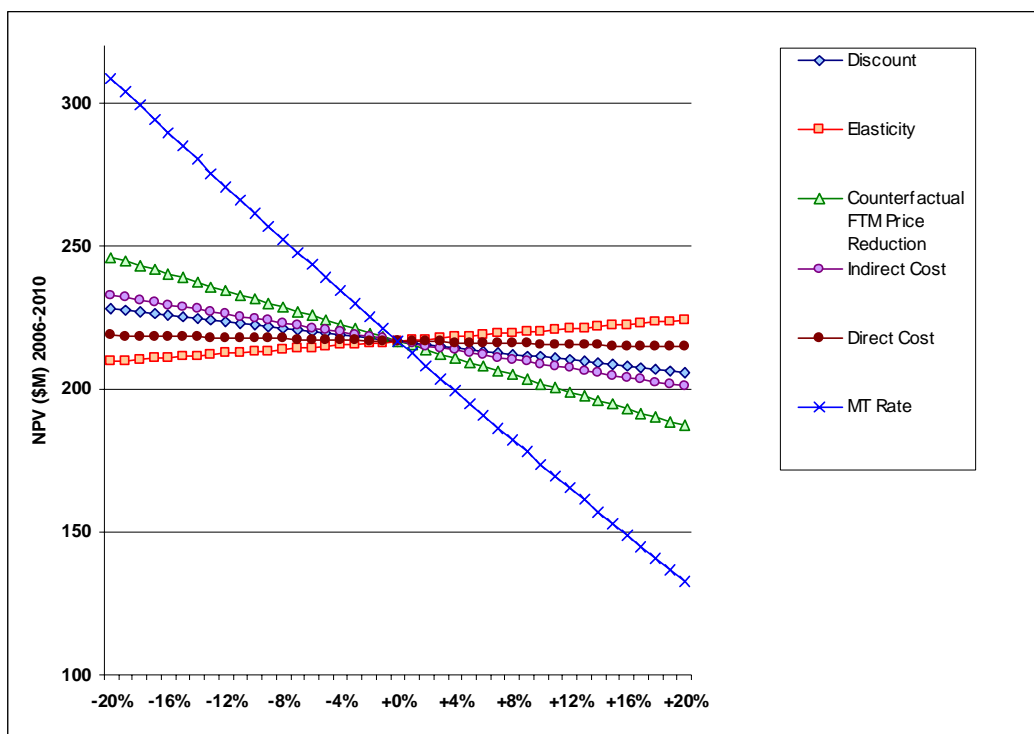


Figure 4: Net Consumer Benefit NPV: Factual 2

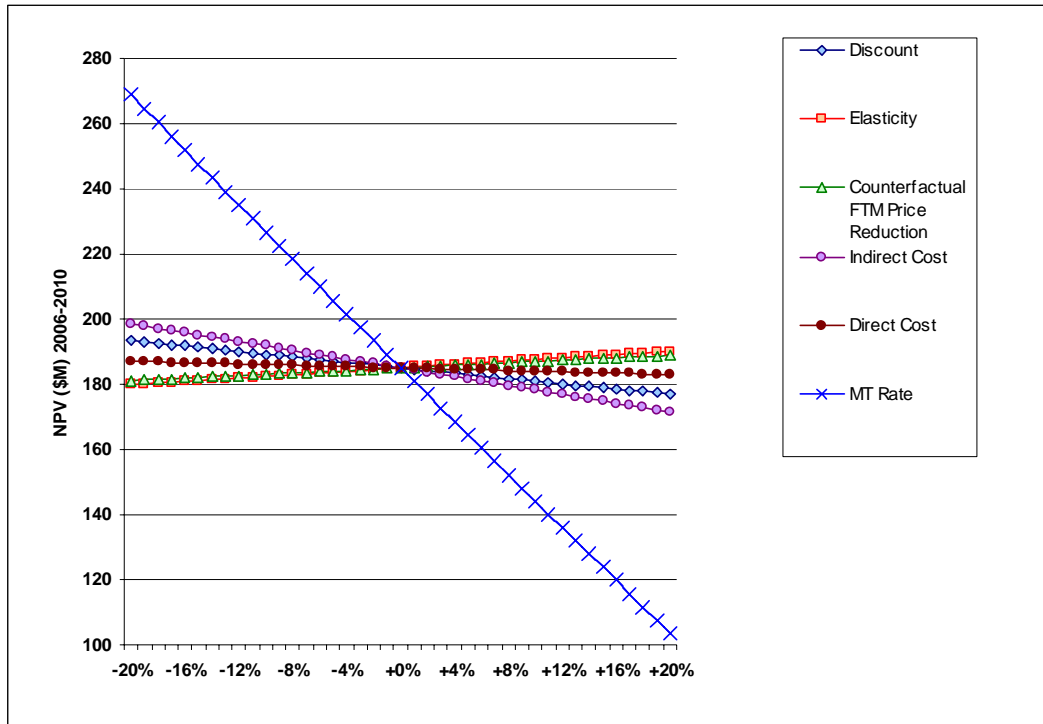


Figure 5: Net Public Benefit NPV: Factual 1

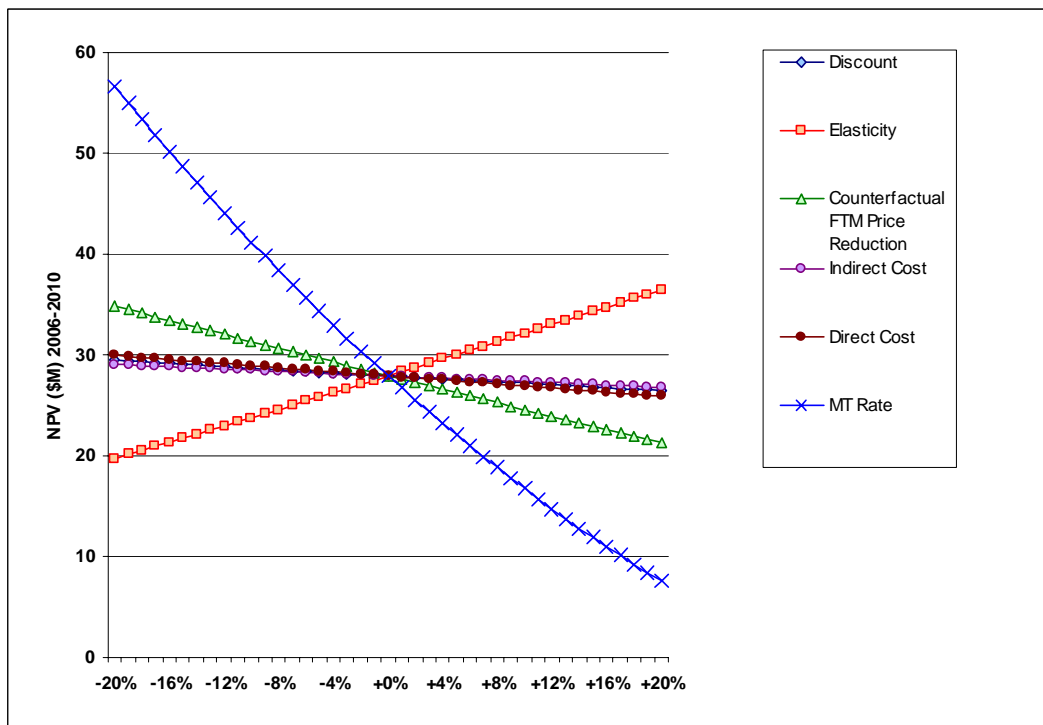
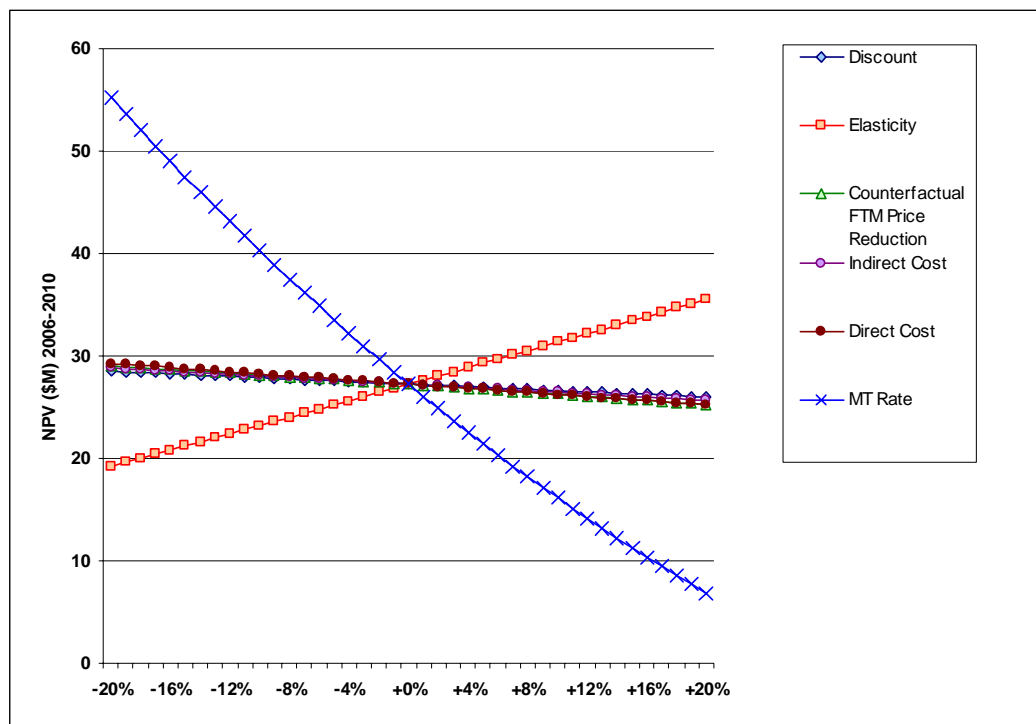


Figure 6: Net Public Benefit NPV: Factual 2



2.2.1. Mobile Termination Rate

19. The Commission-calculated benefit of regulation declines as assumed MT costs increase, for reasons that differ by factual. In Factual 1 and for the calculation of consumer welfare, higher costs reduce regulation benefits by raising the floor to which retail prices are assumed to fall to by 2010. For the calculation of consumer welfare in Factual 2, higher costs mean that the MT rate under regulation, which is set equal to what the Commission defines as cost (16 cents per minute), is higher. Accordingly there is a smaller absolute pass-through of costs to retail prices. Higher costs only affect the factual, and higher post-regulation factual prices (and a constant counterfactual) mean a smaller benefit from regulation.
20. For the calculation of public benefits in both Factuals 1 and 2, a higher mobile termination cost reduces the loss of producer surplus under regulation by raising the factual price. However, the improvement of producer surplus when costs are higher is more than offset by reduced consumer benefits. Overall, surplus is declining in the cost of FTM calling.

21. The main basis for the Commission's 16 cents per minute assumption is identification of (mainly) cost-based regulated MT rates overseas, and conversion of these to New Zealand dollars. The Commission does not attempt to control for the likely cost differences between these countries. We have not carried out a rigorous benchmarking analysis for the purposes of these proceedings. However, given New Zealand's low population density and mountainous geography, it would be very surprising if MT costs in New Zealand were comparable to those in the majority of the countries chosen by the Commission (i.e., the UK, Malaysia and South Korea). Given the sensitivity of the Commission's results to the assumed MT cost, it would seem prudent to carry out a more rigorous benchmarking exercise.

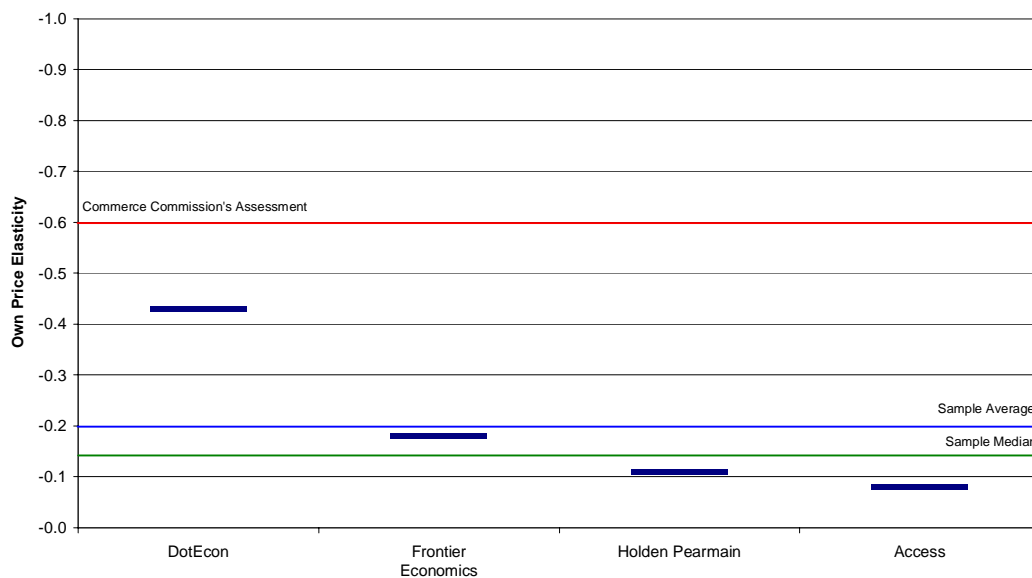
2.2.2. FTM Elasticity

22. The Commission-calculated benefits of regulation (as measured by both consumer surplus and net public welfare) are increasing in the elasticity of demand for FTM. This is because higher elasticity increases the static deadweight gain from reducing prices towards marginal cost, while not affecting the size of the surplus transfer (area B in Diagram 4 on page 63 of the Commission's draft report). Static welfare analysis predicts a deadweight loss whenever the price of a good exceeds the marginal cost of production. The deadweight loss comes about because consumers who value the good by more than the marginal cost of production but less than the price being charge forego consumption. For a given margin between price and marginal cost, the deadweight loss is generally larger the greater is price elasticity of demand because when consumers are price sensitive, comparatively more will be unwilling to buy a good when price exceeds marginal cost. The static welfare effects of regulation, which pushes price closer to marginal cost, are greater when elasticity is large.
23. The Commission assumes a FTM elasticity of -0.6 . In our view, this assumption is likely to be too high (in an absolute sense), for the following reasons.

