The Brattle Group

The WACC for mobile, fixed-line and cable termination rates

15 March 2012

Dan Harris
Jack Stirzaker
Cosimo Fischietti

Final version for consultation

Prepared for OPTA

TABLE OF CONTENTS

1. INTRODUCTION AND SUMMARY

OPTA, the Independent Post and Telecommunication Authority in the Netherlands, regulates both fixed and mobile voice termination services. As part of the regulatory process, OPTA determines price caps for fixed termination rates (FTRs) and mobile termination rates (MTRs). To set the termination rates, OPTA has constructed a Bottom-Up Long-Run Incremental Cost (BULRIC) model to represent the efficient costs of a hypothetical fixed and mobile operator. To arrive at the final termination rates, OPTA must also allow for the operators' Weighted Average Cost of Capital (WACC).

In this context, OPTA has commissioned *The Brattle Group* to calculate the WACC for:

1. A copper-based fixed-line incumbent moving to/on Next Generation Networks (NGN)/Next Generation Assets (NGA);
2. An Hybrid Fibre-Coaxial (HFC)-based cable company, moving to/on Data Over Cable Service Interface Specification 3 (DOCSIS3);
3. A mobile operator (2G/3G and/or 4G), in a competitive market, which for the purposes of this exercise OPTA has defined as a market with three or more mobile operators;

We refer to the lines of business above as 'activities'. OPTA and NMa have set out to harmonise their methods used for determining the WACC. In developing the methodology we advised OPTA and the NMa on the issues of the risk-free rate and the Equity Risk Premium (ERP).[1] We have included this report in an annex to this report. However, the final methodology chosen ('the methodology') is the NMa's and OPTA's. OPTA has asked us to apply the methodology when estimating the WACC for the different activities.

In broad terms, the methodology estimates the WACC by applying the Capital Asset Pricing Model (CAPM) to calculate the cost of equity. The risk-free rate is calculated based on the three-year average yield on 10-year Dutch and German government bonds. The ERP is calculated using long-term historical data on the excess return of shares over long-term bonds, using data from European markets. Specifically, the methodology specifies that the projected ERP should be based on the average of the arithmetic and geometric realised ERP. The methodology also takes note of other estimates of the ERP, from for example, dividend growth models, on deciding whether any adjustments need to be made to the final ERP. In the current case, we have applied the historical ERP without adjustments.

We are estimating the WACC for generic activities rather than specific firms. Therefore, for each activity, we have selected a 'peer group' of publicly traded firms which derive most of their profits from an activity similar to the one for which we are estimating the WACC. We use the peer groups to estimate the beta for each activity and to inform the appropriate level of gearing and cost of debt.[2]

---

[1] See *The Brattle Group* (Dan Harris, Bente Villadsen, Francesco Lo Passo), 'Calculating the Equity Risk Premium and the Risk-free Rate' 26 November 2012. Hereafter referred to as 'the Phase I report'.

[2] Leverage and gearing are usually used interchangeably. Both refer to the percentage of the firm value that is financed by debt, or the market value of debt divided by the sum of the market value of debt and the market value of equity. Unless stated otherwise in this report, gearing refers to net debt over assets.

The methodology specifies that the equity betas are estimated using daily betas taken over three years and tested for liquidity and statistical robustness.

We have examined the gearing and credit ratings of telecoms firms which derive the majority of their revenues in European countries with the highest credit ratings. We conclude that for mobile companies operating in the Netherlands a 25% gearing level is a reasonable target, to maintain an A-rating. For fixed line telecoms firms we conclude that a 30% gearing level is reasonable and consistent with a BBB rating. The peer group of HFC operators has an average gearing of 45%, and a credit rating of BB. This results in a relatively high cost of debt, which is not intrinsic to the activity. Hence as well as calculating a 'specific' HFC WACC based on the peer group, we also calculate a 'generic' WACC for the HFC activity. The generic HFC WACC assumes a lower gearing and higher credit rating than the specific HFC WACC. As OPTA is interested in estimating the WACC for a generic HFC activity, rather than the specific WACC of the firms in the sample, we recommend that OPTA uses the generic WACC in Table 1.

The methodology specifies that the allowed cost of debt should be the risk-free rate plus the average spread between the yield on the firms' debt and the risk-free rate over the last three years. To estimate this spread, we use the generic cost of debt for a firm with the appropriate rating.

The tables below summarise the WACC for each activity and of the inputs which led to the WACC.

