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The Cost of Capital of KPN for Sub-Loop Unbundling (SLU)

A Report for OPTA

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Contents

Executive Summary

This report sets out NERA's estimate of the cost of capital of KPN as an input for determining the regulated tariff for sub-loop unbundling (SLU) applying over the period mid-2007 to mid-2008. As requested by OPTA, the WACC is estimated for KPN as a whole rather than for a specific service.

Our central estimate of the real pre-tax cost of capital for KPN at January 2007 is 6.6%. Table 1 sets out the components for this estimate.

Table 1
Cost of Capital for KPN

Generic parameters	
Real risk-free rate	1.5%
Financial gearing (D/(D+E)	34%
Market gearing (D/E)	51%
Corporate tax rate	25.5%
Cost of equity	
ERP	6.0%
Asset beta	0.56
Equity beta	0.84
Real post-tax cost of equity	6.5%
Cost of debt	
Real cost of debt	2.4%
WACC	
Real post-tax WACC (Net of Debt Tax Shield)	5.0%
Real pre-tax WACC	6.6%

Source: NERA analysis.

1. Introduction

In this report we estimate the cost of capital as an input for determining the regulated tariff for sub-loop unbundling (SLU) for KPN applying over the period mid-2007 to mid-2008.

The structure of this report is as follows:

- Section 2 discusses the choice of appropriate datasets in estimating CAPM parameters;
- Section 3 presents risk free rate estimates;
- Section 4 presents equity risk premium estimates;
- Section 5 presents beta estimates;
- Section 6 sets out cost of debt and gearing assumption; and
- Section 7 concludes by presenting the WACC estimates.

2. Choice of Appropriate Datasets in Estimating CAPM Parameters

This section discusses two key practical issues in estimating the cost of capital, in particular the CAPM cost of equity component of the WACC:

- the choice of reference market; and
- the choice between current or historic evidence as a basis for the parameter estimates.

2.1. Choice of Reference Market

From an investor's standpoint, the cost of capital should be estimated with reference to the financial market that best represents their investment opportunity set, as the cost of capital for any single investment is defined by the whole portfolio of investment opportunities to which an investor has access. This "set" is commonly referred to as the "market portfolio".

In theory the "market portfolio" should include both traded and non-traded assets. However, in practice WACC parameters are calculated with respect to readily available stock market indices, and therefore the "market portfolio" only captures assets listed on a stock exchange, to the exclusion of unlisted assets.

The next key question is whether to use a domestic, regional or worldwide index. Recent Dutch regulatory precedent has tended to use a mixture of Dutch, European, and in some cases the world market as the reference capital market. The highly integrated nature of financial markets suggests that the opportunity set facing investors is significantly wider than the Dutch domestic market. Similarly, examination of the composition of major shareholders in KPN shows that the vast majority are non-domestic: of the top 47.7% of KPN equity, only 6.5% is held by a Dutch investor (the State), the remainder mainly comprises US and European funds.[1]

Based on evidence suggesting that the investment horizon for the typical investor in KPN is wider than the Dutch domestic market, we use the Eurozone market as our primary reference market. We also draw on wider European (and to a lesser extent, world market evidence), where relevant. Further, we cross-check our primary estimates against Dutch domestic evidence to ensure that any country-specific factors are not overlooked.

2.2. Current or Historic Evidence

From a practical viewpoint, it is widely recognised that robust estimates of both the equity risk premium and beta can only be obtained using historic time series data. With regard to the risk-free rate and cost of debt, estimates can be based on either very short term (or spot) data or longer term yield evidence.

[1] Based on equity holdings information from Bloomberg, 08/01/07.

In estimating the risk-free rate, we follow regulatory precedent in the Netherlands and we use a one-year historical period. This methodology was agreed by the Industry Group as the basis for calculating the cost of capital applying over a one year price cap period (of 31 July 2003 to 30 June 2004) and we have used this methodology in updating the estimates of the cost of capital since then.

3. The Risk Free Rate

3.1. Methodology

The expected return on a risk-free asset, ($E[r_f]$), or the "risk-free rate", is the return on an asset which bears no systematic risk at all – i.e the risk-free asset has zero correlation with the market portfolio. Alternatively, the real risk-free interest rate can be thought of as the price that investors charge to exchange certain current consumption for certain future consumption. In part, it is determined by investors' subjective preferences and in part by the nature and availability of investment opportunities in the economy.

In line with the dominant methodology employed by practitioners and regulators we estimate the risk-free rate using government bond yield evidence. Our estimate is based on the following key principles:

- ***Preference for the use of index-linked evidence where possible.*** In practice it is generally difficult to identify an asset that fulfils the criteria of zero correlation with the market since inflation, as do other factors, has been shown to lead to covariance between theoretically risk-free government debt and equity returns. By being insulated from both inflation (and therefore inflation risk), yields on index-linked government bonds (ILGs) are less correlated with the market than the yields on bills and other government bonds, and are therefore closer to satisfying the theoretical requirement of having a zero beta.[2] For this reason various regulatory precedents, including the UK, relies on index-linked-gilts (ILGs) yields to provide the closest proxy to the risk-free asset.
- ***Supplementation of ILG evidence with nominal Government bond evidence.*** In order to provide a cross-check on the risk-free rate estimates obtained using ILG evidence, we further consider nominal Dutch and German Government bond yield evidence, deflated by inflation expected at the time of yield measurement.
- ***Use of one year historical averages.*** Our preferred estimate of the risk-free rate is based on a one year average of yield evidence, consistent with the length of the regulatory period as prescribed by the methodology agreed to by the IG in 2003.
- ***Use of bonds rated at AAA.*** The Netherlands' sovereign credit rating is AAA. In order to estimate a risk-free rate consistent with the country risk faced by investors in KPN, we only consider bonds with this rating.
- ***Use of Eurozone Government bond yields as our primary source of evidence.*** Our preferred reference market to be used in estimating the risk-free rate for KPN's cost of capital is the Eurozone market. However, as set out in Section 2, wider European and global evidence is also relevant, and we cross-check our primary risk-free rate estimates against this evidence accordingly.
- ***Use of 2008 maturity in estimating the risk-free rate to be used in estimating the cost of capital applied in the calculation of the price cap applying over the period mid-2007 to mid-2008.*** This methodology was agreed by the Industry Group as the basis for calculating the cost of capital applying over a one year price cap period (of 31 July 2003

[2] This point was made by Stephanie Holmans in Ofwat RP5 (1996), Section 2.5.

to 30 June 2004) and we have used this methodology in updating the estimates of the cost of capital since then.

3.2. Index-Linked Government Bonds

In this Section we present evidence on international index-linked government bond (ILG) yields.

3.2.1. Eurozone ILGs

As stated above, we consider that the appropriate primary reference market to be used in estimating WACC parameters for KPN cost of capital is the Eurozone market. We therefore consider Eurozone ILG yields as our first-tier of evidence in evaluating the appropriate risk-free rate for KPN. Only France has an AAA bond with a close maturity (2009). Other Eurozone ILGs have longer maturities and/or lower credit ratings (such as Italy which has a 2008 bond but an A+ foreign currency rating).

