UK mobile operators' cost of capital and the financial crisis

A report for Everything Everywhere

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1. Summary

1. Ofcom's consultation, Wholesale mobile call termination review, of 1 April 2010, proposes a Weighted Average Cost of Capital (WACC) for mobile operators which is one third lower than the cost of capital incorporated into current mobile termination charges. In particular, Ofcom proposes reducing the WACC from 11.5% to 7.6%. The major factor driving this reduction is the assumption that returns to UK mobile businesses are expected to be much less risky relative to the overall share market's returns than they were expected to be in 2007 when the current controls were designed. The equity beta is the measure of the relative risk of returns to equity in a particular business compared with the risk associated with the overall equity market. Ofcom is assuming that the expected equity beta for UK mobile businesses has fallen sharply from a range of 1.0 – 1.6 in 2007 to 0.7 – 1.0 in 2010 and consequently that the equity risk premium for mobile businesses is now much lower.

2. In this report, we consider whether Ofcom's proposed reduction in the forward-looking equity risk premium for mobile businesses is justified. In particular, we focus on the question of whether the reduction in the assumed beta incorporated into the expected cost of capital is reasonable. In this regard, the key question is whether the absolute compensation for the riskiness of mobile businesses is now fundamentally different than it was three years earlier (as assumed by Ofcom) or whether Ofcom's measurement approach has been distorted by the temporary impact of the global financial crisis on particular financial data. In short, we find that Ofcom has inconsistently combined parameter values taken from different periods (overlooking the interelationship between the parameters) with the consequence that the mobile operators' WACC has been underestimated significantly.

3. We have had regard to the views of the Competition Commission (CC) on the approach to the cost of capital set out in their Determination, *Carphone Warehouse Group plc v Office of Communications* of 31 August 2010 ('the *LLU Determination*').

4. While the *LLU Determination* does not address the general estimation of betas,[1] it does include an extensive discussion of whether Ofcom had consistently estimated its WACC parameters over the period of the crisis (in this regard, the Determination focuses particularly on the measurement of BT's cost of debt). The principles set out by the CC include that: "*…in industries with long lived assets regulators should take a long-term view of the cost of capital and adjust components only when they believe there has been a permanent shift in the pricing of risk."*[2]

5. The CC found that Ofcom had erred in, inconsistently, combining one parameter for the cost of debt (the debt risk premium) measured with respect to a short-term period

[1] It is, however, concerning that Ofcom's choice for the beta for mobile businesses is actually below Ofcom's assumed beta for the BT Group of 0.86 used in the Openreach decision (which was appealed as the LLU Determination), despite regulatory and commercial practice virtually always finding that mobile businesses are relatively more risky than the businesses of the fixed incumbents (for instance, see the IRG, Principles of Implementation and Best Practice for WACC calculation, 2007, p.22).

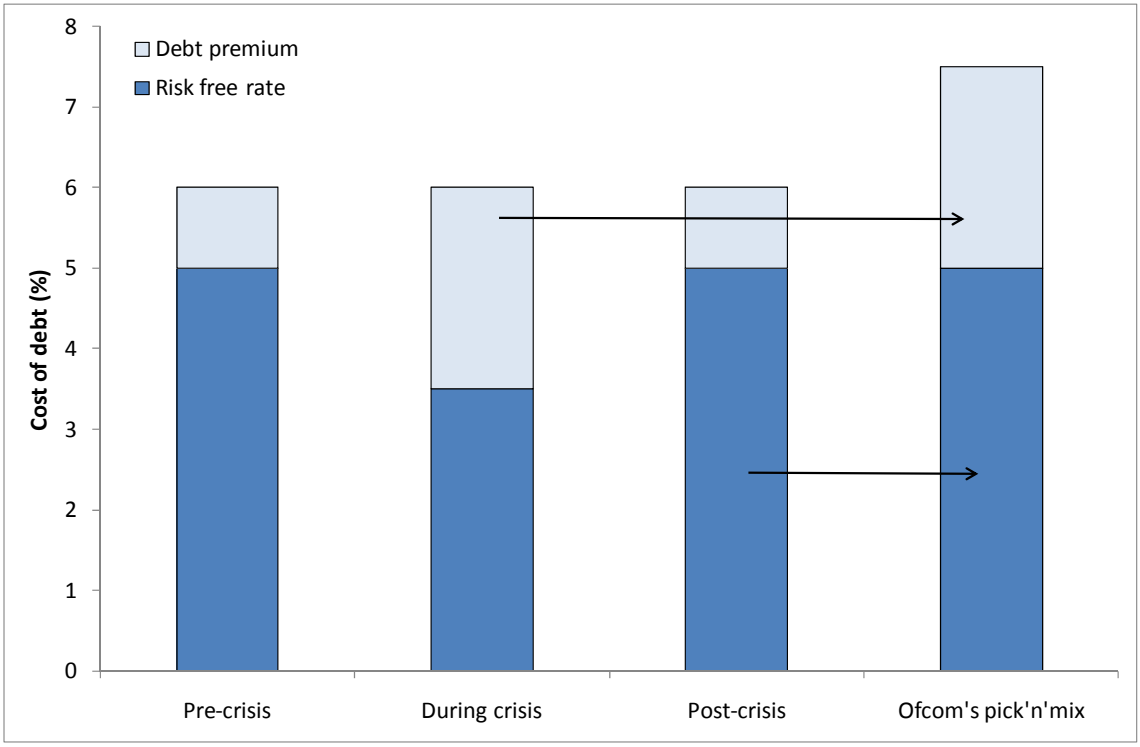
[2] The *LLU Determination* (para. 2.380).

during the financial crisis while taking a long term average approach to another cost of debt parameter (the risk free rate). The debt risk premium is equal to the overall cost of debt less the risk free rate.