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- There is little robust empirical literature on FTM elasticities. However, the empirical estimates that we have been able to locate do not support the Commission's assumption of -0.6 . The studies that we have identified are by DotEcon, Frontier Economics, Holden Pearman and Access Economics¹. The results of these studies can also be found in Vodafone (2003)², which is discussed by the Commission. However, in the Vodafone paper the Access Economics figure is incorrectly represented as -0.8 , when it should be -0.08 . The correct results of the four studies are summarised in Figure 7. We understand that the Access Economics figure was an average of two studies completed in the 1980s, and so is less reliable than the other three studies, which were completed in 2002 based on UK data. The average and median of the sample excluding the Access Economics figure are 0.24 and 0.18 respectively.

Figure 7: FTM Own Price Elasticity Estimates



- The Commission places significant weight on Telecom's [] figure, despite the fact that Telecom clearly pointed out in its section 98 response that the estimation of this figure is not robust.

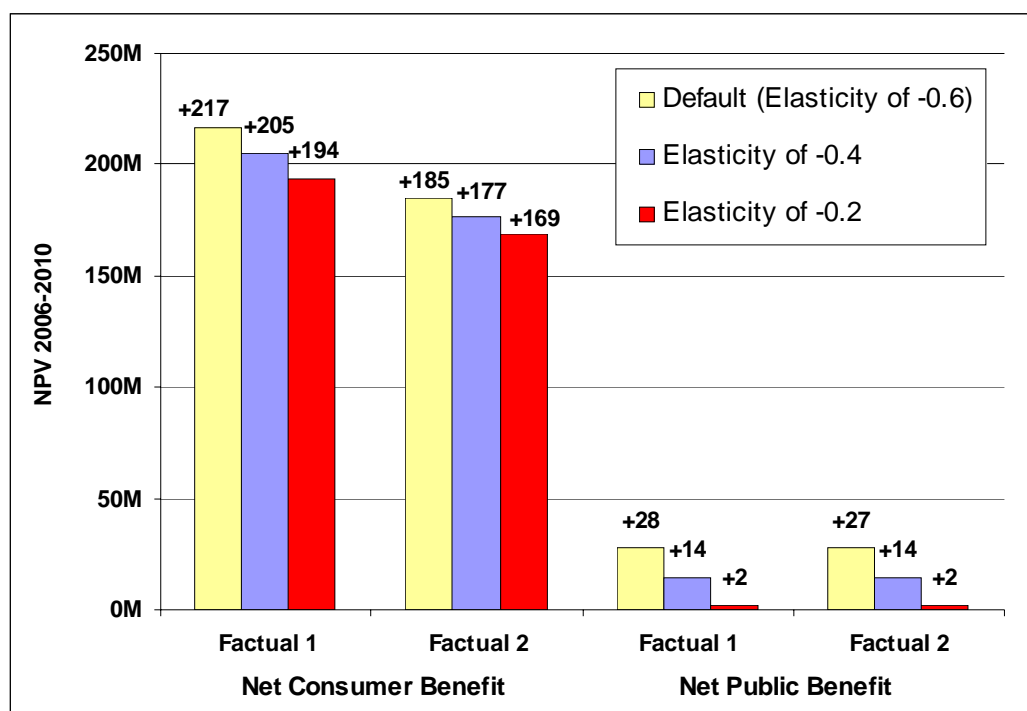
¹ As quoted in Competition Commission (2003), *Vodafone, 02, Orange and T-Mobile: Reports on references under section 13 of the Telecommunications Act 1984 on the charges made by Vodafone, 02, Orange and T-Mobile for terminating calls from fixed and mobile networks*, Final Report, Chapter 8.

² Vodafone (2003) *Review of Price Elasticities of Demand for Fixed Line and Mobile Telecommunications Services*, August, pp. 3-5, available: <http://www.comcom.govt.nz/telecommunications/obligations/Vodafone%20paper%20on%20price%20elasticities%20for%20weighted%20revenues%20approach.PDF>

- The Commission states that, “Telecom noted that the elasticity of residential demand for fixed-to-mobile services is higher ...” (paragraph 445). We understand that Telecom is responding separately to the Commission on this statement. However, we would point out here that the market pricing data are entirely inconsistent with any argument that residential customers are more elastic than business customers; in fact, the data imply the opposite. The Commission’s own data in its CBA model has the average residential FTM price in 2004 as being \$0.566, while the average business price is \$0.3351.³ It is our understanding that this difference is explained entirely by demand-side factors, and that the cost of provision between residential and business customers does not vary materially.
 - We also have a number of concerns about the ACCC’s assumption of -0.6 . The ACCC attributes this to market analysis, estimates used by market analysts and the only recent formal study available at the time (an earlier DotEcon study that appears to be superseded by the one mentioned above). We consider that such estimates bear less weight than the studies discussed above.
24. The above discussion demonstrates that the information contained in Table 10 of the Commission’s draft report is unlikely to be a fair representation of the available data, and indeed that the ACCC’s figure of -0.6 appears to be an outlier. We would suggest that -0.4 is likely to be a more appropriate baseline assumption for modeling purposes, and we would also suggest that -0.2 (and -0.6) be used in sensitivity testing.
25. Holding all else constant, we have re-run the Commission’s CBA model using these alternative elasticity assumptions, and the results are summarized in Figure 8.
26. The greater absolute impact of a lower elasticity on the net public benefits (relative to net consumer benefits) is due to the steeper demand curve reducing the size of the area labeled E in the Commission’s report.

³ The Commission’s own data also show that business pass-through of MT rate drops has been greater than for residential. We return to this issue below.

Figure 8: Net Consumer and Public Benefits Resulting from Changed Elasticity Assumptions



Compensated Demand Curve

27. A related critique of the Commission's analysis is as follows. A compensated demand curve or Hicksian demand curve is constructed by adjusting income as the price changes so as to keep the consumer's utility constant. For cost benefit analysis, it is the compensated demand curve that is appropriate for estimating final consumer welfare, not the standard demand curve (see, for example, Mas-Colell, Whinston and Green, 1995).⁴ Only in special circumstances (i.e., when there is constant marginal utility of income) will the two be equivalent. The Commission has used a standard demand curve for its FTM CBA.
28. The distinction between the compensated and standard demand curves is particularly important when estimating deadweight loss (Hausman, 1981).⁵ For the case of a normal good, the compensated demand curve has a steeper slope than the standard demand curve, and the deadweight loss estimated in respect of the compensated demand curve would be smaller than that estimated in respect of the standard demand curve. In other words, the Commission's estimate of deadweight loss is overestimated for this reason as well.

⁴ Mas-Colell, Andreu, Michael D Whinston and Jerry R Green (1995), *Microeconomic Theory*, Oxford University Press.

⁵ Hausman, Jerry (1981) "Exact Consumer's Surplus and Deadweight Loss", *American Economic Review*, 71.

2.2.3. Sensitivity of Results to Other Variables

29. Most other results from the sensitivity analysis are quite intuitive. Higher direct and indirect costs of regulation reduce the benefit of regulating. Higher discounting reduces the present value of regulation benefits. A greater reduction in counterfactual FTM price, other things held constant, generally reduces the benefit of regulation. This is the intuitive result. However, there is one exception: a larger reduction in counterfactual FTM price *increases* the benefit of regulation for consumers in Factual 2. We explain the cause of this as follows. In Factual 2, the factual FTM price is reduced in absolute terms by the same amount because the factual FTM price is calculated as the counterfactual FTM price minus the pass-through percentage times the difference in factual and counterfactual MT rates.⁶ In other words, relative price effects cancel. This leaves two offsetting effects on consumer benefit. Total consumer benefit is increased because lower prices under regulation stimulate a volume effect. However, there are costs of regulation, some of which are fixed, which may offset these gains. When transfers are counted as surplus, as they are in the consumer welfare calculation, the volume effect of lower prices is large enough to offset the fixed cost. When only allocative efficiency gains are counted, as when calculating net public benefit, the benefit of lower prices is insufficient to overcome these fixed costs. This explains the (slightly) upwards-sloping relationship between counterfactual price in Figure 4 but not elsewhere.

2.3. PASS-THROUGH

2.3.1. General Discussion of Pass-Through

30. There is very little theoretical guidance as to the level of pass-through to FTM prices that we should expect if MT rates are decreased by regulation. The level of pass-through (and probably the speed) will be functions of, among other things, the intensity of competition.⁷ We discuss some empirical estimates later in this report, both for New Zealand and for the UK.
31. In *Decision 497*, the Commission segmented the FTM “market” into SME and corporate customer segments. Customer segmentation probably continues to make sense for present purposes, at least between residential customers and business customers (including SMEs and corporates). Telecom’s submission in response to the Commission’s *Issues Paper* pointed out the distinct competitive dynamics between the residential and the business calling markets, particularly in respect of FTM services. In particular:

⁶ We discuss this methodology further in Section 2.3.3.

⁷ Hausman and Leonard (1999) find that even a monopoly will pass on at least 50% of reductions in marginal costs if the demand curve it faces is linear or convex (a shape that is commonly found, empirically). See Hausman, J. A. and Leonard, G. K. (1999) “Efficiencies from the Consumer Viewpoint,” *George Mason Law Review*, 7:3, Spring.

- Residential customers tend to purchase tolls and FTM services as a bundle, and appear to focus their attention more on the price of toll calls; and
 - Business customers appear to be more price sensitive, and Vodafone competes for FTM calling for corporate customers.
32. Consequently, the average FTM price for residential and business customers is quite different, and the historic level of pass-through has been different – see the “FTM P_0 ” sheet of the Commission’s model. We have modified the Commission’s model to address this customer segmentation – we describe the alterations and results later in this report.
33. The Commission adopts two approaches to modelling pass-through.

2.3.2. Pass-Through in Factual 1

34. The Commission’s first approach to pass-through is to assume that between 2006 and 2010 retail FTM prices under the factual will fall to cost.
35. There are two problems with this approach:
- First, it appears to imply that competition will result in price being equal to marginal cost. However, in an industry characterised by fixed costs, this would be unlikely to be a sustainable equilibrium, and nor would it represent real world competition; and
 - Secondly, it assumes dramatically different competitive dynamics between the factual and the counterfactual. We do not see any basis for expecting that MT regulation will lead to higher pass-through rates. The Commission’s factual 1 approach appears to hinge on its statement that existing rivals are constrained in their ability to compete with Telecom in respect of FTM calling, due to their reliance on the mobile networks for termination (see paragraph 217 of the draft report).⁸ However, the Commission’s focus on FTM calling ignores, and is inconsistent with, the fact that it has defined the market to be a wider one that includes FTM and toll calling. The Commission’s rationale for this wider market definition appears to be that consumers tend to bundle their purchases of toll and FTM calling. We agree with this wider definition, particularly on the basis of supply-side substitutability.

⁸ In fact, at paragraph 483 of the draft report the Commission even goes as far as to allege that integrated operators may be engaging in price squeezing.

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In fact, MT regulation may actually reduce competition relative to the counterfactual. As the penetration of mobile phones increases, mobile-to-mobile (MTM) calling must place greater competitive pressure on FTM calling.⁹ If MT regulation would result in a lower factual mobile penetration level than under the counterfactual (as we believe it would, because of the waterbed effect), then MT regulation would reduce the competitive pressure of MTM calling on FTM calling.

36. For these reasons, we believe that Factual 1 is an inappropriate factual for the CBA.

2.3.3. Pass-Through in Factual 2

37. Although more defensible than Factual 1, Factual 2 also has serious problems. Inconsistencies in the price paths chosen by the Commission result in implausibly high implied pass-through rates of MT prices to FTM prices. In Factual 2, both factual and counterfactual price paths imply pass-through rates well in excess of 100% (see Table 1), and therefore well in excess of historical experience (as discussed below).

Table 1: Implied Factual 2 Pass-Through Rates

	2004	2010	Change
MT Counterfactual (\$)	0.2800	0.2200	-0.0600
Price (P0) (\$)	0.4221	0.3287	-0.0935
Implied Pass-Through			156%
MT Factual (\$)	0.2800	0.1600	-0.1200
Price (P1) (\$)	0.4221	0.2687	-0.1535
Implied Pass-Through			128%

38. This high pass-through is the result of three different factors:
- An inappropriate pass-through modelling methodology based on assumed price trends in FTM rates and the difference between the counterfactual and factual MT rates;

⁹ See Crandall, R W and J G Sidak (2004) "Should Regulators Set Rates to Terminate Calls on Mobile Networks?", *Yale Journal on Regulation*, 21, 261-314.

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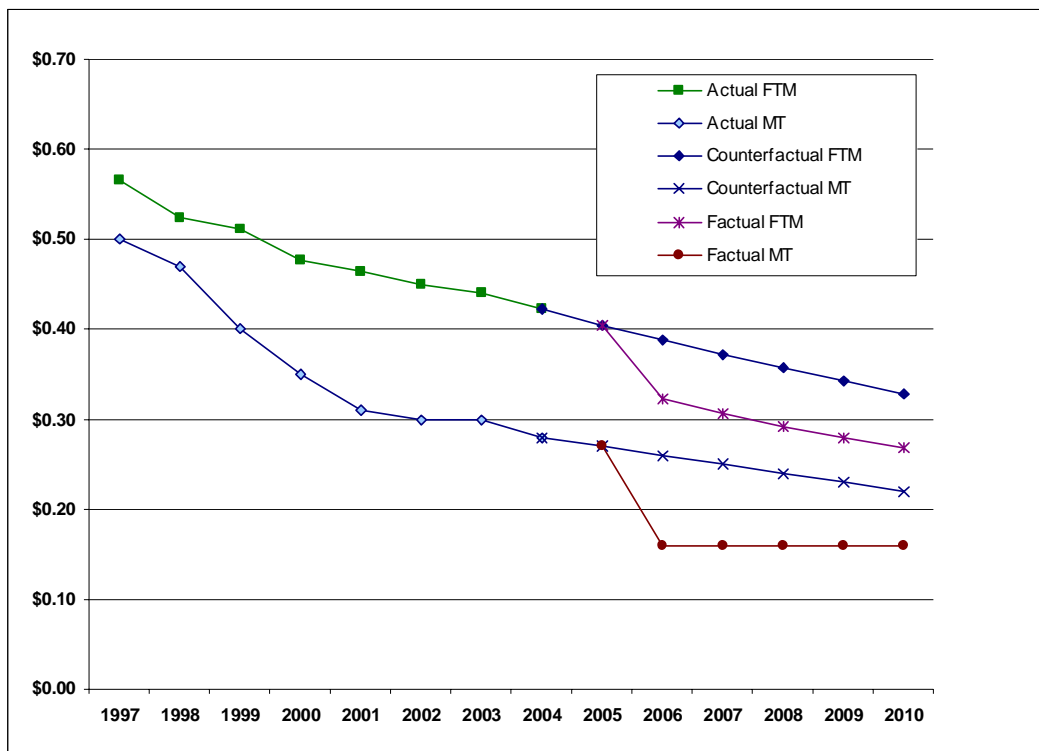
- Inappropriate counterfactual MT rate assumptions; and
- Inappropriate assumptions about the level of pass-through.