Analysis of bid-ask spreads suggests that the French bond is sufficiently liquid – the one year average bid-ask spread is 0.06%, comparable with an average of 0.05% for nominal German government bonds of a similar maturity (2008).[3]

We therefore consider the French bond maturing in 2009 as our primary first-tier source of evidence on the real risk-free rate for the price cap. This evidence is presented in Table 3.1.

Table 3.1
Conclusion on First-Tier Evidence on the Real Risk-Free Rate

	Issue Date	Maturity	1Y Average Yield to Maturity[1]
France	29/09/1998	25/07/2009	1.5%

Source: NERA analysis of Bloomberg data. Measured over period 06/01/2006 to 05/01/2007

The Table shows that the average yield to maturity for the first-tier wider Eurozone ILGs meeting our methodological criteria is 1.5% on a one year historical basis for application to the price cap calculation. Given the small size of this sample, we consider other European evidence, in addition to cross-checking against nominal German and Dutch government bond evidence, in order to further ensure robustness of our estimate. This additional evidence is presented in the following sections.

3.3. Other European ILGs

We also consider ILG evidence based on wider European (non-Eurozone) markets as a cross-check on our risk-free rate estimated above using Eurozone government bond evidence.

Two wider European (non-Eurozone) AAA-rated governments currently have ILGs outstanding; the UK and Sweden. Of these two issuers, the UK is the larger issuer – it has a market value of $126bn outstanding, whilst Sweden's outstanding bonds total $31bn.[4]

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[3] Based on NERA analysis of Bloomberg data.

A single Swedish bond is issued with maturity of 2008 and sufficient historical evidence to estimate a one year historical average yield in line with our methodological approach set out in Section 2.

Analysis of bid-ask spreads suggests that the Swedish bond is sufficiently liquid – the one year average bid-ask spread is 0.08%, comparable with an average of 0.05% for nominal German government bonds of the same maturity.[5]

Significant and widely acknowledged distortions to yields arising from institutional factors mean that UK ILG evidence cannot be robustly used in estimating the forward-looking risk-free rate. Yields have been widely acknowledged to be downwardly biased by factors since 1997 which have artificially inflated demand for UK ILGs, primarily the MFR and later the FRS17. [6] [7] [8]

Our concluding set of wider European evidence on the real risk-free rate is therefore based on the Swedish ILG with a maturity of 2008 measured over a one year period.

Table 3.2
Other European Evidence on the Real Risk-Free Rate

	Issue Date	Maturity	1Y Average Yield to Maturity[1]
Sweden	01/12/1995	01/12/2008	1.2%

Source: NERA analysis of Bloomberg data. Measured over period 06/01/2006 to 05/01/2007

The Table shows that the average yield to maturity for the second-tier wider European ILGs meeting our methodological criteria is 1.2%.

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4 Based on NERA analysis of Bloomberg data.

5 Based on NERA analysis of Bloomberg data.

6 See for example the Bank of England: "*The Minimum Funding Requirement led to strong institutional demand for ILGs. The combination of strong and rather price-insensitive demand (largely from pension funds) with limited supply has pushed real yields down, perhaps more than in the conventional gilt market. Consequently, real yields in the ILG market may not be a good guide to the real yields prevailing in the economy at large*"[6] (Bank of England (1999) *Quarterly Bulletin*, May).

7 FRS17 refers to Financial Reporting Standard 17. This sets out the requirements for accounting for retirement benefits in company accounts and will replace SSAP24 'Accounting for Pension Costs' when it is fully implemented. The Debt Management Office (DMO) argued that the introduction of FRS17 may lead to an increase in demand for government gilts and strong corporate bonds as companies reallocate their pension portfolios from equities into gilts. The DMO cites the extreme example of Boots PLC which moved all its pension fund assets, around £2.3bn, predominantly from equities into long-dated gilts in 2001(DMO (2002) "Annual Review 2001-02", p11).

8 Regulators in the UK have widely acknowledged the downward bias in UK ILG yields – see for example, Competition Commission (2003) "Vodafone, O2, Orange and T-Mobile: Reports on references under section 13 of the Telecommunications Act 1984 on the charges made by Vodafone, O2, Orange and T-Mobile for terminating calls from fixed and mobile networks", para 7.208.

3.4. Conclusions on ILG evidence

Table 3.3 summarises first- and second-tier ILG evidence for the Eurozone and wider European market.

Table 3.3
Conclusion on ILG Evidence

Eurozone (First Tier)	1.5%
Wider Europe (Second Tier)	1.2%

Source: NERA analysis of Bloomberg data.

3.5. Nominal German and Dutch Government Bond Evidence

As stated in Section 2.1, our preferred reference market for estimating the risk-free rate in assessing the cost of capital for KPN is the Eurozone market. In the sections above we have assessed relevant ILG evidence in accordance with our preference for the use of index-linked instruments in estimating the real risk-free rate. Given the relatively limited availability of direct Eurozone ILG evidence and in order to ensure comprehensiveness in deriving a robust estimate of the risk-free rate, we further consider nominal German and Dutch Government bond evidence. The use of German Government bonds is in line with standard regulatory and practitioner precedent in estimating the nominal risk-free rate for the Eurozone area. As a further consistency check, we also consider evidence on nominal Dutch Government bond yields. In line with our methodology set out in Section 3.1, we consider evidence on bonds fulfilling the following criteria:

- AAA rating;
- Sufficient liquidity as indicated by the bid-ask spread (proxied by a bid-ask spread no higher than 0.2%); and
- Maturity as close to mid-2008 as possible.

Table 3.4 presents evidence on nominal yields on German and Dutch Government bonds fulfilling the criteria set out above.

Table 3.4
One-Year Average Yields on German and Dutch Nominal Government Bonds

Issue Date	Maturity	1Y average nominal yield to maturity	Average (to 2008) Eurozone inflation forecast in 2006(1)	1Y implied average real yield to maturity
Germany				
10/07/1998	04/07/2008	3.4%	2.1%	1.4%
30/10/1998	04/07/2008	3.4%	2.1%	1.4%
16/05/2003	11/04/2008	3.4%	2.1%	1.3%
10/10/2003	10/10/2008	3.4%	2.1%	1.4%
Average		**3.4%**		**1.4%**
Netherlands				
26/01/1998	15/07/2008	3.4%	2.1%	1.4%
Average all		**3.4%**		**1.4%**

Source except where noted: NERA analysis of Bloomberg data. Measured over period 06/01/2006 to 05/01/2007. (1) Source for Eurozone inflation forecasts: Consensus Economics (2006). Average inflation calculated for all bonds as average inflation expected for 2007 and 2008. We assume that the 2006 forecast proxies expectations over our year's measurement period (January 2006 to January 2007).

The average of the nominal rates shown in the Table above is 1.4%. This is slightly lower than the 1.5% yield on our preferred source of evidence, the 2009 French government bond.