6. The error identified by the CC was that Ofcom had estimated a higher debt premium for BT which was, in large part, due to a temporarily lower risk free rate during the crisis but had then inconsistently added this higher debt risk premium to a long run average estimate of the risk free rate. The result was an overestimate of the overall cost of debt.

7. The nature of this error is illustrated in Figure 1. The actual long run cost of debt for a company is shown to be relatively stable before, during and after the global financial crisis (as was the case for BT). However, the composition of the cost of debt changes over time. In normal circumstances the debt risk premium is a relatively small component of the cost of debt. However, during the crisis, debt risk premiums rose as the risk free rate fell. The net effect was to leave the cost of debt around the same level. In the recovery after the crisis, the risk free rate can be expected to rise while the debt risk premiums for companies will fall back towards more normal levels.

Figure 1: Ofcom's BT's cost of debt error identified by the CC



8. The error that the CC found with Ofcom's approach to BT's cost of debt was that it was based on an inconsistent combination of a debt risk premium measured during the crisis and a risk free rate intended to reflect the situation post crisis – failing to recognise that movements in the debt risk premium are not independent of movements

in the risk free rate. As a result, the CC found that Ofcom had overestimated BT's post crisis cost of debt.

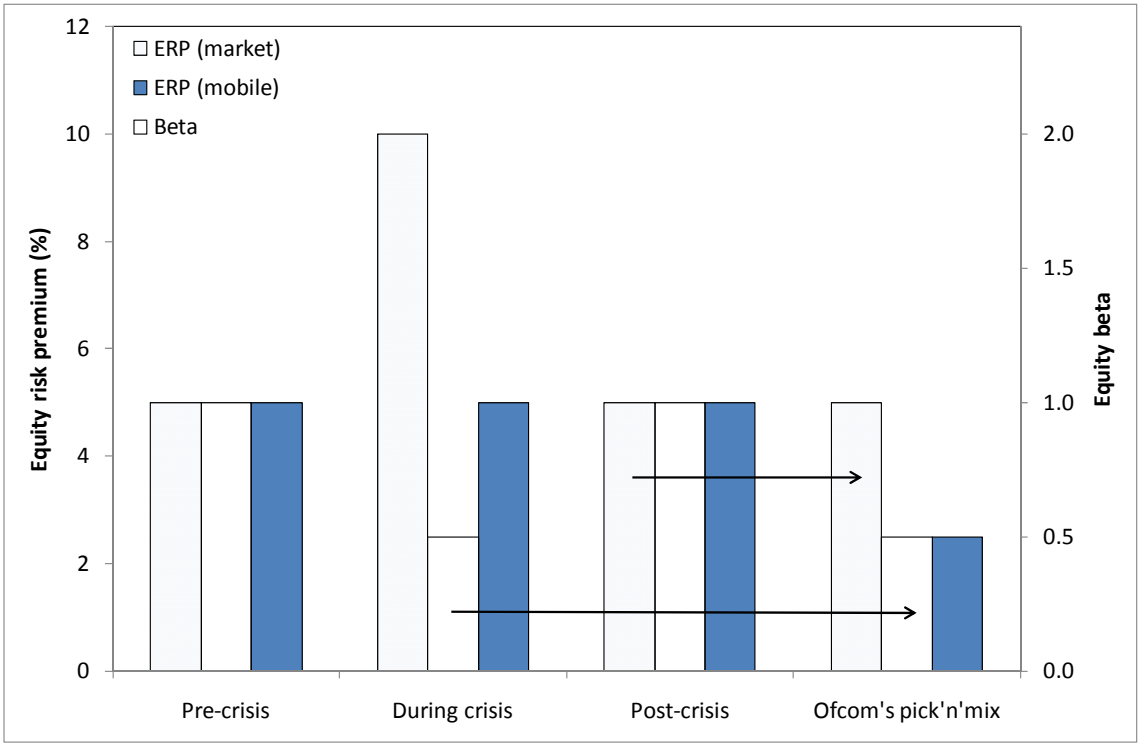
9. We consider that Ofcom has made precisely the same type of error in estimating mobile operators' equity risk premium (ERP_{Mobile}). The equity risk premium for mobile operators is equal to the value of beta multiplied by the equity risk premium of the equity market as a whole (the market risk premium or ERP_{Market}). Beta is a measure of the risk for mobile operators *relative* to the market as a whole.[3] During the crisis, the market risk premium rose to historically high levels (as is typical of financial market crises). Consequently, even if mobile operator's actual risk remained the same during the crisis, there would still have been a dramatic reduction in their observed betas. This is because a stable ***absolute*** risk for mobile operators, at a time when overall equity market risk was rising sharply, implies a falling level of risk for mobile operators *relative* to the market.