39. We deal with each of these factors in turn, and rectify them. We conclude by re-running the Commission's models with these matters modelled in a more appropriate way.

Methodology: FTM Price Paths and Pass-Through

40. Figure 9 compares the Commission's assumed price trends in the factual and counterfactual FTM and MT rates with their historical performance (based on data in the Commission's model).

Figure 9: Historical FTM and MT Rates Compared to Counterfactual and Factual



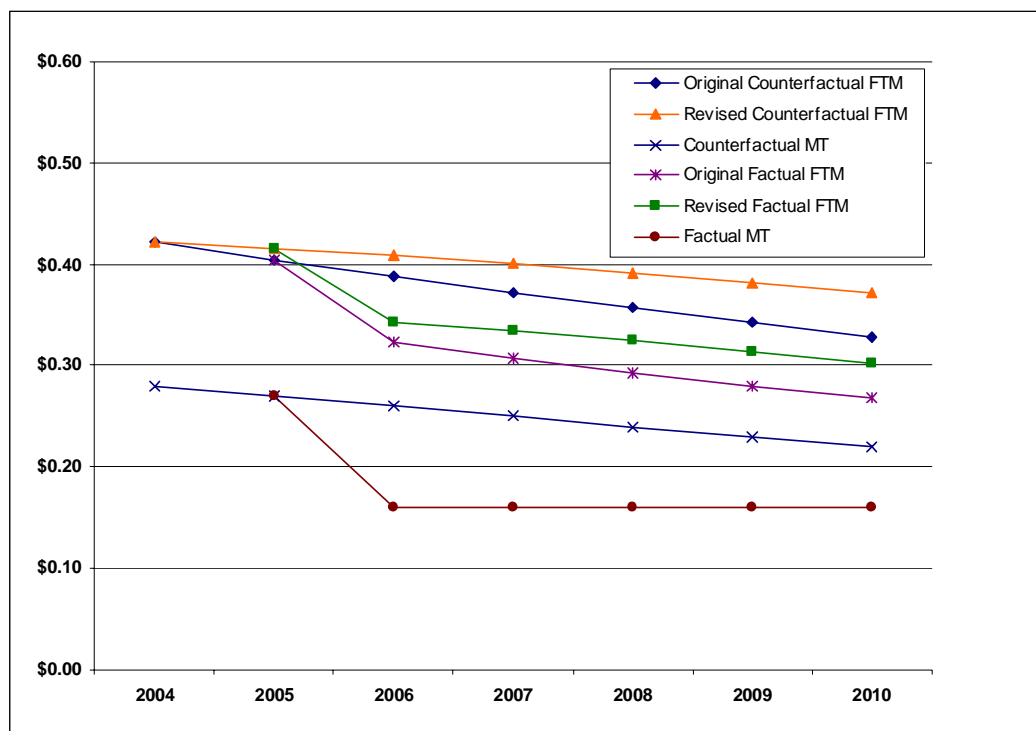
41. As theory would predict, there appears to be a relationship between the historic MT rate and the historic FTM rate. We return to the nature of this relationship below. The key point to note here is that the Commission's assumptions appear to break that relationship moving forwards between the factual MT and FTM prices. The factual FTM price continues to fall at a similar rate to the counterfactual, even though the underlying factual MT rate is stable. We find such a result highly questionable and not consistent with the linkage between FTM and MT rates in historical data.¹⁰
42. This factual FTM price path is a result of the construction of the Commission's model. The model assumes that the factual FTM price is equal to the counterfactual FTM price less a percentage of the difference between the counterfactual and factual MT rates (which the Commission refers to as the "pass-through").¹¹ Accordingly, if the counterfactual FTM price falls in the Commission's model, the factual FTM price will fall as well, *ceteris paribus*, regardless of what is happening to marginal costs (i.e., the factual MT rate).
43. The Commission's model also assumes a price path in the counterfactual FTM rate (a 4.08% decrease per year) that is independent of the counterfactual MT rate path (a one cent decrease per year). Because of this, the distance between the counterfactual FTM and MT rates reduces over time resulting in the very high pass-through figure calculated in Table 1 (historically the gap actually appears to have been increasing).
44. We believe it is more appropriate to assume that changes in the counterfactual and factual FTM rates are driven by changes in the counterfactual and factual MT rates, respectively. That is, for modelling purposes, a change in the counterfactual (factual) FTM rate will only be caused by a change in the counterfactual (factual) MT rate. (Of course, other factors may affect the FTM price beyond the MT rate. However, as between the factual and the counterfactual, these should be the same. As noted elsewhere, we disagree with the Commission's hypothesis that MT regulation will increase the rate of pass-through).
45. For example, using, for the moment, the Commission's assumption that initially 65% of MT rate changes are passed through, gradually increasing to 100% over four years, the 11 cent drop in the factual MT rate between 2005 and 2006 would result in a drop in the factual FTM rate in 2006 of 7.2 cents (65% of 11 cents), with the remaining 35% spread over 2007-2010 (as pass-through rises to 100%). Changes in the counterfactual FTM rate are similarly driven by changes in the counterfactual MT rate.

¹⁰ We have not sought to isolate this relationship econometrically, due to the small sample size and lack of data for control variables. We do not therefore claim absolute rigour. However, we do claim relative rigour, compared to the Commission's approach.

¹¹ See Table 14 of the Commission's report.

46. This is a more direct approach to pass-through than that used by the Commission and, we believe, more appropriate given the reliance on historical pass-through information. The FTM price trend results of this approach using the Commission's counterfactual and factual MT rates and assumptions about the level of pass-through are shown in Figure 10.¹²

Figure 10: Revised Counterfactual and Factual FTM Rates¹³



47. Based on these prices, implied pass-through, as calculated in Table 1, is 85%¹⁴ and 100% for the counterfactual and factual, respectively. Using this approach results in no significant change in the net consumer benefit NPV (\$185 million) and a \$6 million increase in the net public benefit NPV (to \$33 million).

¹² We discuss the appropriateness of these rates and assumptions below.

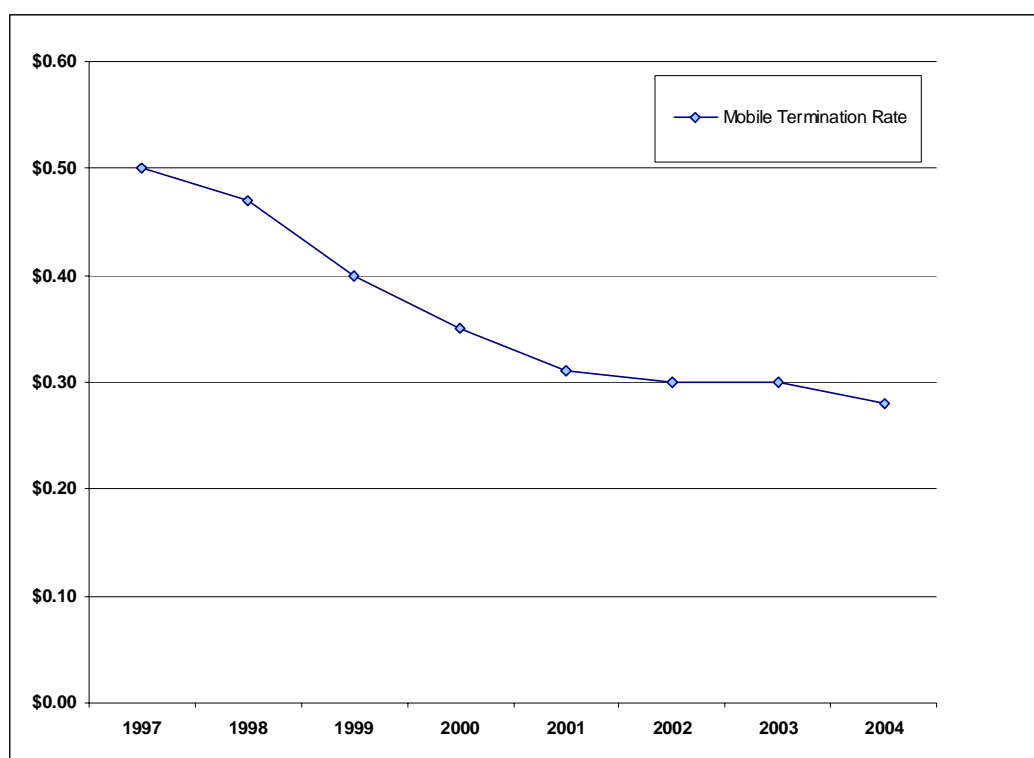
¹³ We note that these figures assume no drop in the MT rate prior to 2004, which would cause drops in the counterfactual and factual FTM rates after 2004 using the Commission's assumptions on the level of pass-through. We discuss below our views on the level of pass-through with resulting model changes that make this assumption irrelevant.

¹⁴ The counterfactual implied pass-through is less than 100% because the Commission's approach assumes that it takes 4 years for the pass-through of a one-off change in the MT rate to reach this level. Accordingly, changes in the counterfactual MT rate that occur after 2006 are not completely passed through by 2010, when our time frame ends. In the factual, there are no changes in the MT rate after 2006, so implied pass-through reaches 100%.

Counterfactual MT Price Paths

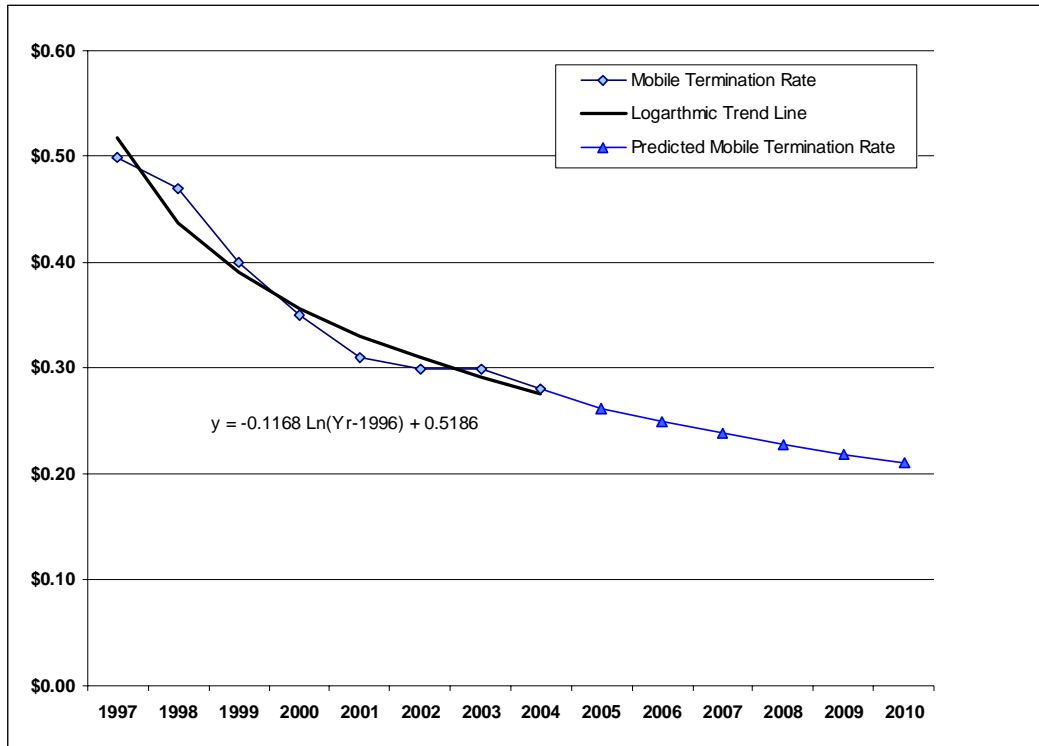
48. Although the Commission uses historical trends to calculate its counterfactual FTM price time series, it does not apply the same approach to creating a counterfactual time series of MT prices, despite having access to historical data. Rather, the Commission simply relies on statements by Vodafone. As we have discussed above, this inconsistency in methodology creates anomalies in the model.
49. In our view, the best evidence the Commission has as to the trend of future (counterfactual) MT prices is the trend of historical prices. In the absence of any expectation of a step-change in factors that determine MT prices (we are not aware of any such possibility in respect of termination rates, and the Commission has not provided one), it would be preferable to use this technique, rather than relying on the statement of an affected player.
50. Figure 11 plots the historical trend of termination rates (with data sourced from the Commission's model).

Figure 11: Historical MT Rate



51. The time series is too short to be confident of a trend. However, to be conservative in respect of our alterations to the Commission's approach, we assume that the rate of decline is slowing over time. Accordingly, we fit a logarithmic trend to the historical data as set out in Figure 12, and use the formula describing the trend line to calculate revised counterfactual MT rates.