3.6. Conclusion on Real Risk-free Rate

Table 3.5 presents summary evidence on the real-risk-free rate.

Table 3.5
Conclusion on Real Risk-Free Rate

1st-Tier ILG Evidence	
Eurozone	**1.5%**
2nd-Tier ILG Evidence	
Europe (non Eurozone)	1.2%
Nominal Evidence	
Germany	1.4%
Netherlands	1.4%
Nominal Evidence Average	**1.4%**

Source: NERA analysis of Bloomberg data

Our primary estimate of the real risk-free rate is 1.5% based on Eurozone ILG evidence. As a consistency check on our primary ILG evidence we consider a number of further sources of supporting evidence, summarised as:

- Second-tier ILG (wider European) evidence indicates an average yield of 1.2%; and
- Nominal German and Dutch government bond evidence indicates an average implied real yield of 1.4%.

Wider sources of evidence indicate rates slightly lower than our primary source. This is likely to be because the wider European and nominal evidence is consistent with a slightly lower maturity than of the French bond. However, we do not downwardly adjust our estimate based on the French bond for two main reasons.

- Firstly, the difference between the ILG rate on the French bond and the real rate implied by nominal Eurozone evidence is small (10 basis points).
- Secondly, given recently historically low levels of global interest rates, risk around forward looking short rates is on the upside. We therefore prefer to exercise caution and not downwardly adjust our Eurozone estimate for small differences in maturity.

Our concluding estimate of the real risk-free rate to be used as an input into the cost of capital for KPN for determining the regulated tariff for sub-loop unbundling (SLU) applying over the period mid-2007 to mid-2008 is therefore 1.5%.

4. The Equity Risk Premium

The equity risk premium (ERP) is the difference between the expected return on the market portfolio and the expected return on a risk-free asset (formally stated as $E[r_m] - E[r_f]$ i.e. it is the reward investors demand for bearing the risk they expose themselves to by investing in equity markets.

In Section 4.1 we summarise recent Dutch and international regulatory precedent on estimates of the ERP. Section 4.2 summarises academic evidence on the ERP. In Section 4.3 we summarise the findings from analyses of long-run historical returns. Section 4.4 concludes.

4.1. Regulatory Precedents on the Equity Risk Premium

OPTA (2003) previously used an equity risk premium of 6.0% in setting the terminating interconnection price control for KPN in 2003.

Table 4.1 presents other recent Dutch (DTe) regulatory precedent on the equity risk premium.

Table 4.1
Dutch Regulatory Precedent on the Equity Risk Premium

Regulator	Case (date)	ERP
DTe	Regional Electricity Networks (2000)	5.5%
DTe	Gas Distribution (2001)	5.5%
DTe	Electricity Transmission (2003)	5.5%
DTe	TenneT (2004) (based on Tabors Caramanis & Associates)	6.4%
DTe	TenneT (2004) (based on Brattle Group)	5.7%-7.9%
DTe	GTS, RDNs and TenneT (2005-6)	5%

Source: DTe. We understand that the application of the cost of capital for GTS is currently uncertain following a court rejection of the NMa's proposed regulatory framework for GTS. However we present here the equity risk premia proposed by the NMa for the energy networks in the Netherlands.

Recent DTe precedent shows estimates of the ERP lying between 4% and 8%, with the weight of evidence close to 6%.

We also consider recent regulatory precedent on the ERP in other European countries, summarised in Table 4.2.

Table 4.2
Recent European Regulatory Decisions on the Equity Risk Premium

Institution	Case	ERP
CER (Ire)	BGE (2003)	5.0%
Ofgem (UK)	Final Proposals for DNOs (2004)	4.8%
Ofwat (UK)	Final Determinations (2004)	~5.0%
Ofcom (UK)	Various (2004) e.g. Partial Private Circuits charge control, TV licence renewal, mobile termination charges	5.0%
CAR (Ire)	Dublin Airport Authority (2005)	6.0%
AEEG (Ita)	Snam Rete Gas (2005)	4.0%
CER (Ire)	ESB (2005)	5.3%
ECK (Aus)	Gas Transmission (2006)	5.0%
CRE (Fra)	Electricity Distribution and Transmission (2006)	4.5%
CER (Ire)	Best New Entrant Price (2006)	5.5%
Ofgem (UK)	Transmission Price Control (2006)	5.2%

French and Italian regulatory precedent shows lower ERPs than those allowed by the DTe, CER and UK regulators, of 4.5%and 4.0%. Irish and UK regulators have typically allowed ERPs in the region of 5.0% to 5.5% and 4.8% to 5.2% respectively. Both regulators have recently allowed values at the upper end of these ranges.

In most cases, some consideration has been given to evidence on historic average returns, however UK authorities have generally judged that the historic ERP overstates the current risk premium. Estimates of the ERP have generally relied heavily on small sample survey evidence on the expectations of investors. Surveys that have been considered by the authorities include CLSE (1999), Price Waterhouse (1998), NERA (1998) and other evidence from investment bank analysts. The reliance on survey evidence has prevailed despite the CC itself recognising that *"this evidence may be subject to biases that are difficult to quantify and assess"* (Competition Commission, 2000a, paragraph 8.28).

However, more recently, justification for the ERP allowed by regulators has focused more on a range of evidence including long run historical evidence of equity returns, ex-ante evidence (price-earnings) in addition to survey evidence. This move away from the reliance on survey evidence, which has been subject to a number of criticisms, has paralleled recent increases in the ERP allowed by UK regulators.

Outside Europe, in countries including the US, and Australia the ERP has generally been set at a higher level. In the US, although the CAPM is not widely used to estimate the cost of equity, it is often used as a check on the DCF results. The most widely quoted source used in US hearings to assess the level of the ERP is the Ibbotson data.[9] The method recommended by Ibbotson is to compute the arithmetic average of stock market returns against long-term Treasury bond yields.

[9] Ibbotson Associates publish data on the ERP every year in a handbook, "Stocks, Bonds, Bills & Inflation".

4.2. Academic Evidence on the Equity Risk Premium

A large amount of academic literature exists discussing the ERP. In particular, the ERP has attracted significant recent academic debate, partly in response to the bullish equity markets observed in the US economy in the 1990s. Table 4.3 below presents selected academic estimates of the ERP, illustrating the large wide range of estimates of the ERP that have been derived in the literature.