10. Once market conditions have returned to more normal levels, however, we would expect to see a fall in the market risk premium back to normal levels and to see mobile operators' relative risk (beta) rise back to more normal levels. Ofcom's error has been to set the value of the market risk premium based on an assumption of long run 'normality' but to set the mobile operators' beta based on low estimates from the midst of the crisis. Consequently, Ofcom assumes a much lower overall equity risk premium for mobile operators because Ofcom has captured one impact of a return to normal conditions (i.e. the lower market risk premium) but not the other impact (i.e. the higher beta).

11. We have sought to illustrate this problem in Figure 2. This Figure is similar to Figure 1. However, a slightly different formulation is required because the relevant cost of equity parameters are multiplicative (instead of additive), i.e. the equity risk premium for mobile operators is equal to the product of the beta for mobile operators and the market risk premium.

[3] In fact, the formula for beta is simply the ERP_{Mobile} divided by ERP_{Market}.

Figure 2: Ofcom's cost of equity for MNOs error



12. Figure 2 shows that the actual equity risk premium for mobile operators remained relatively stable before, during and after the crisis. However, the components of the equity risk premium were impacted significantly by the crisis with the market risk premium rising sharply during the crisis while the beta (indicating the relative risk of mobile operators compared with the market) fell sharply. In estimating a mobile WACC, Ofcom has put together the low beta measured during the crisis with a long run measure of the market risk premium and estimated an artificial and low equity risk premium for mobile businesses – a risk premium which is not representative of any real-world investors' expectations.

13. The analysis of the problem of taking parameter values from inconsistent periods set out in the LLU Determination thus provides strong support for the view that Ofcom has erred in its proposed cost of equity for the mobile operators. Moreover, because of the significance of equity (relative to debt), Ofcom's error in relation to the cost of equity has a substantial impact on the overall estimated WACC for mobile operators (in contrast to the error that the CC found with BT's cost of debt which had only a very minor impact on BT's estimated WACC).

14. The solution, in line with the *LLU Determination*, is for Ofcom to adopt a long-term view of the beta of mobile businesses which would then be consistent with the long-term view of the equity risk premium for the market. In particular, it is important to exclude the distortion to the measured betas of mobile operators resulting from the rise of gearing of companies elsewhere in the economy that occurred in the lead-up to and during the global financial crisis. We recommend the adoption of the same range for

the equity beta as Ofcom has used in its 2004, 2005 and 2007 statements, i.e. 1.0 – 1.6. Based on this range and a range for the market risk premium of 5.0% - 5.5%, we estimate a mid-point **average pre-tax real WACC of 10.2%**. We believe that this mid-point appropriately meets the CC's requirement for a long term view of the cost of capital. We also believe that this estimate should be considered conservative as it is very close to the observed beta for O2 from a period when O2's beta is likely to have already been affected by the rise in gearing elsewhere in the economy.

2. Error identified by the Competition Commission

15. The CC identified an error in Ofcom's estimate of the cost of debt that resulted from inconsistently estimating debt parameters over different time periods:

> *This inconsistency in the logic of Ofcom's decision appears to result from what CPW termed the 'pick-'n'-mix' approach whereby Ofcom added a nominal gilt yield to a debt premium, each estimated at different points in time or over different time intervals. As CPW pointed out, Ofcom's procedure took account of movements in spreads but treated the risk-free rate as a constant and ignored the possibility that the risk-free rate and the debt premium might contemporaneously move in opposite directions. (paragraph 2.392 of the Determination).*

16. In order to understand the nature of the error identified by the CC, it is important to note that the cost of debt, like the cost of equity, can be broken down into multiple components. In the case of the cost of debt, the relevant components are the risk free rate and the debt risk premium.

Cost of debt = Risk free rate + Debt risk premium

17. This equation can be rearranged to have the debt risk premium on the left hand side:

Debt risk premium = Cost of debt – Risk free rate = Spread over risk free rate

18. Ofcom's approach was to estimate the debt risk premium giving considerable weight to the observed debt risk premiums during the crisis. The debt risk premium did increase during the crisis. This was because the risk free rate was lower rather than because the overall cost of debt had increased (see Table 2.5 of the *LLU Determination*).

19. When Ofcom came to estimate the risk free rate, however, it did not give the same weight to the lower observations from the crisis but instead relied on a long-term average that was materially higher than the risk free rates during the crisis. Ofcom then combined these parameter estimates (derived from different time periods) into an estimate of the overall cost of debt that was too high.

20. The CC described the error in the following way:

This inconsistency in the logic of Ofcom's decision appears to result from what CPW termed the 'pick-'n'-mix' approach whereby Ofcom added a nominal gilt yield to a debt premium, each estimated at different points in time or over different time intervals. As CPW pointed out, Ofcom's procedure took account of movements in spreads but treated the risk-free rate as a constant and ignored the possibility that the risk-free rate and the debt premium might contemporaneously move in opposite directions.

As an example of this, the data in Table 2.5 suggests that between June 2008 and May 2009 the nominal gilt yield declined whereas the premium on the BT Group debt increased. The data in Table 2.5 suggests that the BT Group's cost of debt was relatively stable between June 2008 and May 2009. If, however, the debt premiums were added to a constant long-term estimate of the risk-free rate (instead of the nominal gilt yields in the table), the resulting figures would show a rising cost of debt during this period.