Figure 12: Historical and Predicted MT Rates Using Logarithmic Trend



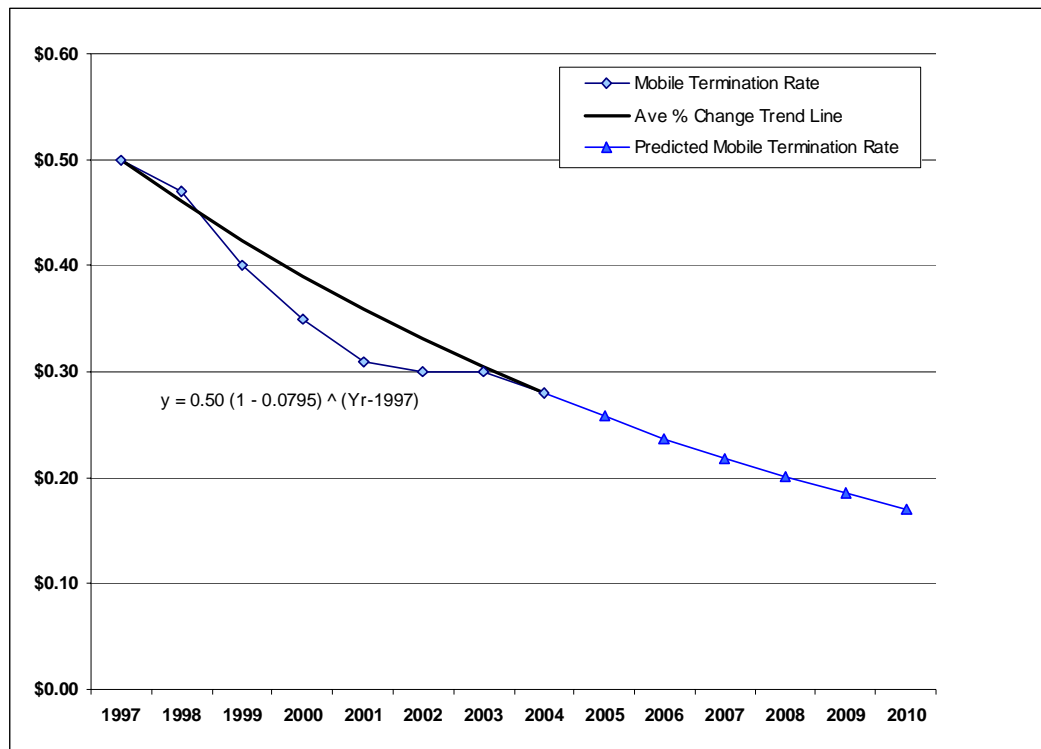
52. Using this methodology, Table 2 sets out the revised counterfactual MT rates.

Table 2: Revised Counterfactual Mobile Termination Rates Using Logarithmic Trend

	2004	2005	2006	2007	2008	2009	2010
Counterfactual MT rate (\$)	0.280	0.262	0.250	0.239	0.228	0.219	0.210

53. Alternatively, we could adopt a similar method to that used by the Commission in setting the counterfactual FTM rates – assuming a percentage decrease each year equal to the average percentage decrease observed between 1997 and 2004, in this case (-7.95%). Figure 13 sets this scenario out.

Figure 13: Historical and Predicted MT Rates Using Average Percentage Trend



54. Table 3 sets out the revised counterfactual MT rates using this methodology.

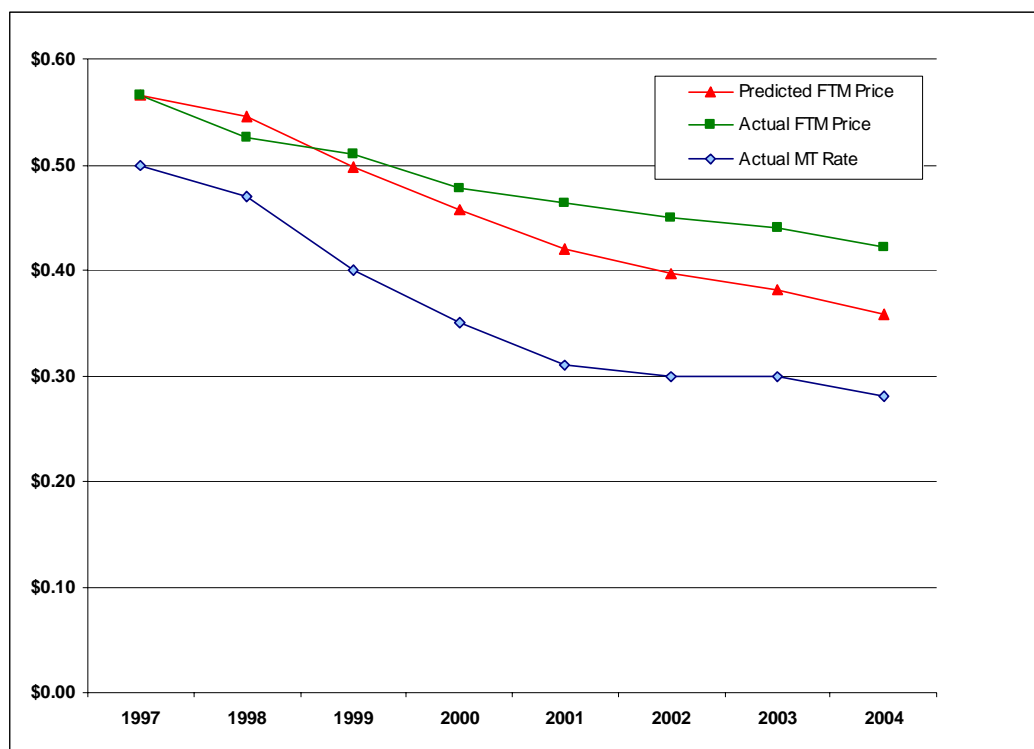
Table 3: Revised Counterfactual Mobile Termination Rates Using Average Percentage Decrease

	2004	2005	2006	2007	2008	2009	2010
Counterfactual MT rate (\$)	0.280	0.258	0.237	0.218	0.201	0.185	0.170

55. With these new counterfactual MT scenarios, we can now derive appropriate counterfactual FTM scenarios, using the methodology described above. However, we first turn to the Commission's pass-through assumptions, before combining all of our modelling suggestions.

How Much Pass-Through?

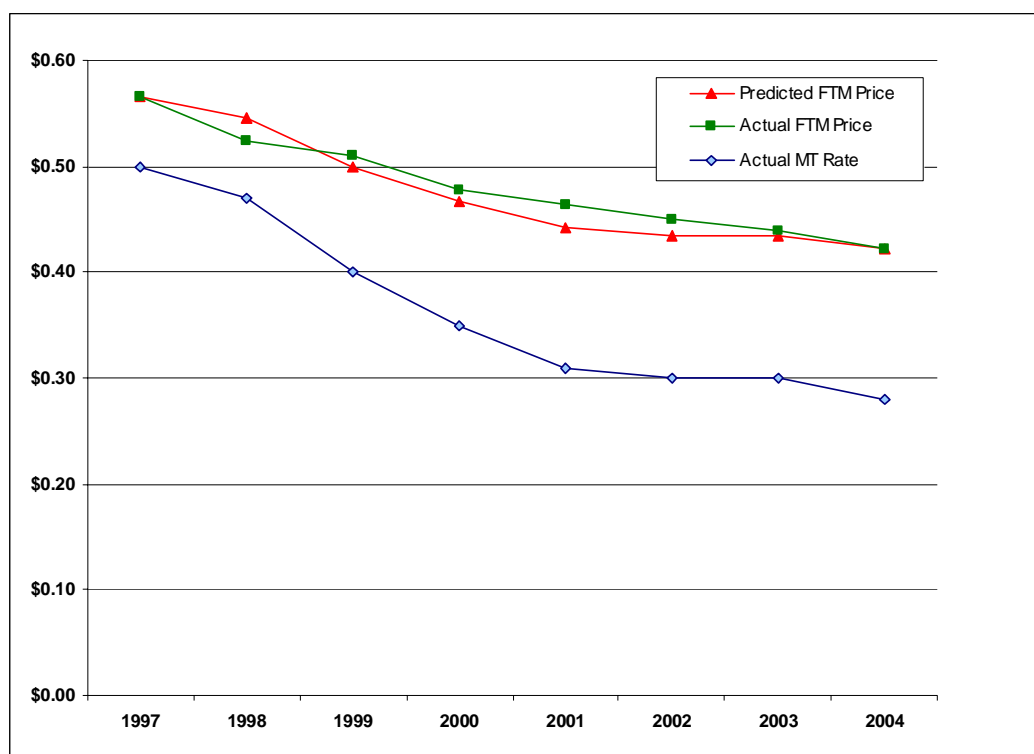
56. The Commission calculates pass-through by noting that between 1997 and 2004, the (average) retail price of FTM dropped from 56.52 cents per minute to 42.21 cents per minute. Over the same period, the average per minute rate for MT rates fell from 50 cents to 28 cents. The Commission reasons that this implies a pass-through of $14.31/22 = 65\%$. (It is axiomatic that the ratio of MT to FTM prices has therefore dropped over time, from 0.89 to 0.67. In other words, the margin of FTM over MT prices (or retail over marginal cost) has risen). The Commission then applies that rate in the first year of a price change. However, the Commission then assumes that pass-through will gradually increase to 100% over four years (see paragraphs 477-478). Its rationale for overriding the historic pass-through rates appears to be a belief that regulation of MT rates will eliminate some sort of constraint on rivals' ability to compete with Telecom, and therefore that MT regulation will effectively boost the level of competition in the FTM space. We have already discussed why we think that this argument is incorrect.
57. As Figure 14 demonstrates, application of the Commission's assumption to historical information effectively overstates pass-through. Since there is little support for the argument that MT regulation will effectively boost the level of competition in the FTM space, we believe the Commission's assumption about the level of pass-through is unreasonable. That is, we do not consider the Commission has grounds for expecting pass-through to increase from its historic rate as a result of MT regulation.

Figure 14: Predicted and Actual FTM Prices

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58. Unfortunately the time series that we have is too short to rigorously analyse the historical pass-through relationship. There are probably a variety of legitimate hypotheses regarding this relationship (furthermore, MT and FTM price changes outside of the sample period may bias conclusions about the relationship in either direction). For example, it might be that a small fraction (below 65%) of any drop in the MT rate is passed through in the first year, and that over five years greater than 65% of the drop is passed through (in order to fit in with the overall 65% relationship, the first year drop would have to be below 65%). A more conservative hypothesis would be that there is 65% pass-through in the first year of a price change only, and no subsequent increase in pass-through.¹⁵ The predicted FTM price path resulting from this approach is set out in Figure 15. Comparison of Figure 14 and Figure 15 demonstrates that this approach is more consistent with historical experience. We accordingly use this assumption in our modelling.

Figure 15: Revised Predicted and Actual FTM Prices



Combination of Critiques

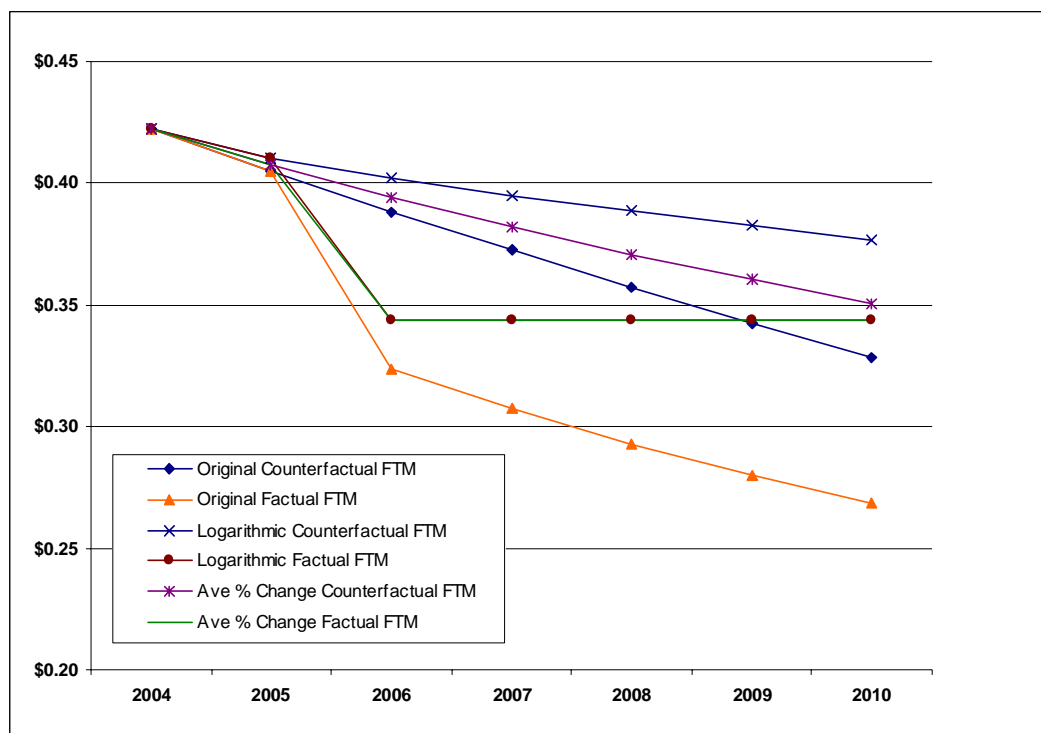
59. We now combine our three critiques of the Commission's modelling, i.e.:
- An improved technique for modelling pass-through;

¹⁵ This approach is more conservative because the consumer and public benefits of lower FTM rates accrue more quickly, increasing the NPV of such benefits.

- An improved technique for predicting the counterfactual MT rate time series; and
- More appropriate pass-through assumptions.

60. Figure 16 depicts the resulting factual and counterfactual FTM time series. We note that the factual rates are now identical from 2006. In Figure 16 the factual FTM time series are also depicted as stationary from 2006. We are not claiming that FTM prices would in fact be stationary over time under the factual. Rather, our point is that for the purposes of carrying out a CBA of the impact of MT regulation, it is appropriate to isolate the *difference* between the FTM factual and counterfactual price time series *caused by that regulation*. In other words, the modelling should attempt to isolate the impact of changed MT prices on FTM prices, on the basis that all else will be equal between the factual and the counterfactual.