Table 4.3
Recent Academic Evidence on the Equity Risk Premium

Source	ERP estimate	Details
Brealey and Myers (1996)	8.5%	Long-run historical data
Bowman (2001)	7.5%	Summary of various US based literature including historical and ex-ante evidence
Franks (2001)	5%	N.A
Dimson, Marsh and Staunton (2001)	5%-10% (Eurozone)	Ex post estimates based on 101 years of data. Based on arithmetic averages
Welch (2001)	5.5% (average)	Mean long-term expected risk premium of respondents to survey of financial economist professors
Fama and French (2001)	2.6%-4.3%	Estimates derived from dividend and earnings growth models over 2nd half of 20th century. Compares with estimate from average returns of 7.43%.
Ibbotson and Chen (2001)	5.9-6.2%	Historical and supply side models.
Oxera (undated)(1)	4.7%-8.5%	Ex post estimates of one year and five years returns averaged using various periods over the last 100 years. Using the whole period the ERP was around 5%
Ibbotson (2002)	6.7%	US real returns over 1926-2001
Ibbotson and Chen (2003)	5.9%	Arithmetic basis, decomposing equity returns into inflation, earnings, dividends, P/E, dividend payout ratio, book value, return on equity and GDP per capita.
Lally and Marsden (2004)	5.5%	New Zealand historical returns 1931-2000
Siegel (2004)	3.0%	DGM model, assuming that only a portion of dividend yield contributes to earnings growth
Dimson, Marsh and Staunton (2006)	6.0%	Average arithmetic returns on equity relative to bonds over period 1900 – 2005 for seven Eurozone countries

(1) Cited in Franks and Mayer (2001).

Of these studies, the Ibbotson and Chen (2001) study is widely quoted in international regulatory contexts.[10] The authors used historical evidence for the US market and supply

[10] See IPART (2002) and related submissions.

side models (egg. dividend growth models) to predict future equity risk premia. The authors conclude:

> *"Contrary to several recent studies that declare the forward-looking equity risk premium to be close to zero or negative, we find the long term supply of equity risk premium is only slightly lower than the pure historical return estimate. The long-term equity risk premium is estimated to be about 6% arithmetically and 4% geometrically. Our estimate is in line with both the historical supply measures of public corporations (i.e. earnings) and the overall economic productivity (GDP per capita)".*

4.3. Historical Evidence on the Equity Risk Premium

LBS/ABN AMRO Studies

Dimson, Marsh and Staunton (LBS/ABN AMRO, 2006) report the returns on equity markets for 17 countries around the world over the last 105 years, and compares them against the returns on treasury bills and bonds. The results are summarised in Table 4.4 for the Eurozone markets reported by Dimson, Marsh and Staunton (DMS), US, UK and the world average.

Table 4.4
LBS / ABN AMRO (2006) Estimates of the Equity Risk Premium, Relative to Bonds, Arithmetic Averages (1900 – 2005)

Belgium	4.4%
France	6.0%
Germany[1]	8.3%
Ireland	5.2%
Italy	7.7%
The Netherlands	5.9%
Spain	4.2%
Eurozone average	**6.0%**
USA	6.5%
UK	5.3%
World average (unweighted)[2]	**6.1%**
World (DMS weighted index)	**5.1%**

Source: LBS / ABN AMRO (2006) "Global Investment Returns Yearbook. The estimates are based on returns over 104 years of data, with 1922/3 excluded where hyperinflation had a major impact on the risk premia and bills returned –100%. .(2) This is a NERA-calculated unweighted average of: Australia, Belgium, Canada, Denmark (from 1915), France, Germany, Ireland, Italy, Japan, Netherlands, Norway, South Africa, Spain, Sweden, Switzerland (from 1911), UK and USA.

In line with our approach set out in Section 2.1 our primary estimates of the cost of capital to be used in setting a tariff for SLU from KPN are based on Eurozone data. The Table shows that the un-weighted Eurozone average arithmetic ERP relative to bonds measured over the period 1900-2005 ranging from 4.2% to 8.3%, with an average of 6.0%.

This estimate is consistent with the un-weighted world average (average of 17 countries reported by DMS) of 6.1%. DMS report a lower figure of 5.1% for their constructed market cap weighted World Index, however, we note that this index is dominated by the US (in 2005 DMS (2006) report that the US comprised 48% of world market capitalisation and the UK 10%. These proportions are likely to be even higher historically). This average may therefore not be as relevant as a secondary source of supporting evidence as the un-weighted world average. Both the Eurozone and un-weighted world averages are consistent with the Netherlands average of 5.9%.

In conclusion, the updated Dimson, Marsh and Staunton data shows an equity risk premium for the Eurozone ranging broadly from 4% to 8% and averaging 6%. This is consistent with World and Netherlands evidence.

Choice of averaging process

Substantial debate has taken place over whether average realised historical equity returns should be calculated using either geometric or arithmetic averages.

A large number of recent academic papers have stated a preference for the use of arithmetic means of historical data to estimate a prospective equity risk premium. Two examples of the arguments presented are as follows:

- Dimson, Marsh and Staunton (2000) argue (p.9) that "When decisions are being taken on a forward-looking basis, however, the arithmetic mean is the appropriate measure since it represents the mean of all the returns that may possibly occur over the investment holding period".[11]
- In his book "Regulatory Finance", Morin (1994) argues, "One major issue relating to the use of realized returns is whether to use the ordinary average (arithmetic mean) or the geometric mean return. Only arithmetic means are correct for forecasting purposes and for estimating the cost of capital."

Consistent with recent mainstream academic wisdom, NERA favour the use of the arithmetic rather than the geometric mean in deriving an average measure to calculate the ERP using historical data.

In their Millennium Book, Dimson, Marsh and Staunton (2001) note that historical evidence on the equity risk premium may overestimate the prospective risk premium. In particular, they argue (p.134) that periods of extreme volatility observed during the 20th century may mean that arithmetic averages of historical data may overestimate the prospective risk premium. They present recalculated arithmetic averages of the risk premia based on projections of early 21st century levels of volatility. Based on this evidence they show that arithmetic averages are around 0.6% lower when re-based for assumed lower levels of market volatility.[12] However, we note that this adjustment is contested (see for example Wright,

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11 Dimson, Marsh and Staunton (2000) "*Risk and Return in the 20th and 21st Centuries*", Business Strategy Review 2000, Volume 11 Issue 2, pp1-18.

12 In Table 28 of their report, Dimson, Marsh and Staunton show that the predicted arithmetic mean equity risk premia versus bills for the UK is 5.9%. This compares to historical evidence presented in Table 25 that shows the UK equity risk premia relative to bills of 6.5%.

Mason and Miles (2003).[13] Caution over adjustments for differences in forward looking volatility relative to long run historical levels may be particularly relevant with respect to recent market behaviour since 2001 (occurring after DMS (2002)) which has demonstrated periods of volatility significantly higher than previous average levels. Other arguments are presented by Dimson, Marsh and Staunton that also suggest that future ERPs may differ from historical estimates. These arguments can be summarised as:[14]

§ Systematic underestimation of inflation by investors;

§ High levels of technological, productivity and efficiency growth over the 20th Century that they (DMS) consider are unlikely to be repeated; and

§ Observed rising stock prices (and therefore returns) are also suggested to be a sign of lowered long term investment risk which would result in a reduction in ***required*** rates of return.

Dimson, Marsh and Staunton's conclusion that the prospective equity risk premium is lower than the historical equity risk premium is not without controversy. There are a number of criticisms of DMS' approach to and justification for deriving downward adjustments to historical returns evidence, made both by other academic commentators and by DMS themselves. Details of these criticisms are set out in Appendix A.