This demonstrates that focusing on the spread alone and not assessing the spread in conjunction with the risk-free rate prevailing at the same time could lead to a mis-statement of the cost of the BT Group's debt. In this case, it appears that the source of the apparent overestimate in Ofcom's calculation is not a miscalculation of the debt premium per se but a result of overlooking the pattern of opposing movements in the risk-free rate and debt premium in the relevant estimation period.

21. The CC found that the error identified in Ofcom's estimate of BT's cost of debt would, in practice, have only a relatively small impact on the overall estimate of BT's WACC (within the estimate's margin of error) as debt represented only a small proportion of BT's capital structure. For BT, as with the mobile operators, equity forms the main component of the capital structure and hence any error in estimating the cost of equity can have a large impact on the overall WACC. This is concerning because, as we explain next, Ofcom is committing the same type of inconsistency error in estimating the mobile operators' cost of equity.

3. Ofcom is making the same type of error in estimating the cost of equity for mobile operators

22. The cost of equity, like the cost of debt, can be broken down into multiple components. In the case of the cost of debt, the relevant components are the risk free rate and the debt risk premium. In the case of equity, the relevant components are the risk free rate and the equity risk premium for mobile operators.

$$Re = Rf + ERPMobile \text{ where:} \quad (1)$$

Re = Mobile operators' cost of equity

Rf = the risk free rate

ERPMobile = Mobile operators' equity risk premium.

23. Mobile operators' equity risk premium can itself be expressed, using the capital asset pricing model formula, as:

ERPMobile = *β* x *ERPMarket* where: (2)

β = Mobile operators' beta;

ERPMarket = Average market cost of equity – *Rf*

= average risk premia across all firms in the overall equity market.

24. Formula (2) can be rearranged to be expressed in terms of beta:

β = *ERPMobile* / *ERPMarket* = Equity risk premium for mobile operators divided by the Equity risk premium for the equity market as a whole (3)

25. If beta is estimated during the global financial crisis (GFC) then both the numerator and the denominator of formula (3) will also be expressed in the prevailing conditions of the GFC.

βGFC = *ERPMobileGFC* / *ERPMarketGFC* = Equity risk premium for mobile operators during the GFC divided by the Equity risk premium for the equity market as a whole during the GFC (3')

26. Ofcom's approach to estimating mobile operators' equity risk premium was to estimate:

- mobile operators' beta giving the majority of weight to the low estimated betas in the lead up to and during the crisis (a period during which mobile operators' estimated betas fell dramatically) - that is, Ofcom predominantly relied on an estimate of beta derived from equation (3'); while estimating
- the *ERPMarket* giving the majority of weight to long run historical average estimates of the *ERPMarket* (failing to reflect the extremely high values of market risk from the same period over which the betas were estimated) - that is, Ofcom used a *ERPMarket* that was not equal to *ERPMarketGFC*.

27. As can be seen from equation (3') above, a falling estimate of beta in the lead up to and during the crisis can be explained by the fact that the *ERPMarket* (i.e. the denominator) rose faster than *ERPMobile* (the numerator). In particular, the risk of mobile operators' businesses fell *relative* to the overall equity market. This does not imply a fall in the absolute level of mobile operator risk (*ERPMobile*), but rather that their risk did not rise by as much as for the equity market as a whole – noting that the

market as a whole included the finance sector and the other sectors of the economy that were increasingly heavily geared in the lead up to the crisis and therefore most heavily exposed to the crisis in financial intermediation.

28. The global financial crisis showed that there had been a dramatic increase in the average level of equity market risk. In other words, the denominator of equation (3') clearly increased. While this is intuitively obvious, we describe in some detail below why the only reasonable assumption is that the *ERPMarket* increased dramatically as a result of the sharp increase in the average level of gearing for the market as a whole in the lead up to the crisis.

29. It follows that, if *ERPMobile* remained fairly stable in the lead up to and during the crisis (eg, because mobile operators were not as heavily geared and did not dramatically increase gearing in this period) then mobile operators' observed betas would fall. But, in this case, a falling beta is not evidence of a fall in the absolute level of *ERPMobile* - it is just evidence of a fall in relative *ERPMobile. This* differs to normal circumstances where a falling beta might reasonably be interpreted as evidence of a falling ERPMobile with the implicit assumption that ERPMarket is constant. However, such an assumption clearly does not hold in the conditions that existed in the lead up to, and during, the financial crisis.

30. If Ofcom had estimated the cost of equity using a beta and a *ERPMarket* estimated predominantly from the period of the crisis then the inconsistency in its estimate of the *ERPMobile would have been removed. The failing* beta for mobile operators would be offset by the use of a higher market risk premium – leaving the ERPMobile largely unchanged (perhaps moderately higher or lower depending on whether the heightened *ERPMarket* more than offsets or less than fully offsets the depressed beta).

31. Ofcom's actual approach is to estimate the beta from the lead up to and during the crisis (which is depressed by the heightened *ERPMarket during* this period), while combining this with a long run historical average estimate of the ERPMarket (which only slightly reflects the heightened *ERPMarket during* the crisis). This result of combining these two low, and mutually inconsistent, estimates of each parameter is an estimate of the cost of equity of mobile operators which is dramatically lower than earlier estimates and likely to be a substantial underestimate of their forward-looking cost of equity.

