November 2006

ETNO Reflection Document on the ERG draft Principles of Implementation and Best Practice for WACC calculation

Executive Summary

Corrections for efficiency by a national regulatory authority (NRA) as currently foreseen in the PIB 2 and 3 (ii) are unjustified in view of a market-driven determination of the cost of capital.

In the current PIB 10 and 11, IRG should acknowledge that each of the discussed methodology to calculate a divisional Weighted Average Cost of Capital (WACC) has serious drawbacks. The PIBs should caution against a divisional calculation of WACC, which does not correspond to divisions of a company that already separately calculate their cost of capital.

ETNO recommends a more thorough investigation of the theory and applicability of real options by the IRG and the European Commission in the light of academic literature and current regulatory challenges. Appendix A.2 should not be part of these PIBs.

I. Introduction

Art. 13 of the Access Directive stipulates that an NRA may impose price control obligations, including obligations for cost orientation, in cases where there is a risk of excessive pricing or where a price squeeze is being applied, which acts to the detriment of end-users. For those cases where cost-orientation as the most intrusive remedy under the New Regulatory Framework is still warranted, Art. 13 of the Directive foresees that a reasonable rate of return on capital employed (ROCE) is granted. In this context, the calculation of the weighted average cost of capital (WACC) is a central element of cost calculation.

ETNO wishes to comment on selected aspects of the IRG draft PIBs on WACC calculation, particularly concerning the PIBs 3, 10 and 11 and Appendix A of the document.

II. Specific Comments

1. Corrections for efficiency in determining the cost of capital

IRG's recommendation allows for several efficiency adjustments in calculating the regulatory cost of capital including capital structure, cost of debt and market risk premium. However, the recommendation lacks any explanation why these adjustments are required or even justified. The cost of capital should reflect the "price" a company has to pay for a specific amount of capital. This price results from market forces by balancing supply and demand such that the best estimation is solely based on data observed on the market.

The IRG already favours methods which strictly reflect the conditions on capital markets. Capital markets are known to be very competitive which in turn implies efficient market results. That means that every adjustment made by an NRA to correct for inefficiencies might only result in an inefficient estimator of the cost of capital and is therefore counterproductive. Thus ETNO recommends the deletion of the remarks about efficiency adjustments of market based data.

There is no justification for corrections for efficiency by the regulator in view of a market-driven determination of the cost of capital.

A regulator should not make efficiency adjustments to a company's gearing of debt. Chapter 3.2 and PIB 2 should be changed accordingly. In PIB 3, the second option described (ii) should be deleted.

2. Calculation of divisional cost of capital.

- Limits to divisional calculation of WACC -

Any calculation of a divisional cost of capital would have to reflect the organisation of the concerned businesses in practice. The vast majority of European telecommunications network operators operate in vertically integrated divisions. Sometimes, separate divisions are run for mobile and fixed activities.

The consultation document proposes to use the calculation of divisional cost of capital, to gain insight into the risks incumbents have to bear solely due to their regulated activities, or to specific areas of regulated activity. In practice, however, businesses calculate their cost of capital across regulated and unregulated activities and across different parts of the network (access, core).

A 'divisional' calculation that does not correspond to divisions of the company that in reality do calculate a separate WACC, or even a product-specific

calculation of WACC is not feasible as the risk cannot be estimated in a sound and reliable manner. ETNO wishes to underline the observation already made in the consultation document, i.e., that there are very serious problems in establishing a valid methodology for such an approach as well as with gathering the necessary data for such a calculation.

ETNO recalls that the methods discussed for calculating a divisional cost of capital have been developed for unregulated sectors and in this context may or may not be used voluntarily by companies. In a regulated environment, the calculation of the cost of capital is part of an obligation imposed by the NRA as a public authority. Such intervention has to be based on sound and tested methodology and data in order to be effective, proportionate and be accepted before appeals bodies. This is not the case for any of the proposed methodologies for calculation or a combination of these.

- Use of benchmarks -

The described problems would in particular not be solved by the application of a benchmark against utility companies, discussed as a "pure play competitor" approach in the draft PIBs. To the contrary, it is quite obvious that the risks born by utility companies are largely different to the ones predominant in the telecommunication industry, even if one focuses on the access network.