In summary, Dimson, Marsh and Staunton (2006) present long-run ex-post evidence that suggests an ERP for Netherlands and the major Eurozone markets ranging from 4.2% to 8.3%, averaging 6.0% and a world average of 6.1%, based on arithmetic historic averages. We object to any adjustment of historic averages without a formal proof that historic ERP estimates are biased. In the absence of such a reliable proof (and with it a robust and transparent methodology to adjust historic data) any adjustment of historic data is highly arbitrary. We therefore, rely on Dimson, Marsh and Staunton's analysis of long-run historical evidence of the ERP, which shows an equity risk premium of around 6% for the Netherlands.

4.4. Summary and Conclusions on the Equity Risk Premium

We summarise evidence presented in this section:

§ OPTA and DTe regulatory precedent shows estimates of the ERP in the range of 5.0% to 8.0%.

§ Recent other European regulatory precedent shows central estimates of the ERP in the range of 4.5% to 6.0%.

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13 Wright, Mason, Miles (2003), "A Study into Certain Aspects of the Cost of Capital for Regulated Utilities in the UK", Smithers and Co Ltd.

14 The authors show, by decomposing the historical ERP and subtracting the estimated impact of unanticipated cash flows and reductions in investors' required rates of return, that predicted ERPs are likely to be greater than historical estimates. Overall, the authors conclude that factors such as these would have likely led to a reduction in investors required rates of return and a reduction in the equity risk premium. They conclude that this evidence suggests (p.149) that the net effect of these factors means an expected equity risk premium on an annualised basis is around 3-4 percent; and on an arithmetic mean basis is around 4-5 percent. This is around 1.5% lower than the ERP implied by the historical averages.

- International regulatory precedent shows central estimates of the ERP in the range of 5.0% to 7.0%.
- Recent academic papers generally conclude that the equity risk premium lies in a range of 4% to 8%. The widely quoted Ibbotson and Chen (2001) study estimates an equity risk premium in the range of 4% to 6%.
- Long-run arithmetic historical averages of the ERP for Eurozone and World countries, presented by ABN AMRO and LBS (Dimson, Marsh and Staunton (2006) suggest an ERP lying in the centre of the range of 4% to 8%.

Overall, we conclude that Dimson, Marsh and Staunton's analysis shows that the equity risk premium is most likely lie around 6%. This is consistent with the midpoint of the range and average arithmetic ERP for Eurozone countries, and is consistent with the average ERP for the World and Netherlands measured over the period 1900-2005.

Of all the evidence presented we consider the LBS/ABN AMRO data on the historical equity risk premia over 1900-2005 to be the most compelling. This data source is widely recognised as the most comprehensive and consistent dataset of historical returns. It also produces estimates of the ERP that are remarkably consistent across countries over a long period of time.

We conclude that 6%, the central point indicated by the Dimson, Marsh and Staunton analysis is the appropriate ERP for our Eurozone reference market, taking into account regulatory precedent and other academic evidence. We note further that our estimate is consistent with other recent regulatory precedent (e.g. DTe) in Holland.

5. Beta

There are two key issues involved in the estimation of a beta coefficient for KPN. These are:

- The appropriate time-frame over which to estimate the betas; and
- The method of de-leveraging our observed equity betas to derive comparable asset betas.

We discuss these two issues below.

5.1. The Time Frame

Beta estimates are generally obtained by means of regression analysis using historical evidence of the relationship between the returns to a company and the returns to the market as a whole. However, using historical evidence raises the question of the appropriate time period over which to estimate beta.

It is standard practice to estimate betas over a range of time periods between 6 months and 10 years and for data periodicities ranging from daily to monthly. Since the beta estimate is to be used as a forward looking measure of risk, under the assumption of market efficiency, the most economically relevant estimation time frame is the most recent period. However, there are three reasons why consideration should be given to betas derived from longer time periods.

- Beta estimates require a sufficiently long time period to smooth out the effects of business cycles
- Short term excess volatility can distort beta estimates
- A longer time period provides more statistically robust regression results.

As set out in Section 2, we estimate the beta based on a one year historical period. In order to ensure that this estimate is robust we cross-check our beta estimate against estimates made over a range of time periods (6M to 5Y).

5.2. Estimating Asset Betas from Observed Equity Betas

There are two adjustments we have to make to our observed equity (or regression) betas to derive asset betas.

The Blume Adjustment process

First, the raw betas (or historical betas, i.e. those betas obtained from the regression of the company's stocks against the market index) have been adjusted according to a simple deterministic formula:

$$\beta_{Equity\text{-}adjusted} = (0.67)*\beta_{Equity\text{-}raw} + (0.33)*1.0.$$

This is referred to as the Blume technique.

Blume tested to see if forecasting errors on based on historical estimates were biased. Blume demonstrated that a tendency for estimated betas to regress towards their mean value of one. The adjustment formula above captures this tendency. There is also an alternative adjustment process, referred to as the Vasicek process. Vasicek developed a method for adjusting betas that took into account differences in the degree of sampling error for individual firm betas rather than applying the same adjustment process to all stocks.

There has not been extensive research into their comparative accuracy. Klemkosky and Martin (1975) discovered that the Vasicek technique had a slight tendency to outperform the Blume technique[15]. However, a slightly later study by Eubank and Zumwalt (1979) concluded that the Blume model generally outperforms the Vasicek model over shorter timeframes, with little difference between the over long time periods[16].

Allowing for financial risk

The value of the equity beta (i.e. the beta obtained from regression analysis) will not only reflect business riskiness, but also financial riskiness.[17] Equity betas have been adjusted for financial risk ("de-levered") to derive asset (or "unlevered") betas according to the following formula:[18]

(5.1) Miller formula: $\beta_{equity} = \beta_{asset}\ (1+(D/E))$

where D represents a company's debt, and E represents a company's equity.

One IG respondents queried NERA's use of formula 3.4, stating that the following formula attributable to Modigliani and Miller is preferable for unlevering Betas:

(5.2) Modigliani-Miller formula: $\beta_{equity} = \beta_{asset}\ (1+(1-t_e)\ (D/E))$

where t_e is the effective tax rate.

The basic difference between the Modigliani-Miller theory and the Miller theory is as follows: Modigliani-Miller assumes that debt is treated more favourably than equity, which in practice occurs through the effect of corporate tax shields on debt. Miller, subsequently, raised the possibility that debt could be treated more favourably than equity when there are different personal tax rates on debt that offset the effect of the corporate tax shields.

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15 Klemkosky and Martin, The Adjustment of Beta Forecasts", Journal of Finance, X, No. 4 (1975); cited in Elton and Gruber, Modern Portfolio Theory and Investment Analysis, Fifth Edition, page 145.