32. The source of Ofcom's error is analogous to the source of the error identified by the CC in the LLU Determination. Namely, Ofcom has estimated one parameter in a manner that is heavily influenced by the crisis (ie, the beta in the mobile consultation and the debt risk premium in the Openreach decision) but has combined this with another parameter that is largely free of the effect of the crisis (*ERPMarket in* the mobile consultation and risk free rate in the Openreach decision).

33. This need not axiomatically lead to error if the two parameters are independent – such that there is no reason to believe that a lower beta (higher debt risk premium) would be associated with a higher *ERPMarket (*lower risk free rate). However, in both

circumstances there is every reason to believe that the parameters are related. In the LLU Determination, the CC concluded that the

> *"…it appears that the source of the apparent overestimate in Ofcom's calculation is not a miscalculation of the debt premium per se but a result of overlooking the pattern of opposing movements in the risk-free rate and debt premium in the relevant estimation period."* (para 2.394)

34. Precisely the same pattern of opposing movements exist in relation to the estimation of beta for mobile operators and the market risk premium in the lead up to and during the crisis.

4. Opposing movements of mobile operator betas and the market risk premium during the crisis

35. The likely inverse relationship between mobile operators' betas and the *ERPMarket* during the GFC can be seen directly and mathematically from equations (3) and (3'). These equations demonstrate that an increase in market risk due to a temporary crisis arising in the financial sector will reduce observed betas for those firms relatively less affected by the crisis. However, this does not mean that the ERP for those firms has fallen. The ERP for these firms can be constant and the beta fall dramatically if market risk increases dramatically. It would, therefore, be an error to assume that a lower observed beta during the crisis implies a lower cost of equity for these firms during the crisis (or post the crisis).

36. This is true as a general observation. However, it is especially true having regard to the fact that the overall level of gearing for the mobile operators remained relatively stable in the lead up to the crisis while the market wide level of gearing increased dramatically. These facts are sufficient to explain the increase in overall market risk and the fall in the observed beta for mobile operators – both, however, associated with a stable absolute level of the mobile operators' equity risk premium.

37. We demonstrate this point with regard to the following statements by Ofcom and the Brattle Group in relation to Vodafone's gearing. Ofcom states:

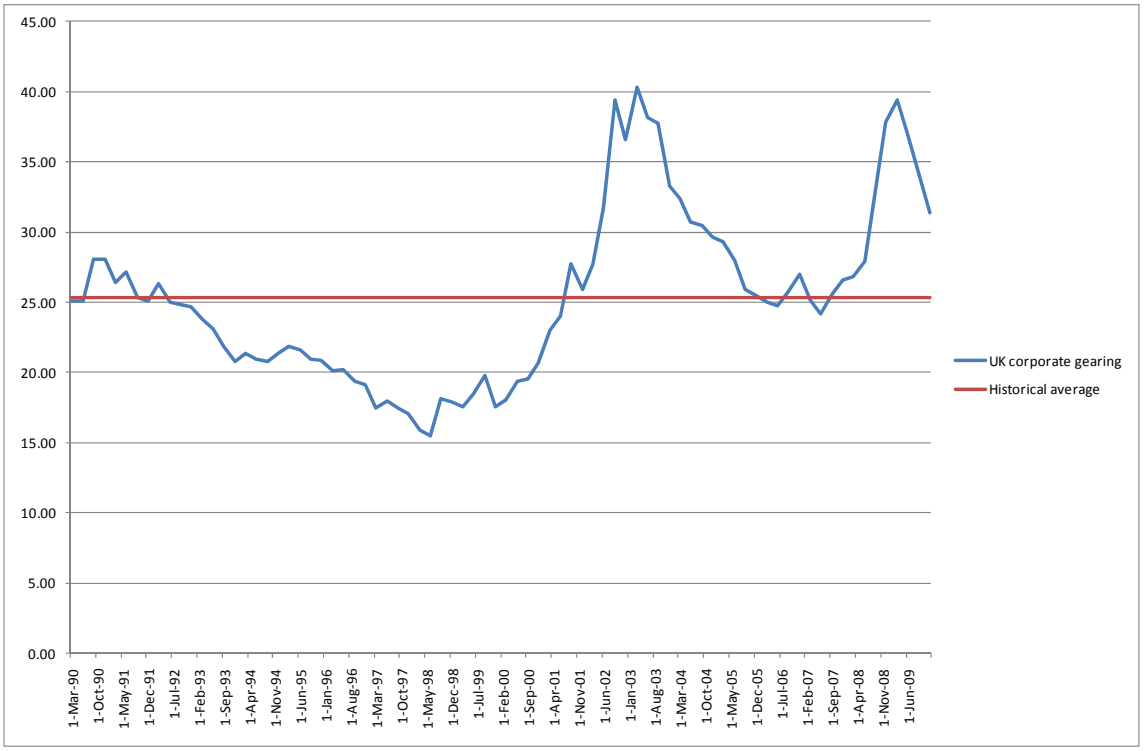
> *A8.117 Brattle's analysis also suggests that a 25% - 35% gearing level looks a reasonable range of the gearing of the companies in question, particularly Vodafone, which has had gearing levels in this range for the last four years. Since gearing levels have been relatively stable for the last few years, the observed equity betas can be said to be broadly consistent with such a gearing level, and it is not necessary to 'relever' the estimates.*
>
> *A8.118 Accordingly, we propose to lower our equity beta estimates for an efficient MCP, and propose a range, of 0.7 to 1.0 for the equity beta (the range in 2007 was 1.0 to 1.6 in 2007.*