Figure 16: Revised Counterfactual and Factual FTM Rates



Effect of Modifications on Net Consumer and Public Benefits

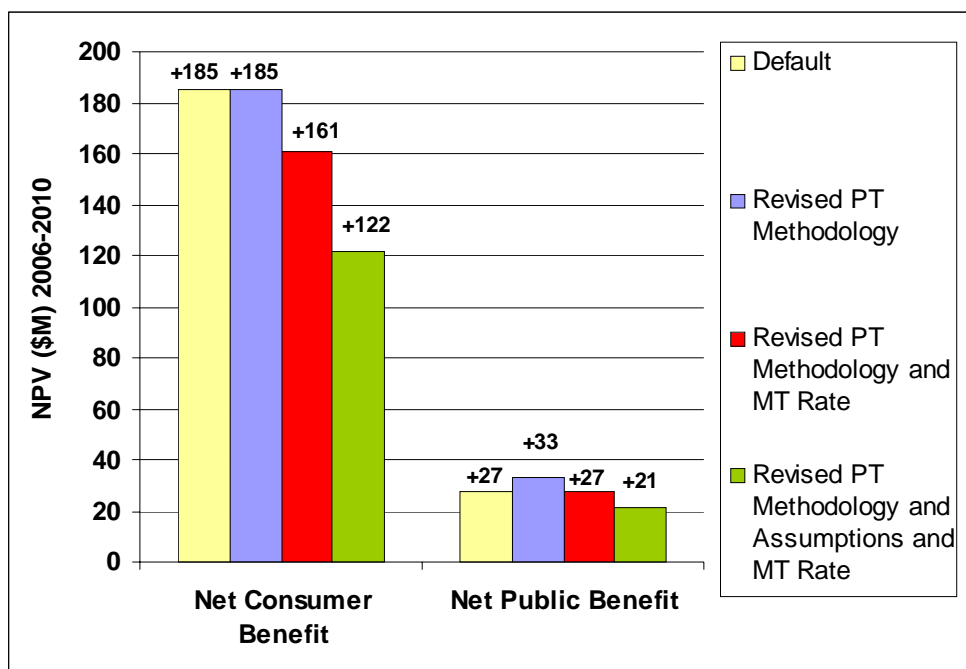
61. Table 4 largely replicates Table 14 of the Commission's report with revised rates and prices given the change in the pass-through modelling and assumptions, and also the revised logarithmic counterfactual MT rates discussed in paragraph 51. We note that row 4 now shows the change in the factual MT rate rather than the difference between the factual and counterfactual MT rates. As discussed above, we believe this is a more direct and more appropriate way to consider pass-through.

Table 4: Factual 2 - Reduction in Factual Retail Fixed-to Mobile Price (P1) Based on Revised Pass-Through Assumptions and Logarithmic Counterfactual Mobile Termination Rates (\$)

	2004	2005	2006	2007	2008	2009	2010
Counterfactual fixed-to-mobile price (P0)	0.4221	0.4104	0.4024	0.3952	0.3886	0.3825	0.3769
Counterfactual MT rate	0.280	0.262	0.250	0.239	0.228	0.219	0.210
Factual MT rate	0.280	0.262	0.160	0.160	0.160	0.160	0.160
△ Factual MT rate	0.000	-0.018	-0.102	0.000	0.000	0.000	0.000
Pass through assumption	65.0%	65.0%	65.0%	65.0%	65.0%	65.0%	65.0%
Factual fixed-to-mobile price (P1)	0.4221	0.4104	0.3441	0.3441	0.3441	0.3441	0.3441

- 62. We note that our approach results in overall pass-through of 65% for both the counterfactual and factual, consistent with history.
- 63. Figure 17 sets out changes in consumer and public benefits resulting from the three sets of changes outlined in this section and the logarithmic MT rates.

Figure 17: Factual 2 - Net Consumer and Public Benefits Resulting from Assumption Changes (Logarithmic MT Rate Trend and Revised Pass-Through)



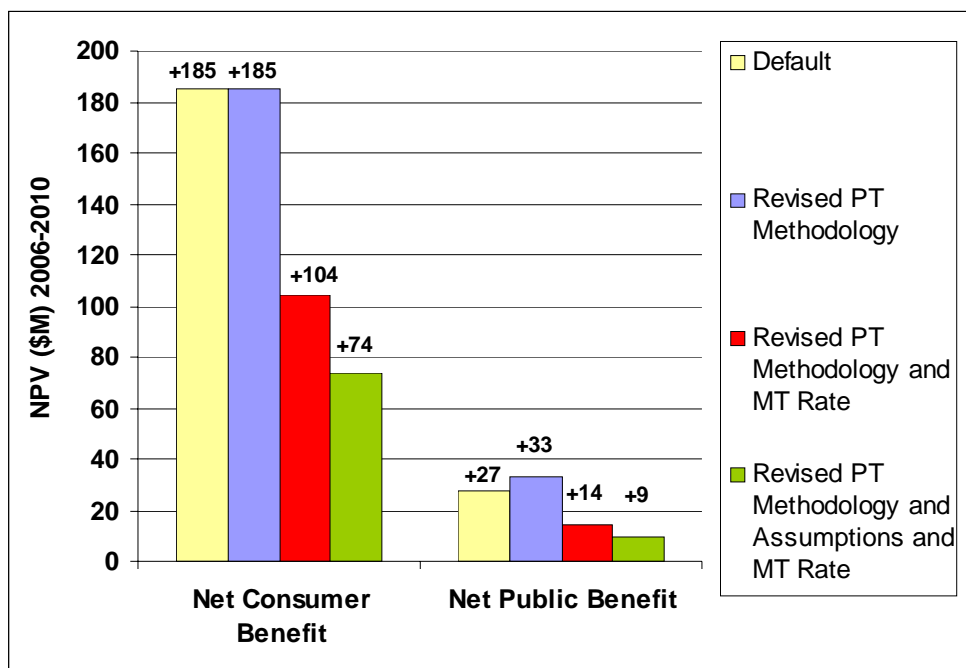
64. Table 5 repeats Table 4 using the average percentage decrease approach to counterfactual MT rates discussed in paragraph 53.

Table 5: Factual 2 - Reduction in Factual Retail Fixed-to Mobile Price (P1) Based on Revised Pass-Through Assumptions and Average Percentage Decrease Counterfactual Mobile Termination Rates (\$)

	2004	2005	2006	2007	2008	2009	2010
Counterfactual fixed-to-mobile price (P0)	0.4221	0.4077	0.3943	0.3821	0.3708	0.3604	0.3508
Counterfactual MT rate	0.280	0.258	0.237	0.218	0.201	0.185	0.170
Factual MT rate	0.280	0.248	0.160	0.160	0.160	0.160	0.160
△ Factual MT rate	0.000	-0.022	-0.098	0.000	0.000	0.000	0.000
Pass through assumption	65.0%	65.0%	65.0%	65.0%	65.0%	65.0%	65.0%
Fixed-to-mobile price (P1)	0.4221	0.4077	0.3441	0.3441	0.3441	0.3441	0.3441

65. Figure 18 sets out changes in consumer and public benefits resulting from this approach.

Figure 18: Factual 2 - Net Consumer and Public Benefits Resulting from Assumption Changes (Revised Pass-Through and Average Percentage Decrease MT Rate Trend)

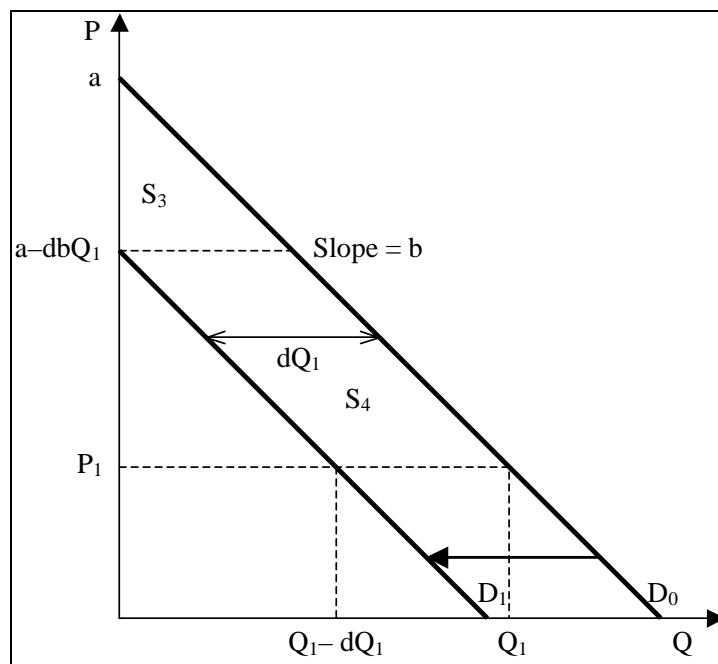


2.4. COSTS OF REGULATION

2.4.1. Impact On Other Services

66. We re-emphasise our view that the Commission's CBA fails to capture the full set of effects of MT regulation. In particular, the CBA does not capture the welfare losses arising from higher mobile subscription and origination prices.
67. The Commission uses Diagram 4 on page 63 of the draft report to explain its CBA framework. It is an implicit assumption of the Commission that the FTM demand curve in Diagram 4 does not shift in response to mobile termination regulation. However, as Professor Hausman notes, the demand for FTM is a function of, among other things, the quantity of mobile subscriptions. If mobile termination regulation reduces the quantity of subscription (as Professor Hausman demonstrates), then the FTM demand curve will shift inwards under the factual. This means that the Commission's CBA results will overstate the benefits of regulation – Professor Hausman calculates the net effect.
68. Using the Commission's CBA assumptions, we can quantify the reduction in demand for FTM required to offset the gains in consumer and total surplus the Commission estimates will occur under regulation. Details are provided in Appendix A to this report. The reduction in demand for FTM is a leftwards shift in the demand curve for FTM, reducing the total surplus in the market (see Figure 19).¹⁶

Figure 19: Post-Regulation Leftwards Shift of Demand for FTM



¹⁶ In order to simplify the mathematics, we have assumed linear demand curves.

Table 6: Maximum Reduction in Demand for FTM Resulting from Post-Regulation Reduction in Subscriber Base Under Commission Factual 1 Assumptions

	2006	2007	2008	2009	2010
Maximum Reduction in Post-Reg Demand (Transfer + Allocative Efficiency)	-4.5%	-8.2%	-11.6%	-14.3%	-16.8%
Maximum Reduction in Post-Reg Demand (Allocative Efficiency Only)	-0.1%	-0.3%	-0.7%	-1.0%	-1.4%

69. Table 6 shows that the reduction in demand for FTM need only be small, less than 2%, for the Commission's estimates of social gains from regulation to be eliminated. If the surplus transfer from producers to consumers is counted as a benefit of regulation, then a reduction in demand for FTM of 4.5% initially up to 16.8% by 2010 will be required to offset the Commission's estimated gains from regulation.
70. This analysis makes two conservative assumptions. First, it ignores surplus changes on other sides of the mobile market affected by MT regulation. Since reductions in consumer and social surplus can be expected overall in these other markets, the breakeven reduction in demand for FTM is smaller than presented here. Second, this approach takes no account of the costs of regulation. Again, were these costs to be accounted for, a smaller reduction in demand for FTM would be required to breakeven.

2.4.2. Indirect Costs

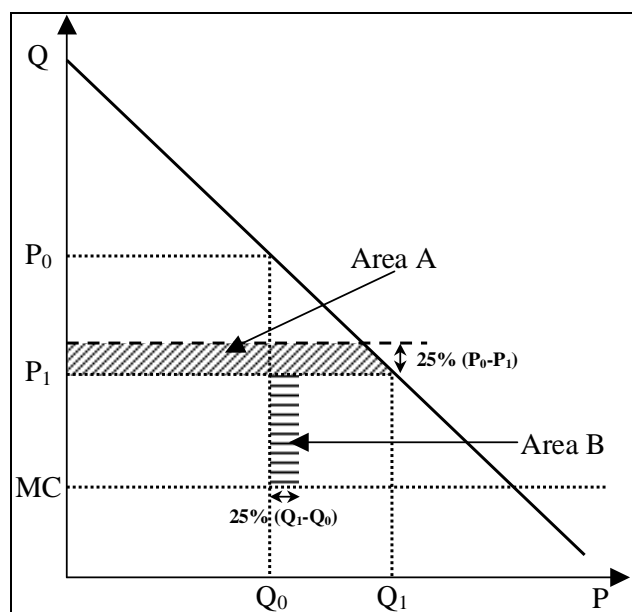
71. The Commission also calculates what it calls indirect costs. This is based on a calculation the Commission conducted for the LLU investigation. This methodology relies on assuming a proportion of the benefits of regulation will be lost to regulatory error. Specifically, the Commission calculates the indirect cost of regulation for the calculation of consumer welfare by assuming that regulation of mobile termination would reduce the gap between pre-control and "competitive" prices by 75% (paragraph 496). In other words, the indirect cost of regulation is the reduction in consumer surplus (mostly kept by producers) associated with prices not falling as far as the Commission deems optimal (represented by Area A in Figure 20).
72. In response to the Commission's draft report on LLU, we commented on the Commission's scaling methodology in calculating the cost of regulatory error, noting (at paragraph 52 of our report):¹⁷

¹⁷ CRA (2003) *Economic and Technical Critique of the OXERA Unbundling Cost Benefit Analysis*, 23 October.

This scaling approach biases the potential outcomes of the Commission's inquiry, since by taking a proportionate approach it is almost impossible for the Commission to make a finding that unbundling would not be in the long-term interests of consumers. There is no reason in economics to expect that the welfare costs of regulatory error should be restricted to being less than the theoretical benefits of regulation.

73. The costs of regulation include the effect on investment incentives through *ex post* expropriation, related commitment problems such opportunism brings, the administrative burden regulation places on market participants, and the deadweight loss of investment in lobbying instead of productive activity (as well as in the present case the impacts on mobile subscription and origination). There is no reason to believe that these costs vary in proportion to changes in consumer surplus, and our view is that the Commission's choice of metric in calculating indirect costs is flawed.
74. The Commission is inconsistent in its calculation of indirect costs on consumer welfare and net public benefits. Figure 20 shows that when the Commission is calculating the effect of regulation on consumer welfare, the indirect cost of regulation is Area A (as described above). However, when the Commission calculates the net public benefit of regulation (the increase in total surplus), then the indirect cost of regulation is instead defined as 25% of the gain in producer surplus associated with an increase in quantity sold.¹⁸

Figure 20: Calculation of Indirect Costs in Consumer (A) and Public Benefit (B) Regulation



¹⁸ If the Commission were to use the same methodology used in the Consumer Benefits calculations by calculating the indirect costs as the total surplus difference resulting from a price increase of $25\% * (P_0 - P_1)$ (as in Figure 20), then the net public benefits would be \$1.3m and \$0.8m lower in Factual 1 and Factual 2, respectively.