16 Eubank and Zumwalt, "An analysis of the Forecast Error Impact of Alternative Beta Adjustment Techniques and Risk Classes", Journal of Finance, 33 (5), 1979; cited in The Cost of Capital, Theory and Estimation, C S Patterson, page 127.

17 As a company's gearing increases, the greater the variability of equity returns, since debt represents a fixed prior claim on a company's operating cashflows. For this reason, increased gearing leads to a higher cost of equity.

18 This formula is attributed to Miller (1977).

Some recent empirical evidence suggests that the more appropriate formula for levering and un-levering betas is the Miller formula.[19] We also prefer to use this formula for its simplicity since it does not require estimation of forward-looking effective tax rates for telecommunications companies.

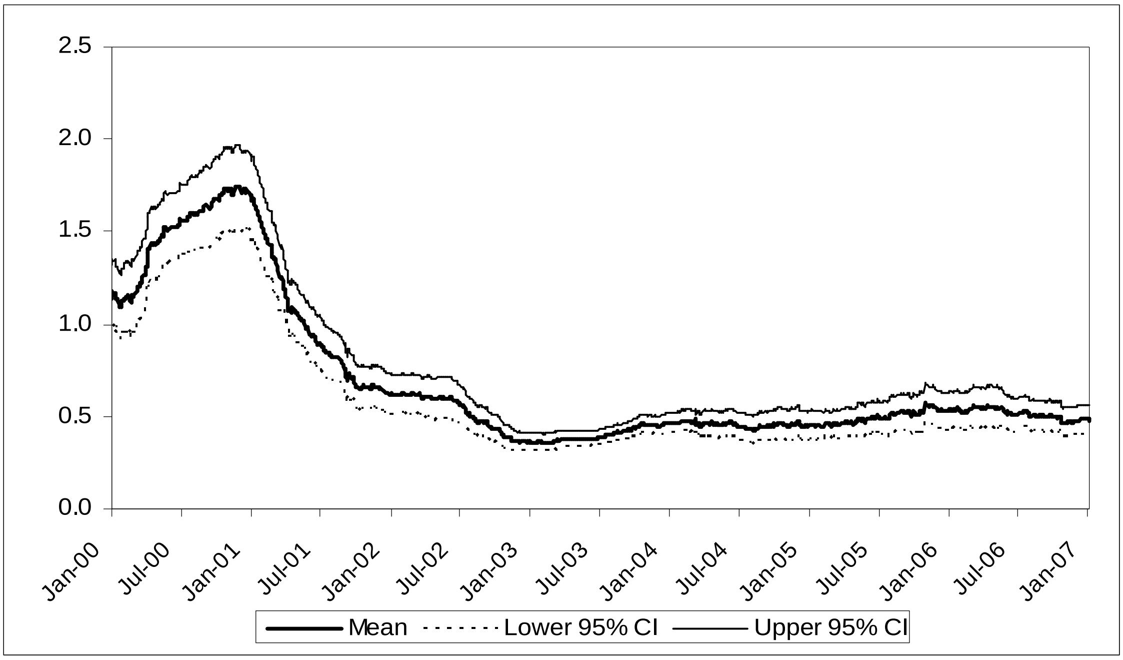
The impact of using the Miller formula rather than the Modigliani-Miller formula is the derived asset beta is lower. However, when the beta is levered back up to an assumed gearing of 25% or 50% the overall impact on the WACC is very small.

5.3. Empirical Evidence

Figure 5.1 shows a time series of KPN's asset beta estimates from January 2000 to August January 2007 (represented by the thick line). This time series consists of 1-year rolling daily asset betas (i.e. calculated using two years of historical daily data at each point in the series shown). Beta estimates have been estimated against the DJ Stoxx European 600 Index. We also calculated the 95%-confidence interval for our KPN's (mean) beta estimate (represented by the upper and lower lines), i.e. we can be reasonably sure that the "true" beta estimate is within range of the upper- and lower lines.

[19] A recent study by Graham (2002) in the Journal of Finance suggests that personal taxes in the US can offset 50% of the debt interest tax shield. Other recent theories originating with Miles and Ezzell (1980) have noted that the expected value of the corporate debt tax shield declines with increasing debt since as a firm increases its debt it becomes less likely that the firm will pay tax in any given state of nature. These theories are particularly relevant for the current volatile circumstances of the telecom industry where the value of the interest tax shield is lower.

Figure 5.1
KPN 1-Year Daily Rolling Asset Beta
(Mean Estimate, 95%-Confidence Interval)



Source: NERA analysis of Bloomberg data.

Figure 5.1 shows that KPN's historic one-year asset betas have been reasonably stable over the last year ranging from around 0.47 to 0.56, with the most recent one-year asset beta of 0.48. The Figure also shows that the 95% confidence intervals are narrow – the most recent 1Y daily asset beta confidence interval is 0.40 to 0.56.

Table 5.1 presents estimates of KPN and other European telecommunications companies' beta values using daily and weekly time intervals.[20]

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[20] Comparators to KPN are selected on the basis of comparable status as major telecommunications operators (preferably former fixed line incumbent) undertaking fixed line, mobile and other data activities. We have refined our comparator set since our last report for OPTA dated 21/02/06. Firstly, we have removed TDC and Portugal Telecom. In the case of the former, an 88% acquisition in January 2006 by Nordic Telephone Co means that TDC's typical equity price co-movement with the market is likely to be distorted as trading is restricted to a 12% stake and prices will be dominated by parent company activities which may be unrelated to TDC's fundamental systematic risk. Secondly, for a similar reason we also exclude Portugal Telecom – which has been the subject of a hostile acquisition for 100% of its equity by Sonaecom announced in February 2006. The acquisition is currently still pending, however the equity price of Portugal Telecom will be distorted by progress of the acquisition and the activities of the parent-to-be company. Both TDC and Portugal Telecom have significantly lower betas than the remainder of the comparator group, consistent with the acquisition status of both.

Table 5.1
Asset Beta Estimates for KPN and European Telecommunications Comparators

	6M Daily	1Y Daily	2Y Weekly	5Y Weekly
Royal KPN NV	**0.44**	**0.48**	**0.55**	**0.45**
Upper bound for KPN's beta	***0.56***	***0.56***	***0.69***	***0.53***
TeliaSonera AB	0.83	0.90	0.81	0.79
BT Group PLC	0.54	0.45	0.46	0.52
Deutsche Telekom AG	0.50	0.42	0.43	0.45
Telefonica SA	0.49	0.48	0.47	0.61
France Telecom SA	0.54	0.51	0.55	0.43
Average excl KPN	**0.58**	**0.55**	**0.55**	**0.56**

Source: Bloomberg/NERA analysis of Bloomberg data. Betas have been estimated against the DJ Stoxx European 600 Index (SXXP), over time periods which end on 05/01/2007. The gearing rates used for unlevering are the averages of debt/market cap ratios supplied by Bloomberg over the time period in question. Raw equity betas have been adjusted using the following formula: $b_{equity\_adjusted}$ *= (0.67)**b_{equity_raw} *+ (0.33)*1.0. The equity betas reported in the table are the adjusted betas. (3) Adjusted equity betas have been unlevered using equation the following formula:* $b_{equity\_adjusted} = b_{asset}$ *(1+(Debt/Equity).*

The Table shows that asset betas for KPN and the industry average are broadly invariable to the measurement period – KPN's asset beta ranges between 0.44 (6M) and 0.55 (2Y), whilst the industry average asset beta ranges between 0.55 (2Y) and 0.58 (1Y).