38. Ofcom's reasoning here appears to be that because Vodafone's gearing has been relatively stable over time there is no need to adjust the estimated betas. But this assumes that the average level of market wide gearing has also been stable – an assumption that is demonstrably false. Market gearing was well above historical averages in both the lead up to the crisis and was at extreme levels during the worst of the crisis – when high levels of debt combined with collapsing market wide equity prices. That is, in the lead up to the GFC the numerator of the market wide gearing ratio (debt) increased dramatically and during the GFC the denominator went in the opposite direction (due to falling equity prices).

39. This gave rise to extreme levels of market gearing and, along with that, extreme levels of risk associated with holding the market portfolio of equities. The fact that Vodafone's equity beta measured relative to the market fell does not imply that Vodafone's level of equity risk fell – just that it did not rise by as much as the market.

40. The obvious reason why Vodafone's risk fell relative to the market is that, unlike the average firm in the market, Vodafone maintained relatively stable levels of gearing. By contrast, the average level of gearing of UK corporates rose dramatically in the period as can be seen in Figure 3 below based on Bank of England data which excludes financial institutions.

Figure 3: UK corporate gearing (non-financial corporates)



Source: Bank of England data on average gearing of private non-financial corporate sector

41. It should be noted that this chart understates the average rise of gearing in the general economy because the data excludes financial companies (whose gearing increased materially in the lead up to the crisis and during the crisis proper). Given the importance of financial companies to the FTSE in generally (and particularly to the risk of the FTSE over the crisis), it is important for understanding the movement in overall market risk that these companies are included.

42. Data that includes financial companies shows an even more dramatic trend in the average gearing of FTSE-100 companies over the past 20 years. Figure 4 shows the weighted average gearing of the 50 current FTSE-100 companies that have gearing figures available from Datastream continuously over the last 20 years. As can be seen, the level of gearing nearly tripled. A similar trend is observed on the larger sets of companies that have been covered by Datastream over the last 5 years (82 firms) and 10 years (70 firms) respectively.

Figure 4: Gearing of FTSE-100 firms

Source: Datastream, CEG analysis.

43. We note that following the crisis there has been a move by companies to significantly reduce their gearing back towards historical average levels. A recent article noted:

> *The amount of debt that UK companies are holding on their balance sheets has fallen dramatically since 2007. If leverage was the name of the game in the boom years following the Millennium, then the past three have been all about deleveraging. Analysis from KPMG shows that two-thirds of the FTSE 100*

companies that have filed their accounts for 2010 have reduced their debt levels since 2007.[4]

44. The Governor of the Reserve Bank of Australia has explained the underlying factors driving gearing as follows:

> *In the boom years that precede a crisis, credit expands very strongly as businesses or households (or both) gear up, either to fund spending or asset acquisition. Some of the decisions that people make during those periods are based on unrealistic expectations about future economic conditions or asset prices. As such, they turn out not to be financially viable.*
>
> *A process of de-leveraging therefore follows. Businesses and households become more cautious, increasing saving, selling assets and reducing debt. Lenders also become more cautious, both because they see the weaker economic circumstances as increasing the risk on loans, particularly as collateral values decline, and because they typically begin to experience a noticeable increase in bad loans. The result is that both the demand for, and the supply of, credit tend to decline.*[5]

45. Vodafone did not have high gearing going into the crisis but, as identified by Ofcom and the Brattle group, maintained a stable level of gearing. What Ofcom and Brattle Group fail to acknowledge is that the market as a whole was not maintaining a constant gearing ratio. Consequently, Vodafone's falling equity beta (which is a measure of risk *relative to the market*) need not be explained by Vodafone's risk falling but rather by the riskiness of the overall market rising.

46. It is, therefore, an error to assume that a falling beta implies a falling ERP for mobile operators. This would be an error even if the increased level of gearing for the market was not associated with such an extreme event as the global financial crisis. The fact that the crisis did occur makes it even more important not to simply translate a low beta from the crisis into a low *ERPMobile*.

47. Ofcom's decision inconsistently combines:

- a low market risk premium of 5% - consistent with post crisis market wide deleveraging returning the market risk to levels more consistent with the long run historical average (making the market safer); with
- a measure of Vodafone's risk relative to the market during the crisis (when the market gearing and market risk were very high).

[4] The Telegraph, Rebuilding confidence: it's time to climb off the tightrope and start investing, 25 October 2010.

[5] http://www.rba.gov.au/speeches/2010/sp-dg-081010.html

48. The Brattle Group commits the same errors. The following statements are taken from pages 9 and 10 of the Brattle report.