75. The Commission does not explain this inconsistency in treatment. The calculation of indirect costs (Area B in Figure 20) is not proportional to the change in surplus since none of the deadweight gain triangle is counted. It is also unclear why the Commission is willing to define indirect costs as being proportional to gains in producer surplus in moving from Q_0 to Q_1 output but ignores the reduction in producer surplus in moving from P_0 to P_1 .
76. A deeper problem with the Commission's approach is highlighted by this inconsistency of treatment in the calculation of indirect costs. How can it be that the cost of regulation to society is changed by what is counted as a benefit of regulation? The cost of regulation is ultimately tied to the effect of regulation on the behaviour of market participants e.g. their investment in lobbying activity or the timing and amount of investment in new assets. The cost of regulation is not related to whether the Commission counts transfers as benefits or not. Accordingly, we consider that the indirect cost of regulation should be unchanged by whether the claimed benefit of regulation is limited to allocative efficiency gains or whether it is defined to include transfers as well. In Section 2.5 we show that deducting indirect costs, as calculated for the effect of regulation on consumer surplus, from the calculation of net public benefits produces a large negative net surplus from regulation.
77. An alternative approach would be to calculate the reduction in net public benefit arising from reducing the gap between factual and counterfactual prices by 25 percent, and then applying that as the indirect loss to both the consumer and net public benefit calculations – the “indirect costs” under this approach would amount to \$7.0m and \$8.8m under Facts 1 and 2 respectively. Of course, this experiment just serves to illustrate the arbitrariness of this technique.

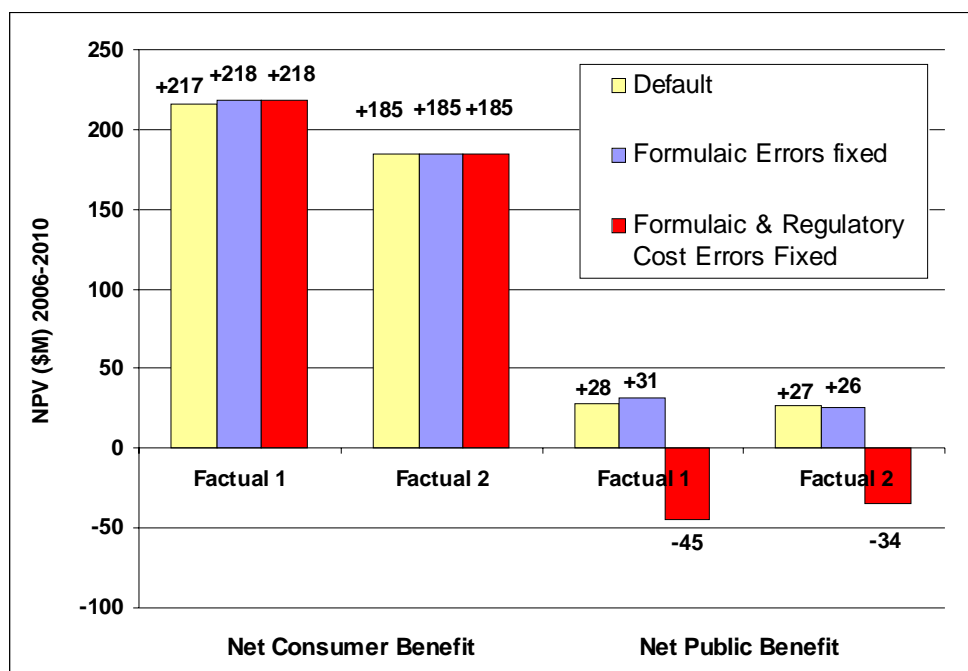
2.5. SPREADSHEET ERRORS

78. The Commission has made a number of errors in the quantification that we have not discussed elsewhere:
- Cell K20 in ‘FTM CBA model results’ sheet contains an error (also replicated in Cell K40). The NPV misses a year of discounting and the value in the cell should be \$9,537,427 rather than \$10,109,673. This incorrect result is reported in Table 20 (page 96) of the draft report. This means that the total NPV net public benefit, reported in table 20 as \$27.92m, should be \$28.49m;
 - The model is inconsistent in its demand curve assumptions. The counterfactual calculations assume a constant elasticity demand curve, while the factual calculations use a linear demand curve (which shifts each year in order to maintain a constant demand elasticity); and

- Sensitivity analysis of elasticity in the Commission’s model does not function correctly. In the Commission’s Factual 2 model, this is because elasticity is a fixed number in sheet ‘Indirect costs workings’ row 6, meaning elasticity does not vary with the rest of the model when it is re-set for sensitivity. Consequently, the elasticity sensitivity variable in cell B33 of ‘FTM CBA model results’ sheet does not produce a correct result because indirect costs are calculated using unchanged elasticity. The Commission’s Factual 1 model is also incorrect, but for a different reason. Cell B21 in ‘FTM Q0’ sheet is fixed and is (incorrectly) unchanged when the elasticity in the rest of the model is changed for sensitivity analysis.¹⁹

79. In Figure 21 we correct three of the errors in the model. Starting from the default estimates from the Commission, we correct the discounting problem described in the first bullet above and modify the factual quantity calculations to reflect constant elasticity demand curves described in the second bullet point.²⁰ To these corrections we adjust the calculation of indirect costs of regulation so that, in the public benefits case, they reflect the indirect costs assumed by the Commission in the calculation of consumer welfare under regulation.

Figure 21: Net Consumer and Public Benefits Effects of Formulaic and Regulatory Fixes



¹⁹ The effect of this error is only felt when the model is sensitivity tested. The Commission’s model is geared for sensitivity testing of other variables and these calculations appear sound.

²⁰ For present purposes, we see using constant elasticity demand curves as more appropriate than linear demand curves, since they are mathematically simpler and do not imply shifts in demand curves in order to maintain the same elasticity.

2.6. RESULTS

2.6.1. Interpretation of Commission's Results

Counting Transfers

80. We have filed with the Commission on several different occasions reports that include our views on the inappropriateness of treating surplus transfers as a benefit of regulation or competition enforcement.²¹ We will not repeat our views here, as they are clearly documented elsewhere. Furthermore, we understand that Professor Michael Katz will be filing a report on this issue.
81. However, we will point out that the Commission has not provided any evidence that the New Zealand mobile operators are making “functionless monopoly rents”. It would seem to us extremely unlikely that either Telecom or Vodafone were making such rents. Rather, the evidence indicates that the market is very competitive, and any rents being made are likely to have a social value in the sense of incentivising (sunk) investment in a risky environment.
82. Key indicators of effective competition in the mobile market include the following:
- The massive growth in the market, and the continually increasing market share of Vodafone at the expense of Telecom; and
 - The ongoing investment by both Telecom and Vodafone in sunk and risky assets that can provide new services. In its response to the Commission's Issues Paper, Telecom documented the continual fluctuations in technology advantages between Telecom and Vodafone. It can be expected that the consumer welfare gains from these investments has been enormous.
83. As is documented by the economics literature more generally in respect of dynamic industries, competition between Telecom and Vodafone takes place in many dimensions, such as product differentiation, innovation, brand recognition, investment and price.
84. Another implication of counting transfers as a benefit is that it essentially stops quantification being a test of the value of regulation. The Telecommunications Act requires competition to be identified as limited in a market before designation or specification of a service. A static test that identifies prices which maximise consumer welfare without considering producer welfare will *always* find consumer welfare is increased by lower prices, even if that is below cost.

²¹ See, for example, our reports filed in respect of the LLU proceedings; the gas pipelines price control proceedings, and the Pohokura authorisation proceedings.

Beneficiaries of Surplus Transfers

85. If despite these points the Commission wishes to count surplus transfers as a benefit of regulation, then it is forced to carefully consider the incidence of the claimed benefits. In this regard, the Commission should note that:
- 62 percent of FTM volumes are originated by business, with residential customers accounting for only 38 percent.²² Using these volume figures and the net surplus transfer “gain” from regulation of \$177.5m²³, \$110.6m is transferred to businesses, and \$66.9m is transferred to residential customers. The proportion of the “business” surplus transfer that is passed through to end consumers depends on, once again, the intensity of competition in the output markets of those businesses, but is likely to be on average significantly less than 100%; and
 - According to Rosenberg (1997)²⁴, businesses with 25% foreign ownership or greater generate 39% of gross business earnings in New Zealand. This may be regarded as an extremely rough estimate of the proportion of business FTM minutes that are consumed by foreign-owned businesses.
86. To further consider the division of the surplus transfer between residential and business customers, we have recalibrated the Commission’s Factual 2 model and our own modified version of this model using inputs suitable for describing the separate residential and business components of the market. We have used these models to calculate a net surplus transfer, which represents the total surplus transfer less direct costs and the transfer component of indirect costs.
87. Table 7 sets out the inputs that differ from the Commission’s original model and our modified model. For the inputs not covered in the table, the Default models have the same values as the Commission’s original model, including the original pass-through methodology. The Modified models are based on logarithmic counterfactual MT rates, revised pass-through methodology and corrected spreadsheet errors.
88. Prices and quantities are taken from the Commission’s model, with the latter inferred as mentioned in Footnote 22. The direct costs of \$2.4 million per year are apportioned by the business and residential quantities. The initial pass-through rates are calculated from the historical data given in the Commission’s model. Pass-through is assumed to rise to 100% in the Default Settings and remain constant in the Modified models.

22 Inferred from weighted average, business and residential FTM price data in the Commission’s model.

23 The calculation of this number is described below.

24 Rosenberg, B. (1997) “Foreign Investment in New Zealand: The Current Position”, in *Foreign Investment: The New Zealand Experience*, Ed. P. Enderwick. We understand that Rosenberg’s data relates to 1995, but we have been unable to find more recent data.

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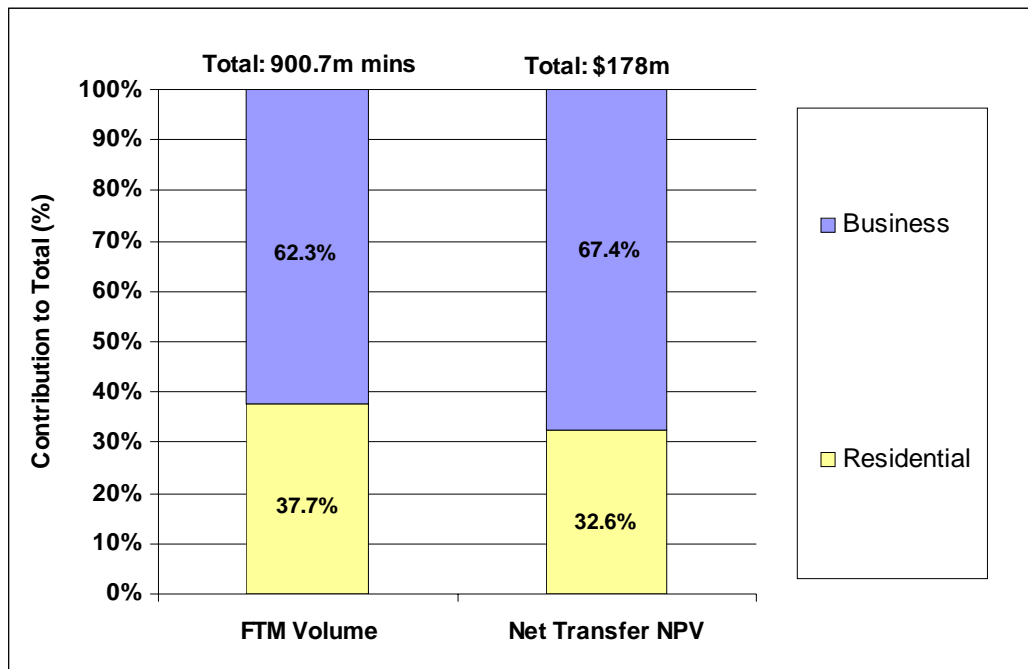
89. We have used the default FTM elasticity of -0.6 in the default models and our modified FTM elasticity of -0.4 described in Section 2.2.2. We believe, however, that there is some support for using a higher elasticity for business customers and a lower elasticity for residential customers. Making this change would result in more of the net surplus transfer gains being attributed to business. Accordingly, we have erred on the side of conservatism and used constant elasticities.

Table 7: Residential and Business Factual 2 Model Inputs

	Default	Default Residential	Default Business	Modified	Modified Residential	Modified Business
FTM Elasticity	-0.60	-0.60	-0.60	-0.40	-0.40	-0.40
Direct Costs (\$m)	2.4	0.9	1.5	2.4	0.9	1.5
2004 FTM Price (\$)	\$0.4221	\$0.5660	\$0.3351	\$0.4221	\$0.5660	\$0.3351
2004 FTM Quantity (m mins)	900.7	339.5	561.2	900.7	339.5	561.2
Initial Pass Through Rate	65.0%	50.0%	75.0%	65.0%	50.0%	75.0%
Final Pass Through Rate	100.0%	100.0%	100.0%	65.0%	50.0%	75.0%

90. Figure 22 sets out the portions of the net surplus transfer, calculated using the default models that are attributable to residential customers and business customers compared to the proportion of minutes. The greater level of business pass-through results in an even greater proportion of the net consumer benefits being attributed to businesses relative to the proportions of quantities.
91. Relative to our initial calculation that \$111.6m is transferred to businesses instead of consumers, the results in Figure 22 indicate that \$119.9m of the surplus is transferred to businesses.