First, telecommunications operators face a substantial technological risk due to a significantly higher degree of innovation. Relatively recent alternative access technologies, such as mobile or cable, are already adopted by consumers and brand new access technologies like fibre or mobile high speed solutions (e.g., WiMAX) will shortly be at hand. Different from utility sectors, the telecommunications sector is characterised by competing infrastructures in many geographies in the fixed network and throughout the EU as concerns mobile networks. Moreover, not every new technology is successful as has been the case with several technologies (e.g., Wi-Fi as an access solution; ISDN is some countries).

This buoyant and risky technological development clearly contrasts to the static technologies applied by utility companies.

Secondly, IRG's assumption about the correlation of aggregate demand and specific demand for telecommunication services on page 26 of the document is neither empirically nor theoretically proven. It might be argued, for example, that an increase of aggregate demand implies an increase of business activity and thereby induces an increased demand for telecommunication services because more business involves more communication as well.

Moreover the assumed one-dimensional relationship between aggregate demand, specific demand and the relevant beta of telecommunication and utility companies oversimplifies the matter. A beta in fact not only measures the correlation between aggregate and specific demand but every stochastic dependency between the incumbent's and the market's return. Further examples, presumably defining stochastic dependency, include the business cycle, techno-

logical progress and so forth. So even if a weak correlation of aggregated and specific demand is assumed, this is still not sufficient for a low beta due to the potential impact of the other factors influencing beta.

In conclusion the "pure play competitor" approach does not provide a sound basis for a calculation of a divisional WACC. ETNO moreover believes that a benchmark with utility companies is not appropriate to simulate the beta of a pure access network operator.

It is indeed highly questionable whether the proposed simulation makes any economic sense because there is no single example of a pure access network operator created by market forces (so-called "Baby Bells" in the United States also offer regional core services and only emerged due to AT&T's de-merger enforced by court decision). The business model of a pure access network operator is economically untested and so far not supported by capital markets. As a result, a market-based estimation of a corresponding beta is unlikely to provide meaningful results.

The PIBs 10 and 11 should acknowledge that every discussed methodology to calculate a divisional WACC has serious drawbacks. The PIBs should caution against a divisional calculation of WACC which does not correspond to divisions that already use separate rates for their cost of capital.

3. Concept of real options.

IRG's arguments about the concept of real options appear not fully developed and in parts not sufficiently thought through. Throughout the document, IRG claims that the real option theory is a concept to measure the cost of capital. That is not accurate. Real options mainly exist before actually spending capital and thus -- under the assumption of a perfectly competitive capital market needed for the applicability of capital asset planning model (CAPM) -- *before* actually raising capital on the market. Real options therefore mainly exist before there is any cost of capital. Thus, the real option theory, or more practically the actual existence of options in investment strategy should be taken into account in defining the regulatory framework, much more than in specifying the particular regulatory obligation of cost orientation.

Furthermore, real options largely refer to the unsystematic risk of a firm; whereas, the CAPM only allows compensation for the systematic risk. This fact was already highlighted by Dixit/Pindyck, Investment under Uncertainty, p. 153:

> "*Thus investment is highly sensitive to volatility in project values, irrespective of investors' or managers' risk preferences, and irrespective of the extent to which the riskiness of V is correlated with the market*." [V marks the uncertain value of the project to be decided upon. Volatility represents the whole risk including the systematic and the unsystematic part whereas the correlation between V and the market is just reflected by the project specific beta.]

It seems moreover that the IRG overestimates the potential positive values of an early investment. Certainly, first mover advantages may exist and have a significant impact on the timing of capital spending. However, in the case of a regulated industry first mover advantages are often dissipated by the instruments of mandating access and cost based regulation of prices. Indeed, as long as the regulated prices do not reflect all costs including the opportunity cost from destroying real options, for a competitor it will be even preferable to use the first mover's network because by doing so competitors are able to avoid the above-mentioned opportunity cost.

In this context, IRG's reasoning is very difficult to follow. It seems to argue that real options have a value of zero because competitors no longer possess the option to invest as soon as the incumbent has spent capital on an area-wide network. This does not take into account that this phenomenon (no capital spending by competitors) might only result from an improper regulation which fails to take the impact of real options into account and thereby privileges the strategy of "buying" instead of "making".