KPN's asset beta is consistently lower than the average beta for major European comparators; the average asset beta of our proxy comparators ranges from 0.55 to 0.58. However we note, the beta estimate is based on a regression analysis and will therefore contain a statistical error.

In Table 5.1 we present therefore the upper bound of the 95%-confidence interval for KPN's asset beta, which is calculated as 0.56. That is, KPN's "true" asset beta is very unlikely to be larger than this value.

Our preferred beta estimate is the 95%-confidence upper bound of KPN's 1 year beta estimate of 0.56. The 95%-confidence upper bound gives us confidence that KPN's true asset beta is not larger than 0.56. Our preferred estimate of 0.56 is consistent with the average of 1 year asset betas (0.55) for similar European telecommunications companies.

6. The Cost of Debt and Gearing

6.1. Cost of Debt

NERA's approach to estimating a cost of debt is based on *actual* market evidence of historic debt issues by KPN. This reflects most closely both KPN's likely cost of debt finance prevailing over the near future (such as the regulatory price cap period 2006 to 2008) and historical actual debt costs. This cost of debt estimate can therefore be used in both estimation of the cost of capital applicable to the price cap and in historical CEA analysis.

Table 6.1 presents information on the average spreads over government bonds of debt issued by KPN and comparator companies.

Table 6.1
KPN's EURO Debt Issues
(Excluding Callable/Convertible Bonds)

Issue date	Maturity	S&P Rating	Years to Maturity	Coupon	Eurozone Inflation Forecast[1]	1Y Implied Real Coupon[2]
05/11/1998	05/11/2008	BBB+	2	4.75	2.1%	2.6%
21/07/2004	21/07/2009	BBB+	3	4.15	2.0%	2.1%
21/07/2004	21/07/2011	BBB+	5	4.5	2.0%	2.5%
16/03/2006	18/03/2013	BBB+	7	4.5	1.9%	2.5%
22/06/2005	22/06/2015	BBB+	9	4	1.9%	2.0%
13/11/2006	17/01/2017	BBB+	11	4.75	1.9%	2.8%
Weighted average[3]			**6.4**			**2.4%**

Source: NERA analysis of Bloomberg data. (1) Inflation forecast is average of2006-forecast inflation over the maturity of the bond (2) Real implied yield calculated as (1+nominal yield)/(1+forecast inflation)-1 (3) Averages have been weighted by total amount currently outstanding.

According to the data presented above, the real implied weighted[21] average coupon of all of KPN's normal (non callable/convertible) bonds outstanding (denominated in euros) is 2.4%. Since KPN will continue to pay interest on all of the above bonds over the regulatory period of mid 2007-mid 2008, the weighted average real coupon of 2.4%, which is consistent with a maturity of 6.5 years, is our preferred estimate of the cost of debt.

Over the forward looking regulatory period of 2007-2008, it is likely that KPN will issue further debt (although this will in all likelihood be a significantly small amount than currently outstanding). In order to ensure that our estimate of the actual cost of debt based on coupon costs is consistent with likely forward looking costs of raising new debt, we cross-check our estimate against:

§ 1Y average yields to maturity for KPN's bonds as set out above;

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[21] We used the total amount outstanding of each bond issue to weight the different coupons.

- § 1Y average yields to maturity for a corporate Euro denominated bond index of the same credit rating and approximate maturity as the weighted average for KPN's bonds above.[22]

Yields to maturity for KPN's Euro debt issues are set out in the Table below.

Table 6.2
KPN's Euro Denominated Debt Issues
(Excluding Callable/Convertible Bonds)

Issue date	Maturity	S&P Rating	Years to Maturity	1Y Nominal Yield to Maturity	Eurozone Inflation Forecast[1]	1Y Implied Real Yield to Maturity[2]
05/11/1998	05/11/2008	BBB+	2	4.0%	2.1%	1.9%
21/07/2004	21/07/2009	BBB+	3	3.5%	2.0%	1.5%
21/07/2004	21/07/2011	BBB+	5	4.5%	2.0%	2.5%
16/03/2006	18/03/2013	BBB+	7	4.7%	1.9%	2.7%
22/06/2005	22/06/2015	BBB+	9	5.0%	1.9%	3.0%
13/11/2006	17/01/2017	BBB+	11	5.0%	1.9%	3.0%
Weighted average[3]			**6.4**			**2.5%**

Source: NERA analysis of Bloomberg data. (1) Inflation forecast is average of2006-forecast inflation over the maturity of the bond (2) Real implied yield calculated as (1+nominal yield)/(1+forecast inflation)-1 (3) Averages have been weighted by total amount currently outstanding.

The weighted average 1Y implied real yield to maturity is 2.5%, fractionally higher than our estimate of 2.4% based on the coupon costs for KPN.

We further check the 1Y implied real yield on the Bloomberg Euro denominated BBB+ corporate bond index for the maturity available that is closest to 6.4 years (7 years). This is set out in the Table below.

Table 6.3
1Y Yield on Bloomberg Composite BBB+ Corporate Index

1Y Nominal Yield	Eurozone Inflation Forecast[1]	1Y Implied Real Yield[2]
4.4%	1.9%	**2.4%**

Source: NERA analysis of Bloomberg data: BFV EUR Eurozone Industrial BBB+ 7 Year. Note that Bloomberg includes callable bonds, and the yield presented here is yield to worst for these bonds and yield to maturity for bullet bonds.

The implied real 1Y average yield for the Bloomberg Corporate Index is 2.4%. This is consistent with our estimate of coupon costs based on KPN's debt.

To conclude, our preferred estimate of the real cost of debt for KPN is 2.4%. This reflects the weighted average cost of KPN's currently outstanding debt over the period mid 2007-mid 2008. It is also consistent with expected future coupon costs of new debt issued over the period, as measured by 1Y average yields on actual and comparator bonds to KPN of 2.4% to 2.5%.

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[22] We assume, in the absence of further information, that the weighted average maturity of any debt issued by KPN over the period mid 2007-2008 will be the same as of currently outstanding debt – i.e. 6.4 years.

6.2. Gearing

We calculate KPN's market gearing level as total debt outstanding divided by the market value of equity. Consistent with our approach elsewhere we take historical gearing over the past year as the best expectation of forward looking gearing over the period mid-2007 to mid-2008. Based on market gearing we also calculated the financial gearing, which is total debt over enterprise value (D/(D + E)). This is shown in Table 6.4.