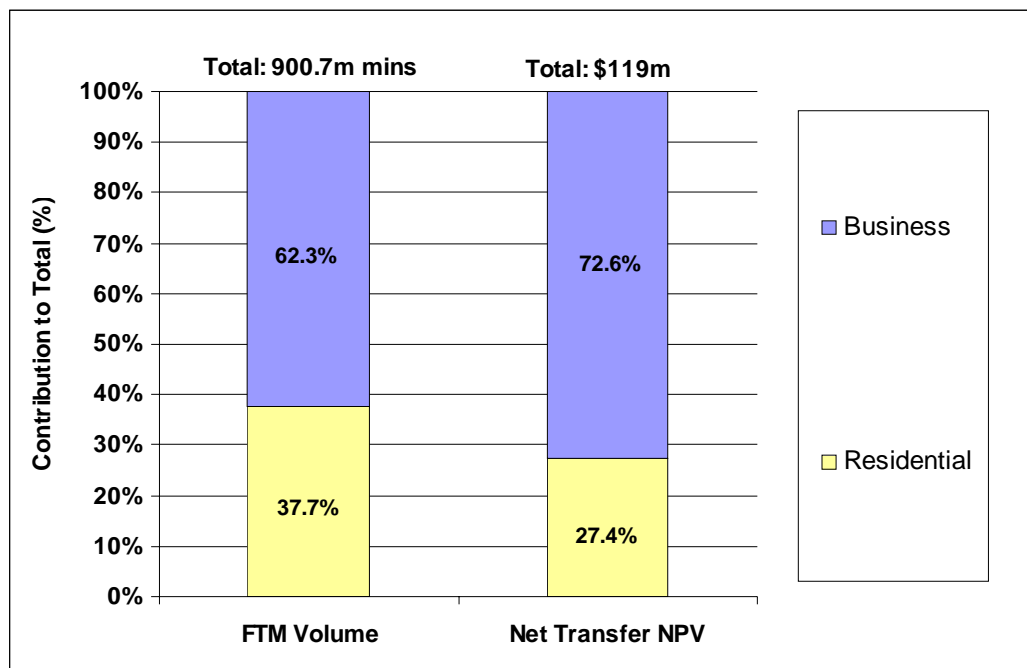
Figure 22: Apportionment of Quantity and Net Transfer Using Default Models²⁵



92. Figure 23 repeats Figure 22 using the modified model settings. The modified pass-through assumptions result in an even greater portion of the net surplus transfer going to businesses – 73% compared with our initial volume based calculation of 68%.

²⁵ We note that, due to the construction of the model, there is a small difference between the total net surplus given here and the total calculated from the normal default model settings of \$0.4 million

Figure 23: Apportionment of Quantity and Net Transfer Using Modified Models²⁶



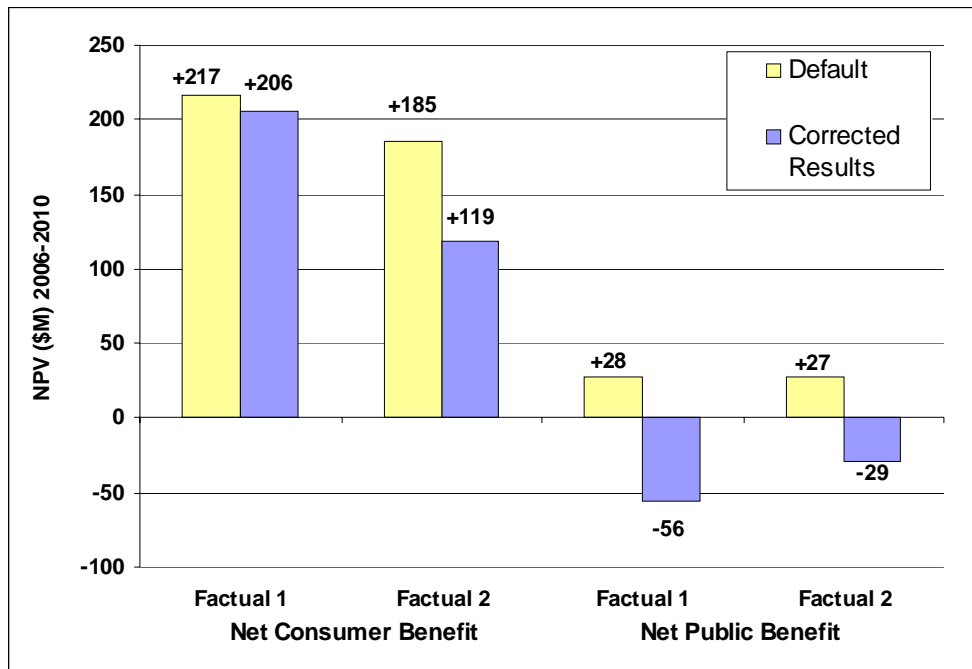
2.6.2. Corrected Results

93. Figure 24 sets out the default results of the model alongside corrected results incorporating the revised elasticity and the formulaic and regulatory cost fixes (using the consumer benefits measure). The Factual 2 results are also adjusted for the logarithmic MT rate and the modified pass-through methodology and assumptions.

²⁶

We note that, due to the construction of the model, there is a small difference between the total net surplus given here and the total calculated from the normal modified model settings of \$1.9 million

Figure 24: Default and Corrected Results



94. We note that our corrected results have not dealt with the issues described in Section 2.4.1. Nor do they attempt to adjust for the incidence of surplus transfers described in Section 2.6.1.

3. THE INITIAL UK EXPERIENCE

3.1. BACKGROUND

95. This section of our report is motivated by the Commission's discussion of the UK experience at paragraphs 129 to 136 of its draft report. On the basis of this discussion, the Commission rejects the existence of the "waterbed effect".
96. As noted earlier in this report, we disagree with this conclusion. In his accompanying report, Professor Hausman theoretically demonstrates the existence of the waterbed effect. In this section, we outline the initial evidence from the UK that supports the existence of this effect.
97. The UK Competition Commission (UKCC) concluded that:²⁷
- ... there will be a waterbed effect, i.e. most of the reductions in revenue from termination charges being capped will be recovered from the retail market.*
98. Oftel and subsequently Ofcom based their cost benefit analyses of the impact of MT regulation assuming a full waterbed effect, albeit that Oftel described this approach as conservative.²⁸
99. An important aspect of the UK situation was highlighted by the UKCC - regulation was to be imposed on a market in which significant annual price reductions had been occurring and were being expected to continue to occur as a result of commercial forces, particularly the entry of Hutchison '3' and continuing declines in new equipment prices.²⁹ The UKCC thus estimated that the impact of regulation would be to reduce the rate of fall of mobile prices:³⁰

... average retail prices would still fall but by, on average, about half of the rate as shown in the MNOs' business plans, that is, by about 3 per cent a year [compared with reductions of around 5.5 per cent per year in the business plans].

²⁷ UKCC Report, paragraph 2.563.

²⁸ Oftel, Review of mobile wholesale voice call termination markets - EU Market Review, 15 May 2003, paragraph 7.60.

²⁹ For instance, in June 2003, Hutchison announced plans to undercut the prices of similar packages of other operators by up to 50% (BBC news, "UK 3G operator to cut prices", 5 June 2003 available at <http://news.bbc.co.uk/1/hi/business/2967132.stm>).

³⁰ Ibid, paragraph 2.565.

100. The significant fall in mobile retail prices that had previously been expected is important to bear in mind in assessing the impact of the regulation of MT charges to date. If regulation results in mobile retail prices not falling by the extent that they otherwise would have, then this nonetheless represents a cost of the regulation on consumers. To determine whether regulation is socially desirable overall, it is important to weigh this cost against the expected benefits such as lower fixed-to-mobile prices.

3.2. THE UK TERMINATION CHARGE REDUCTIONS

101. The MT charges of two of the four UK mobile operators were first regulated in 1999/2000 with the level of charges being capped at 11.7ppm and then reduced to 10.86ppm in 2000/2001 and to 10.2ppm in 2001/02 (the two operators further reduced their charges to 9.4ppm in 2002/03).³¹ This initial regulatory period coincided with a dramatic growth in mobile penetration, driven particularly by the take-up of pre-pay tariffs. The number of mobile subscribers in the UK grew from around 9 million in 1997/98 to around 46 million in 2001/02. The major transformation of the UK mobile industry, including the realisation of substantial economies of scale, makes it difficult to identify the impact of MT regulation in this period.
102. Following inquiries by Of tel, the UKCC and Ofcom, new controls were imposed on the 2G voice termination services of the four UK 2G mobile operators (but not on the termination charges of the 3G-only entrant, '3'). The new controls required:
- A 15 per cent real reduction (around a 14 per cent nominal reduction) in MT charges on 24 July 2003; and
 - A further reduction of around 30 per cent on 1 September 2004 to 5.63ppm for the combined 900/1800MHz operators and 6.31ppm for the 1800MHz operators.³²

3.3. THE IMPACT OF TERMINATION REGULATION ON UK PRICES AND VOLUMES

103. This section examines the evidence in relation to the impact of the regulated reduction in MT charges in July 2003 on the prices and volumes of the main services that would be likely to be affected. Only limited evidence is so far available on the larger reduction that took place in September 2004.

³¹ UKCC, paragraph 2.7.

³² See Ofcom, Wholesale Mobile Voice Call Termination Statement, 1 June 2004, paragraph 6.87.

3.3.1. FTM Calls

104. Ofcom's statistics show that average revenue per minute on FTM calls was 13.5ppm in the second quarter (April-June) 2003 and was 12.8ppm in the second quarter 2004, i.e. a reduction of around 0.7ppm.³³ The July 2003 nominal reduction in MT charges of 14 per cent lowered average MT charges from around 10.2ppm to 8.8ppm, i.e. by 1.4ppm. This implies that only around 50 per cent of the July 2003 reduction in termination charges was passed through into lower FTM prices.³⁴ In relation to the September 2004 reduction, our calculations are that BT has passed through around 70 per cent of the reduction.
105. It should be noted that BT FTM prices are under a general price cap, together with a basket of its other fixed services. This provides BT with some flexibility in setting its FTM prices, although the higher it keeps its FTM prices (and thus the higher BT's retention after deducting the MT charges), the lower it must set the prices of the other types of fixed calls included in the basket. The other fixed operators are under no such regulatory constraint and, on average, have somewhat higher prices for FTM calls than BT.³⁵
106. In terms of the impact on volumes of FTM calls, information is available in relation to the July 2003 reduction, but not as yet on the September 2004 reduction. Between the second quarter (April-June) 2003 and the second quarter 2004, the volume of FTM calls was virtually unchanged (increasing by less than half of one per cent).³⁶

³³ Based on fixed-to-mobile call revenues and volumes in Ofcom, *The Communications Market*, Quarterly Update October 2004, Tables 4 and 5.

³⁴ This assumes no significant changes in the mix (say between peak and off-peak). This assumption is likely to be reasonable for a 12-month period. We note that taking a shorter period of comparison, i.e. comparing the quarter immediately before the price cut (April-June 2003) with the quarter after the price cut (October-December 2003), does not greatly alter the result with around 53% of the termination cut being passed on.

³⁵ Based on operators' fixed-to-mobile call revenues and volumes in Ofcom, *The Communications Market*, Quarterly Update October 2004, Tables 4 and 5.

³⁶ Ofcom, *The Communications Market*, Quarterly Update October 2004, Tables 4 and 5.

3.3.2. Mobile Retail Prices

107. Ofcom's statistics show that average mobile call revenue per minute increased by 3.9% between the second quarter 2003 and the second quarter 2004.³⁷ Given that mobile operators set their prices with the purpose of achieving a commercial return over the lifetime of the subscriber, operators will set prices for their packages taking into account any further reductions in termination charges. Operators were aware of the July 2003 cut following the Competition Commission's January 2003 report and accordingly it is likely that some increase in retail prices was already factored into the second quarter 2003 prices (similarly the second quarter 2004 prices may reflect some factoring in of the September 2004 cuts in termination charges). Comparing average mobile call revenue per minute between the first quarter 2003 and the second quarter 2003 shows an even larger increase of 6.6%.³⁸
108. Average revenue per minute figures are vulnerable to changes in mix, although the information contained in Ofcom's statistics does not suggest any substantial change in mix with, for instance, the share of higher priced outgoing international calls falling and calls while roaming abroad only increasing from 2.2% to 2.3% of all calls.
109. Oftel also produced a series for mobile prices that assumed an average usage profile and monitored the total cost for that particular usage profile – this has the benefit of avoiding the influence of changes in mix.³⁹ Unfortunately, this series is only available up until October 2003. The series estimates a price fall (excluding handset prices) for the assumed profile of 1.6% between May and October 2003. However, once handset prices were included, the overall cost of mobile telephony was estimated to have increased. Indeed, the series shows that the overall cost of mobile telephony had fallen by around 10.6% from October 2001 to reach a low point in February/March 2003 and then had virtually reversed the reduction of the previous 18 months, rising by 10.8% by October 2003. Oftel also noted that the price increases were focused on low users: "Once handset cost is included, zero and low usage customers saw their average mobile bills increase by 14% and 8% respectively."⁴⁰

³⁷ Ofcom, *The Communications Market*, Quarterly Update October 2004, Tables 1 and 2.

³⁸ Oftel, *Market Information – Mobile Update*, October 2003.

³⁹ Oftel, *Mobile price monitoring*, available at http://www.ofcom.org.uk/static/archive/oftel/publications/market_info/mobile1003.pdf (with links to the actual data series).

⁴⁰ Oftel, *Mobile price monitoring*, p.3.

110. Ofcom's most recent report (for the second quarter 2004) on the market states that there has been "flat to slightly rising prices over the past 12 months".⁴¹ It appears that this statement excludes handset prices - the earlier Oftel analysis suggests that including handset prices is likely to show a greater increase in the total cost of mobile telephony.
111. A September 2004 report by Enders Analysis analyses changes in mobile retail prices in the UK. The report concludes, "mobile prices have in fact risen in the last two years".⁴²
112. In terms of volumes, Ofcom latest statistics suggest that growth in mobile call and SMS volumes is starting to taper off:⁴³

The average number of mobile voice calls also failed to show any signs of a significant increase in the three months to June, although the total proportion of voice calls made from mobile phones grew slightly over the same period...The average number of SMS message per active customer also remained flat quarter on quarter, although up year on year.

⁴¹ Ofcom, *The Communications Market*, Quarterly Update October 2004, p.36.