Furthermore, by mandating access NRAs create the competitors' real option to invest on the newly defined interface. As was already stated by Pindyck, "Pricing Capital under Mandatory Unbundling and Facilities Sharing" (April 2005), this real option is comparable to a financial option with competitors taking the long position and the incumbent taking the short position. As is well known, the long position of an option contract has a positive value whereas the short position has a negative value of equal height. On capital markets this shift of value implied by an option contract is compensated by the option price. For regulatory purposes, the real option price would have to be added to avoid distortions of make or buy decisions resulting from the ignorance of relevant opportunity costs.

ETNO therefore recommends further investigation of the theory and applicability of real options. In particular, Appendix A.2 should not be part of the PIBs because it is in parts misleading and overall not sufficiently developed. Future research should take into account all relevant academic literature on the topic and in particular consider the impact of regulation on the existence and value of real options.

ETNO recommends a separate, more thorough investigation of the theory and applicability of real options by the IRG and the European Commission in the light of academic literature. Consideration of options for the investors should have impacts on the regulatory obligations themselves, not only on cost calculations. Appendix A.2 should not be part of the PIBs.

4. Applicability of arithmetic vs. geometric mean.

On page 15 the IRG notes that "the choice of approach (between arithmetic and geometric mean) basically depends on the predictability of returns over longer time periods and the distribution of these returns". The IRG essentially

leaves the choice to the NRA's discretion. It only emphasises that unpredictability of returns favours the arithmetic mean, but negative correlation on returns as well as longer periods of return favour the geometric mean. This distinction is misleading and should be revised.

It is well known in statistical theory that the arithmetic mean of annual returns in the past is an appropriate estimator of expected future annual returns if annual returns are independent and identically distributed (iid). The iid-assumption is a prerequisite to derive an estimator of expected returns solely from historical data. If this assumption is violated, the nature of dependencies and/or the variation of distribution over time must be explicitly modelled and implemented in the estimation procedure. In contrast to IRG's statement there is, however, no 'magic' statistical trick which makes the geometric mean a better choice if the iid-assumption is violated (i.e., for the case of serial correlation).

Assuming iid, the geometric mean of annual returns in the past is an appropriate estimator of expected future annual return with an estimation period equal to the observation period. The arithmetic mean on the other hand is appropriate for an estimation period equal to the uniform length of the observation period's partitions. These partitions typically span a period of one year.

A simple example might demonstrate the difference between arithmetic and geometric mean. Assume an observation period of two years. The observed share started with a price of € 100 which increased to € 200 (annual return of +100%) by the end of year one and decreased to € 100 (annual return of -50%) by the end of year two. The arithmetic mean of both annual returns equals +25% and yields the expected annual return of a portfolio strategy of buying the share today and selling it in exactly one year.

The geometric mean on the other hand yields the expected annual return of a portfolio strategy of buying the share today and selling it in exactly two years. It might be calculated either by the geometric mean of both annual returns:

$$\sqrt[2]{(1+100\%)(1-50\%)}-1=\sqrt[2]{\frac{200}{100}\times\frac{100}{200}}-1=0\%,$$

or simply by the annualized return over two years:

$$\sqrt[2]{\frac{100}{100}}-1=0\%.$$

In general the geometric mean of annual returns over any observation period equals the annualized return over the same period.

Sometimes the estimation period might be somewhere between the uniform length of the observation period's partition and the length of the complete observation period. In this case, the so-called "Blume estimator" gives a nearly unbiased estimator of the expected return. The estimator equals the weighted

average of arithmetic and geometric mean where the weights represent the length of the estimation period in relation to the length of the observation period. In the example, the expected annual return of a portfolio strategy of buying today and selling in 1,25 years equals:

$$25\% \frac{2-1{,}25}{2-1} + 0\%(1 - \frac{2-1{,}25}{2-1}) = 18{,}75\%.$$

The most appropriate estimation period is certainly the average holding period of the incumbent's shares because it strictly reflects the conditions on the capital market and is therefore consistent with the method of determining the other parameters as recommended by the IRG.