Table 6.4
KPN's Gearing 2005-06

Quarter	Market Gearing D/E	Financial Gearing D/(D+E)
30/09/2006	52%	34%
30/06/2006	53%	34%
31/03/2006	50%	33%
31/12/2005	49%	33%
Average	**51%**	**34%**

Source: NERA analysis of Bloomberg data. Note that gearing for December 2006 quarter end is not yet available. We use total debt/market cap as reported by Bloomberg and in line with our previous approach.

For our purpose of calculating the average weighted cost of capital for KPN, we rely on KPN's most recent one year average financial gearing of 34%.

We would not expect the gearing assumption to matter significantly to the cost of capital estimate as the benefits of increased debt finance above 40% are largely offset through a higher cost of equity.

7. WACC Estimates

Table 7.1 presents our overall estimate of the cost of capital for KPN to be used as an input to the calculation of the tariff applying to sub-loop unbundling over the period mid-2007 to mid-2008.

Table 7.1
Cost of Capital for KPN

Generic parameters	
Real risk-free rate	1.5%
Financial gearing (D/(D+E)	34%
Market gearing (D/E)	51%
Corporate tax rate	25.5%
Cost of equity	
ERP	6.0%
Asset beta	0.56
Equity beta	0.84
Real post-tax cost of equity	6.5%
Cost of debt	
Real cost of debt	2.4%
WACC	
Real post-tax WACC (Net of Debt Tax Shield)	5.0%
Real pre-tax WACC	6.6%

Source: NERA analysis.

Our best estimate of the real pre-tax cost of capital for KPN over the period mid-2007 to mid-2008 is 6.6%

Appendix A. Evidence on the Historical ERP

DMS (2002) state that "*a crude estimate of the expected equity risk premium is the arithmetic mean of the one-year historical premia"* (p.183). Further, DMS (2002) recognize that "*historical arithmetic means […] are clearly influenced by past levels of stock market volatility (among other factors)"* (p.184). They therefore suggest that estimates of expected future arithmetic risk premia must be calculated based on current predictions of market volatility (p.184).

We note that DMS's adjustments to historical averages are highly contested. First, with regard to declining volatility, Wright, Mason and Miles (2003)[23] note that

> *"There is indeed a reasonable amount of evidence that macroeconomic aggregates like GDP became more stable in the second half of the twentieth century. But, at least in mature markets, the evidence that stock markets, as opposed to the rest of the economy, have got much safer, is distinctly weaker. In economies that escaped major disruption, such as the UK or the US, there is little or no evidence of a decline in stock return volatility." (p. 39)*

Moreover, DMS (2002a) are themselves cautious about their volatility adjustments:

> *"For our estimates of arithmetic premia, we illustrate the approach using the same volatility for all national markets. That cannot be correct since markets inevitably expose investors to differing levels of risk. Nevertheless, for simplicity we assume a current volatility level for all sixteen national markets of 16%, and for the world index of 14%....Clearly, the volatility of one stock market is not in reality the same as another. Different stock markets have had differing risk levels in the past, and projections for the future should not be uniform […] We therefore stress that assuming the same projected volatility for all premia is an expositional device, no more." (p. 184)*

23 Wright, Mason, Miles (2003), "A Study into Certain Aspects of the Cost of Capital for Regulated Utilities in the UK", Smithers and Co Ltd.

The second issue of systematic underestimation of inflation by investors has been discussed in a range of academic papers. A recently published book by Cornell (1999) on "The Equity Risk Premium" does not agree that investors have systematically underestimated inflation over the 20th century.[24] Cooper and Currie (1999) in their analysis of the cost of capital for the UK water sector also concluded that it was implausible that investors had systematically underestimated inflation over a long period of time. A number of other recent academic papers have reached similar conclusions.[25]

Third, Wright, Mason and Miles (2003)[26] question DMS' (2001) argument that the trading costs of forming diversified portfolios have decreased. They note that the portion of the population investing indirectly in the stockmarket (e.g. via pension funds) has risen substantially in recent years, which may have increased principal-agent cost for the average investor.

Fourth, DMS (2002b) themselves write on their adjustment for unanticipated growth:

> *"This is clearly a rather ad hoc measure of unanticipated real dividend growth, but it suffices to illustrate the general idea." (p. 15)*

And when discussing the increase in the price/dividend ratios over the century to justify their adjustment for the required risk premium, they state:

> "*Undoubtedly, the change is in part a reflection of expected future growth in real dividends, so we could in principle decompose the impact of this valuation change into both an element that reflects changes in required rates of return, and an element that reflects enhanced growth expectations. To keep things simple, we assume that the increase in the price/dividend ratio is attributable solely to a long-term fall in the required risk premium for equity investment." (p. 15)*

In conclusion, DMS (2001) state that

> *"We acknowledge that our dividend projections are simplistic, and the reader should not put too much weight on cross-country differences" (p. 192)*

and, in addition to four other caveats on the "scope to finesse our estimates of the expected risk premium",

> *"Fifthly, and very importantly, we use a naïve model of investors' dividend expectations, an issue that merits further research." (p. 193).*

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24 "Although the United States did experience a prolonged period of unexpected high inflation between 1973 and 1980, the rate then dropped unexpectedly over the period between 1982 and 1990…(T)his means that although bondholders have experienced both good and bad intervals because of inflation, inflation has had almost no impact over the full period on their average returns. Consequently, inflation cannot explain the large average difference between the historical returns on equity and the historical returns on long term treasury bonds"

25 See Cooper and Currie (1999) and Draper and Paudyal (1995).

26 Wright, Mason, Miles (2003), "A Study into Certain Aspects of the Cost of Capital for Regulated Utilities in the UK", Smithers and Co Ltd.

We concur with the authors that the methodology used in deriving unanticipated growth is "simplistic". The authors use previous long term-dividend growth as a proxy for investors' forecasts over a single year. The difference between long-term dividend growth and outturn dividend growth is then taken as unanticipated growth. This application may lead to systematic biases in the estimation of forecast error. For example, during periods of increasing (decreasing) dividend growth rates, the use of historical long-term dividend growth will systematically underestimate (overestimate) future dividend growth.

The assumption that changes in the price/dividend ratio can be wholly attributed to changes in required risk premium is also questionable, as noted by the authors themselves. In addition to this, the ex-post price/dividend ratio may systematically under- or over-estimate the required risk premium, particularly where dividend growth is unstable, as equities are priced on the basis of *projected* dividends.

In line with the criticism applied to DMS' adjustments, and DMS' own comments on the simplicity and expositional nature of their approach, we do not incorporate these contested adjustments in our estimate of the ERP. This is particularly relevant given that recent (2005) long run estimates of the ERP are downwardly influenced by recent consecutive and significant losses in global equity markets associated with the bear market of the early 2000s. This decrease in the measure of the ERP is counterintuitive; the bear market is widely reported to have been associated with an increase in the ERP. Further, DMS themselves recognise the exceptional nature of recent falls. We therefore conclude that 2005 evidence may be on the low side as an estimate of the forward looking ERP and further contested downward adjustments may result in a bias.

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