⁴² Enders Analysis, UK Mobile call charge trends, 22 September 2004.

⁴³ Ofcom, *The Communications Market*, Quarterly Update October 2004, p.8.

113. Accurate information on mobile penetration is more difficult to obtain, as information from operators that Ofcom generally relies on is vulnerable to double-counting subscribers. For instance, when a mobile subscriber churns from one operator to another, the new operator will include the new subscriber immediately in its statistics while the other operator may continue to count the subscriber for months after the churn has taken place. The churn associated with a new mobile operator entering the market could lead to operator-reported figures overstating total penetration. Ofcom does conduct consumer research that suggests that the proportion of UK adults with a mobile phone was around 75% in May 2003, 73% in August 2003 and was around 79% in the second quarter 2004.⁴⁴ While more recent data is not available, the Ofcom consumer research also suggested that penetration amongst low-income earners (with household income below £17,500) had fallen from 64% to 60% between May and August 2003.⁴⁵ We note that if increases in mobile retail prices have been focused on handset prices, then such increases would be only likely to impact subscriber numbers in the medium term as existing handsets become lost, stolen or broken and some subscribers faced with the higher prices for new handsets decide to drop out of the mobile market altogether. In addition, the loss in affordability for certain groups may not show in overall penetration rates, if other structural changes in demand are occurring such as take-up by older age groups which appeared to be a factor in the UK.

3.4. SUMMARY

114. Given the range of factors impacting on telecommunications prices, it is difficult to draw strong conclusions from the analysis of short-term impacts of the recent reductions in MT charges in the UK. Nonetheless, it is reasonably clear that the UK regulators overestimated the consumer benefits of reducing MT charges, as a substantial proportion of the reduction in MT charges has not been passed through into lower FTM prices.
115. Further, despite the expectation of the regulators that MT charges would act only to reduce the expected decline in mobile retail prices (driven by factors such as Hutchison's entry), mobile retail prices appear to have instead remained constant or, indeed, increased once handset prices are also taken into account. This is consistent with a waterbed effect taking place with mobile retail prices being higher than they otherwise would have been.

⁴⁴ Ofcom, *The Communications Market*, Quarterly Update October 2004, p.35 and Oftel, Consumers' use of mobile telephony - Q14 August 2003, 27 October 2003, p.6.

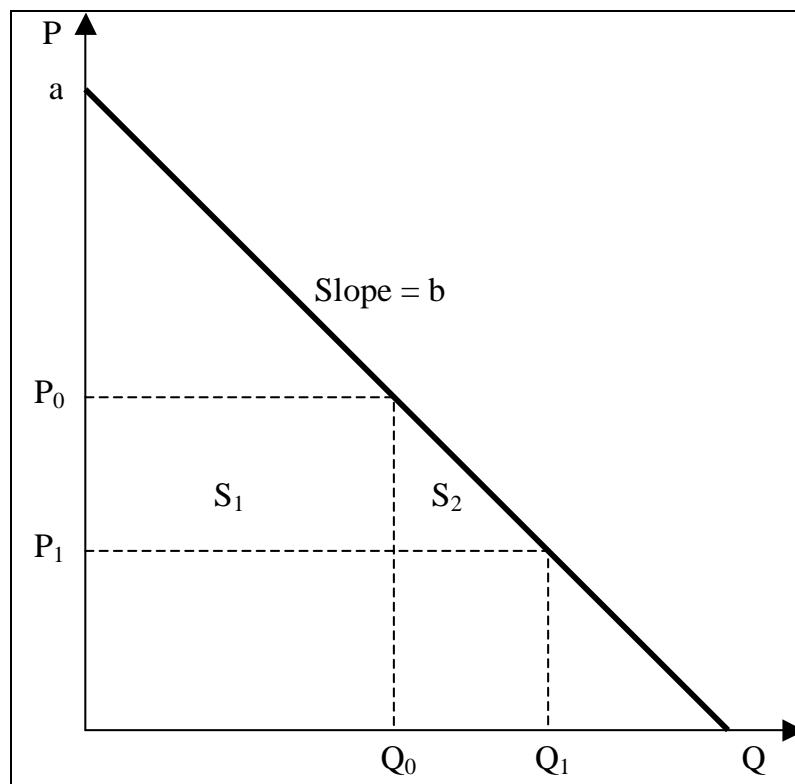
⁴⁵ Oftel, Consumers' use of mobile telephony - Q14 August 2003, 27 October 2003, p.7.

APPENDIX A: DEMAND FOR FTM WHEN SUBSCRIBER BASE IS (INVERSELY) RELATED TO THE TERMINATION RATE

When mobile termination is regulated (capped), profit maximisation implies offsetting adjustments in the price of mobile subscription. As a result, we expect a reduction in subscriber numbers (relative to a no-regulation counterfactual) and we hypothesize a leftward shift in the demand for FTM calls (there are fewer subscribers to call). This leftward shift in demand for FTM represents a loss of surplus compared to the counterfactual. What is the maximum post-regulation reduction in demand for FTM that will still produce a net benefit to regulation?

Under the Commission's simple linear model we can determine algebraically the reduction in demand for FTM that will just offset the gain in consumer surplus resulting from lower price for termination. This approach calculates the maximum reduction in demand for FTM that can occur before the net surplus change becomes negative. The calculation can be set depending on whether the gain is limited to allocative efficiency only or allocative efficiency plus the transfer from producers.

Figure 25: Change in FTM Consumer Surplus Following Price Reduction



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The Commission calculates the gain in consumer surplus as the sum of S_1 (transfer from producer) and S_2 (allocative efficiency gain). S_1 and S_2 can be algebraically stated as:

$$S_1 = (P_0 - P_1)Q_0$$

$$S_2 = \frac{1}{2}(P_0 - P_1)(Q_1 - Q_0)$$

where P_0 (P_1) is the pre- (post-) regulation price with corresponding quantities Q_0 (Q_1).

Since $P = a - bQ$:

$$S_1 = (a - bQ_0 - (a - bQ_1))Q_0 = b(Q_1 - Q_0)Q_0$$

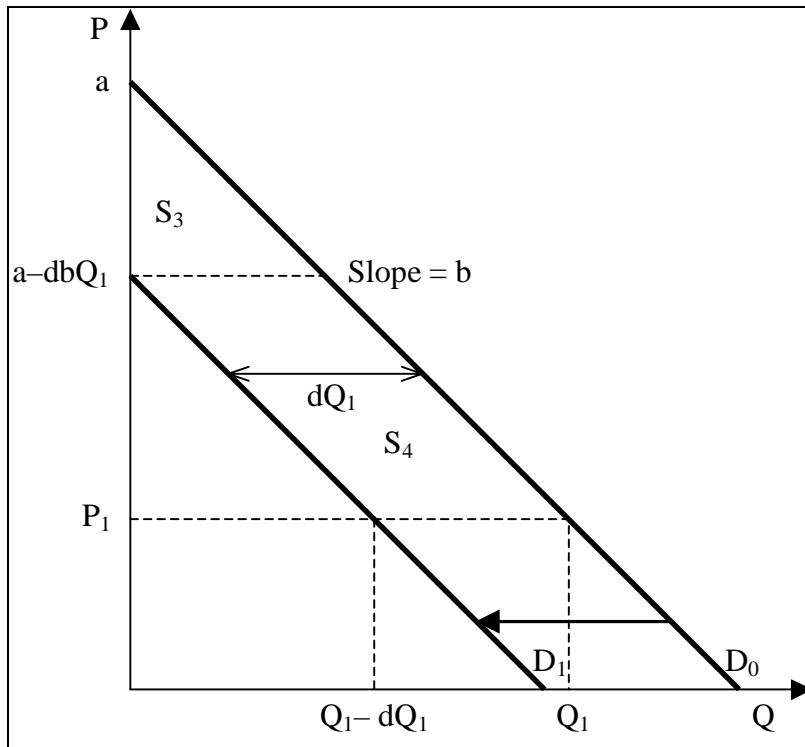
$$S_2 = \frac{1}{2}(a - bQ_0 - (a - bQ_1))(Q_1 - Q_0) = \frac{b}{2}(Q_1 - Q_0)^2 \quad (1)$$

and

$$S_1 + S_2 = \frac{b}{2}(Q_1^2 - Q_0^2) \quad (2)$$

Now consider a post-regulation leftwards shift of the demand for FTM by quantity dQ_1 as a result of reduction in the subscriber base. This is equivalent to a shift down in the demand curve by amount dbQ_1 .

Figure 26: Post-Regulation Leftwards Shift of Demand for FTM



Reduction in post-regulation surplus after the fall in the subscriber base (compared to the original subscriber base) is measured by the areas $S_3 + S_4$. Algebraically, these areas are:

$$S_3 = \frac{1}{2}(dbQ_1)(dQ_1)$$

$$S_4 = (a - dbQ_1 - P_1)dQ_1$$

Since $P_1 = a - bQ_1$

$$S_4 = (a - dbQ_1 - (a - bQ_1))dQ_1 = bdQ_1^2(1 - d)$$

and

$$S_3 + S_4 = bdQ_1^2 \left(1 - \frac{d}{2}\right) \tag{3}$$

We are interested in the leftward shift (represented by d) required such that the gain in consumer surplus from regulation ($S_1 + S_2$) is just offset by loss of surplus associated with the reduction in demand for FTM ($S_3 + S_4$).

Equating (2) and (3):

$$S_1 + S_2 = S_3 + S_4$$

$$\frac{b}{2}(Q_1^2 - Q_0^2) = bdQ_1^2\left(1 - \frac{d}{2}\right)$$

Rearranging:

$$Q_1^2(d^2 - 2d + 1) = Q_0^2$$

$$Q_1^2(d - 1)^2 = Q_0^2$$

This equation is satisfied when

$$d = 1 - \frac{Q_0}{Q_1} \quad \text{and} \quad d = 1 + \frac{Q_0}{Q_1}$$

These are the values of d that equate the gain in consumer surplus from the reduction in price ($S_1 + S_2$) with the lost surplus associated with a falling subscriber base and reduced demand for FTM calling ($S_3 + S_4$). Since $d < 1$ is required for a reduction in demand we have the following result: the net change in consumer surplus from regulation (when the transfer S_1 is counted as a benefit) will only be positive if demand for FTM calling falls by a proportion that is near to unity than $d = 1 - \frac{Q_0}{Q_1}$. Intuitively, the reduction in demand for FTM resulting

from the decline in the subscriber base must not outweigh the price effect in the FTM market (holding demand constant).

Now consider the threshold if only allocative efficiency is counted as a benefit (area S_2 in Figure 25). The breakeven reduction in demand for FTM d is found by equating the gain in consumer surplus from regulation, now limited to allocative efficiency (S_2), with the loss of surplus associated with the reduction in demand for FTM ($S_3 + S_4$).

Equating (1) and (3):

$$S_2 = S_3 + S_4$$

$$\frac{b}{2}(Q_1 - Q_0)^2 = bdQ_1^2\left(1 - \frac{d}{2}\right)$$

Rearranging:

$$d^2 - 2d + \frac{(Q_1 - Q_0)^2}{Q_1^2} = 0$$

By the quadratic formula the previous equation is solved by:

$$d = 1 \pm \sqrt{1 - \frac{(Q_1 - Q_0)^2}{Q_1^2}}$$

Rearranged, this is:

$$d = 1 \pm \sqrt{1 - \left(1 - \frac{Q_0}{Q_1}\right)^2}$$

The roots of d are real since $Q_1 > Q_0$. $d < 1$ is required for a reduction in demand. Accordingly, the net change in consumer surplus from regulation (when the transfer S_I is **not** counted as a benefit) will only be positive if demand for FTM calling falls by a proportion nearer to unity than:

$$d = 1 - \sqrt{1 - \left(1 - \frac{Q_0}{Q_1}\right)^2} \quad (4)$$

A.1 EMPIRICAL ANALYSIS

We now have algebraic expressions for the maximum reduction in demand for FTM associated with a reduction in the subscriber base permitted that will still result in a net gain from regulation in the FTM market. The input parameters for these thresholds are limited to the pre- and post-regulation FTM quantities Q_0 and Q_1 and these are calculated (or assumed) by the Commission in their analysis.

In Table 16 of the Commission's Draft report (p. 92) counterfactual (Q_0) and factual (Q_1) quantities are reported for the Commission's Factual 1 between 2004 and 2010. These quantities are reproduced in Table 6 below, along with the maximum post-regulation reduction in demand for FTM associated with reduction in subscriber base.

Table 8: Maximum Reduction in Demand for FTM Resulting from Post-Regulation Reduction in Subscriber Base

	2004	2005	2006	2007	2008	2009	2010
Q_0 ⁴⁶	901	923	945	969	992	1,017	1,042
Q_1	901	923	990	1,056	1,122	1,187	1,252
Maximum Reduction in Post-Reg Demand (Transfer + Allocative Efficiency)	0.0%	0.0%	-4.5%	-8.2%	-11.6%	-14.3%	-16.8%
Maximum Reduction in Post-Reg Demand (Allocative Efficiency Only)	0.0%	0.0%	-0.1%	-0.3%	-0.7%	-1.0%	-1.4%

The maximum permitted post-regulation reduction in demand is smaller when only allocative efficiency is counted as a benefit of regulation. The magnitude difference between the smaller and larger permitted reductions indicates the importance of the inclusion of the surplus transfer to the Commission's estimate of the benefit of regulation.

A.2 SUMMARY

This analysis has shown that the Commission has only fine tolerances to produce a welfare gain from the market for FTM. If we extend the analysis to include the markets for subscription and calling, which presumably suffer a reduction in welfare following post-regulation price increases there, then it becomes difficult to see how a net gain from regulation can be achieved. Possibly mitigating the apparently fine tolerances in Table 6, the effect on FTM from a reduction in subscriber numbers is second order and it may in fact be quite hard to produce a reduction in demand large enough to offset the consumer gains measured by the Commission. To calculate this requires us to estimate of a) the magnitude of the waterbed effect on subscription price b) the effect of the increase in subscription price on subscriber numbers and c) the effect of reduced subscriber numbers on demand for termination.

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Source: Table 16, Commission Draft report.