> *Equity risk reflects the combination of underlying business risk (to do with the variability of revenues and the extent of fixed costs) and financial risk (to do with the presence of fixed debt obligations).* ***Other things equal****, the more debt a company has outstanding, the greater the equity risk and the higher the equity beta. In general, we would not consider trustworthy betas for companies experiencing extreme changes in financial leverage throughout the data window…*
>
> *Figure 6 plots financial leverage for all four companies over time and indicates that none of the companies have experienced significant changes since 2004.* ***Since the leverage changes over time are relatively small, they cannot possibly explain the large changes in the firms' equity betas through time.*** *For example, Vodafone increased leverage from 20% to 35% since 2004. Increasing leverage by 15% implies a 25% rise in the equity beta. But over the same period, Vodafone has seen roughly 33% come off its equity beta.* ***The explanation for the observed reduction in betas over time lies elsewhere.*** **(Emphasis added.)**

49. The Brattle Group's analysis assumes that the overall level of market gearing is also stable. In reality, over the period 2004 to 2009 the average level of market gearing increased dramatically. Put simply, while mobile operators' overall gearing may have been stable in absolute terms it almost certainly fell dramatically *relative to* the market wide gearing. Given that beta is a measure of *relative risk* this is certainly an important, if not the most important, explanation for why beta estimates fell.

50. In their report the Brattle Group effectively adopts the following propositions:

- Betas for operators fell from 2002 onwards;
- Telecom operators' gearing did not fall over this time and, consequently, financial leverage cannot explain the fall in beta;
- Alternative explanations are required and these explanations will involve an assumed reduction in absolute risk for telecom operators (eg, due to "changing investor perceptions" and mobile telecommunications becoming a "mature" industry).

51. However, the basis for the second step in this logical chain is not justified. While mobile operators' gearing did not fall in absolute terms, their gearing relative to the market did. This is sufficient to explain a fall in estimated beta relative to the market. Importantly, the subsequent de-leveraging of the market back to pre 2004 levels can be expected to be associated with an increase in estimated beta for these operators.

5. Heightened market risk premium during the crisis

52. Ofcom has decided to use as a value of 5.0% for the specific equity risk premium for the overall market. In determining this value, Ofcom state that they have had regard to a range of sources. Ofcom notes that the long run historical average (based on data from 1900) estimated by Dimson, Marsh and Staunton is "one of the most authoritative sources of historical estimates" and suggest premia between 4.0% and 5.5%.[6] However, the DMS study relied upon was from the 2009 *Openreach* decision and excludes more recent data. While Ofcom did also briefly note other sources, it states that these are unreliable and should be given little weight.

53. Ofcom did note that evidence indicated that the market risk premium had increased significantly during the financial crisis.[7] However, Ofcom maintained its decision to give greatest weight to the long run historical average, although in doing so it would choose a point estimate of 5.0% in the upper half of the range estimated by Dimson, Marsh and Staunton.[8] Accordingly, Ofcom's assumption for the market risk premium cannot be said to be consistent with Ofcom's estimate of beta which is heavily impacted by the short-term circumstances of the financial crisis.

6. International regulatory practice

54. In this final section, we note that other regulators have shared the view of the CC that "that in industries with long- lived assets regulators should take a long-term view of the cost of capital and adjust components only when they believe there has been a permanent shift in the pricing of risk."[9] In the time frame available for this report, we have only undertaken a very brief survey of other regulatory decisions.

55. The report by the Belgian regulator (the BIPT) on the cost of capital for fixed and mobile operators of January 2010 shows that the BIPT considered it necessary to remove the impact of the distortion to estimated betas resulting from the financial crisis. In particular, after analysing the data, the BIPT decided to base its estimates on moving average estimates over the period January 2006 to November 2009 with data from the most severe period of the financial crisis from mid 2008 to the end of March 2009 being omitted.[10] Based on this data, the BIPT calculate an asset beta for Vodafone of 0.73 compared with an asset beta of 0.66 if the period of the GFC is not removed.[11] For Ofcom's gearing assumptions, this translates to a range for the equity

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6 Ofcom, A new pricing framework for Openreach, 22 May 2009, para. A8.18-A8.19.

7 Ofcom, A new pricing framework for Openreach, 22 May 2009, para. A8.41-A8.42.

8 While the market risk premium is not the focus of this report, there are grounds for Ofcom to now choose a market risk premium at the upper end of the range estimated by Dimson, Marsh and Staunton. In particular, Dimson, E., Marsh, P., Staunton, M. (2010), Credit Suisse Global Investment Returns Sourcebook 2010, calculate historical market risk premia of 5.2% for the UK index and 6.1% as the mean across all countries in their sample.

9 The LLU Determination, para. 2.380.

10 Consultation Publique du 21 Janvier 2010 - Relative Au Cout Du Capital pour Les Operateurs Puissants en Belgique (See Figure 14, p.34).

11 Ibid, Table 10.

beta of 0.973 to 1.123. We note that while the BIPT does make an adjustment for the financial crisis, the period excluded is relatively short when account is taken of the protracted period of rising gearing in the UK.

56. The Australian Energy Regulator's (AER) most recent estimate of beta (used to set the equity beta in all decisions from 2009 to 2014) has also been based on data that has deliberately excluded the worst of the global financial crisis (GFC). The AER noted that its expert, Associate Professor Henry considered that the events associated with the Global Financial Crisis and:

> *Henry has not updated the estimates for the post 'technology bubble' period from his previous report as he has advised that it may be reasonable to consider recent months as unrepresentative due to the CAPM assuming that there is equilibrium in the equity market.*[12]

57. The Bahrain regulator also made specific adjustments for the financial crisis noting that "Based on the above considerations, TRA proposes to allow for some additional headroom in the risk-free rate to reflect the asymmetric risk that this uncertainty [associated with the financial crisis] presents for financing".[13] The regulator also increased the Equity Risk Premium to take into account the impact of the GFC.[14]

7. Recommended approach

58. We consider that Ofcom's approach to the measurement of mobile operators' cost of capital has been distorted by the choice of inconsistent periods for measuring the beta and the market risk premium which has been exacerbated by the impact of the global financial crisis in leading to large differences between short-term and long-term parameter values. In this regard, Ofcom has made an error of a similar type to that identified by the CC in the LLU Determination with respect to the measurement of BT's cost of debt.

59. The error can be remedied by the adoption of a long-term view of the beta of mobile businesses which would then be consistent the long-term view of the equity risk premium for the market. As is evident from Figure 4, average gearing across the UK corporate sector started to move away from its long-term average level in 2002 – the same period for which the Brattle Group found that observed betas for moibile operators started to fall. This suggests that it would be reasonable to adopt for the long-term equity beta for UK mobile businesses the range 1.0 – 1.6 which is the range used by Ofcom in its statements in 2004, 2005 and 2007 and which is the basis for the current charge controls. The subsequent fall in observed betas below this range reflects the rise in gearing elsewhere in the equity market – a process that is now

[12] AER, Electricity transmission and distribution network service providers, Review of the weighted average cost of capital (WACC) parameters, May 2009, p.274.

[13] http://www.tra.org.bh/en/pdf/DeterminationCost_of_Capital2009FINAL.pdf, paragraph 241.

[14] Ibid, para. 164.

being reversed through de-leveraging. Ofcom's adoption of market wide ERP that is based on a long term historical average level of excess market returns is itself predicated on the market returning to 'normal' levels of gearing and risk.

60. Alternatively, Ofcom could rely on the more recently estimated betas. However, these would need to be adjusted to be consistent with the level of beta that would have been observed if the market level of gearing was consistent with the long term average (ie, consistent with the Ofcom MRP).

61. The nature of this adjustment is consistent with the nature of the gearing adjustment that is generally made in relation to an individual firms' gearing when moving from an equity beta to an assets beta. Specifically, the simplest gearing adjustment involves multiplying the individual firm's beta by one minus the individual firm's gearing. This gives an asset beta measured relative to the market risk associated with the market gearing *during the period of the beta estimation* (call this period 1).

62. Let the gearing in a long term average market gearing be called "G^1_{Market}". If we let the gearing associated with the proposed long-term MRP be called "G^2_{Market}", then the following equation describes how the asset beta estimated in period 1 needs to be adjusted to make it comparable to the MRP estimated for period 2.

$$\beta^2_{Asset} = \beta^1_{Asset} \times \frac{1-G^2_{Market}}{1-G^1_{Market}} \qquad (4)$$

63. Using the data underlying the 20 year data series in Figure 4 above, the average level of gearing in the market prior to 2002 (G^2_{Market}) was 32.7%. The average post 2001 (G^1_{Market}) was 55.2%. On the basis of these numbers then the Vodafone asset betas estimated during the period post 2001 to 2009 would need to be scaled up by a factor of 50% (=(1-0.327)/(1-0.552)-1).

64. We also note that Ofcom ultimately is interested in estimating the beta for the business of supplying mobile services in the UK. In this regard, Ofcom is correct to reject any reliance on the observed betas for Telefonica, DT and FT given their large fixed businesses. However, Ofcom should also recognise that the observed betas for Vodafone are likely to understate the betas for a UK-only mobile business. Prior to its acquisition by Telefonia, O2 was recognised by Ofcom as providing the best proxy for a UK mobile business (although even O2 had international operations). As noted by Ofcom in its 2007 Mobile Call Termination Statement (para. A18.67), the estimated beta for O2 was very close to the midpoint of Ofcom's range 1.0-1.6. To the extent that the rise in gearing of the UK equity market more generally was already starting to affect observed betas then this suggests the mid-point of 1.3 should be regarded as a conservative estimate for a UK mobile-only business.

65. In Table 1, we present our recommended parameters value and WACC estimate based on an equity beta range of 1.0-1.6 and a range for the market risk premium of 5.0% to 5.5% with all other parameters being the same as Ofcom assumes. We estimate a mid-point pre-tax real WACC estimate of 10.2%

Table 1 – Revised WACC estimate

WACC Component	Ofcom March 10	CEG low	CEG high
Real risk free rate	2.0%	2.0%	2.0%
Inflation assumption	2.5%	2.5%	2.5%
Market risk premium	5.0%	5.0%	5.5%
Equity beta	0.7-1.0	1.0	1.6
Gearing	25-35%	35%	25%
Cost of equity (post tax nominal)	8.0-9.5%	9.5%	13.3%
Debt premium	1-2%	1%	2%
Corporate tax rate	28%	28%	28%
Cost of debt (post tax nominal)	4.0-4.7%	4.0%	4.7%
WACC (pre-tax real)	6.5-8.8%	7.8%	12.7%
Average pre-tax real	**7.6%**	**10.2%**	