Table 1: Summary WACC calculation

		Fixed Line Operators	Mobile Operators	HFC Operators		Notes
				Specific	*Generic*	
Risk Free Rate	[1]	2.6%	2.6%	2.6%	2.6%	See Section 4
Asset Beta	[2]	0.39	0.49	0.45	0.45	See Section 6.5
Equity Beta	[3]	0.52	0.61	0.72	0.59	[2]x(1+(1-[7])x[9])
ERP	[4]	5.0%	5.0%	5.0%	5.0%	See Section 6.7
After-Tax Cost of Equity	[5]	5.2%	5.7%	6.2%	5.6%	[1]+[3]x[4]
Pre-Tax Cost of Debt	[6]	4.4%	4.0%	7.1%	4.4%	See Section 5
Tax Rate	[7]	25%	25%	25%	25%	Dutch Corporate Tax Rate
Gearing (D/A)	[8]	30%	25%	45%	30%	See Section 3
Gearing (D/E)	[9]	43%	33%	82%	43%	[8]/(1-[8])
After-tax WACC	[10]	4.6%	5.0%	5.8%	4.9%	(1-[8])x[5]+(1-[7])x[6]x[8]
Inflation	[11]	2.0%	2.0%	2.0%	2.0%	See Section 8
Pre-tax WACC	[12]	6.2%	6.7%	7.8%	6.5%	[10]/(1-[7])
Pre-tax Real WACC	[13]	4.1%	4.6%	5.7%	4.4%	(1+[12])/(1+[11])-1

2. SELECTION OF PEER GROUPS

We are estimating the WACC for a generic telecoms-related activity, rather than for a specific firm. Therefore for each activity we need to find publicly traded firms which derive the majority of their profits from the activity for which we are trying to estimate the WACC. We call these firms 'comparables' or 'peers'. We define a group of peers or a 'peer group' for each activity. We use the peer groups for several key steps in the WACC calculation:

1. Estimating the beta for the activity;

2. Estimating the appropriate level of debt for the activity (gearing);

3. Estimating a credit rating and cost of debt for the firm.

We first identify a group of potential peers. We then apply a test to see if the firms' shares are sufficiently liquid before deciding on the final peer group.

In determining the number of peers that should be in each peer group there is a trade-off: adding more peers to the group reduces the statistical error in the estimate of the beta but as more peers are added there is a risk that they may have a different systematic risk than the regulated firm. While we would like peer groups with around six firms to ensure a good level of accuracy we accept that there may not be a sufficient number of suitable firms to meet this ideal for each activity.

The number of firms that telecoms regulators have used in recent WACC decisions varies. Table 2 illustrates that the UK and Italian regulators have used only one or two peers while the Spanish telecoms regulator, the CMT, used 10 peers for the fixed line business and five peers for the mobile business.

There are few 'pure play' firms which operate only in one of the three sectors in which we are interested. Many incumbent fixed-line firms have developed mobile businesses, and other firms which began as purely mobile firms have developed other lines of business. Accordingly, it would not be reasonable to require that to be included as a peer a firm earns 100% of its revenues from the specific activity. If we did apply such a stringent criteria, we would not be able to identify many, or indeed any firms which could be included in the peer group.

Instead we require than the firm earns a significant proportion of its revenue and profits for each particular activity. This approach is standard practice when estimating the WACC for telecoms activities. Agcom, the Italian telecoms regulator, uses data from Telecom Italia to estimate the WACC for fixed-line services, even though Telecom Italia earns a substantial portion of its profit and revenues from the mobile sector. OPTA and the Swedish Regulatory Authority have both used this approach for determining the WACC of fixed and mobile businesses.[3]

---

[3] Source: NRA's Decisions with regard to the second round of mobile and fixed termination rates (second round).

Table 2: Peers used in other regulatory decisions

NRA/Decision		WACC for fixed activities	Wacc for mobile activities
Agcom (IT) 2011-2012	[1]	Telecom Italia	Vodafone Telecom Italia
Ofcom (UK)	[2]	British Telecom	Vodafone
CMT (ES)	[3]	Belgacom	Mobistar
		BT Group	Vodafone
		Deutsche Telekom	Telia Sonera
		France Telecom	Telenor
		KPN	Mobile Telesystem
		Portugal Telecom	
		Swisscom	
		Telecom Italia	
		Telefonica	
		Telekom Austria	

Notes and Sources:
[1]: Agcom Decisions 578/10/CONS (fixed), 621/11/CONS (mobile)
[2]: Ofcom's July 2011 Statement on WBA (fixed), March 2011 Statement on M7/2007 (mobile)
[3]: CMT Decisions of May 26-2011 (fixed), July 14-2011 (mobile)

Specifically, in screening potential peers for the fixed-line copper sector, we identify operators with an Earnings Before Interest Tax Depreciation and Amortisation (EBITDA) contribution from mobile activities lower than 40%, or where the revenues contribution from the mobile business is lower than 30%. For the mobile peer group we select operators with an EBITDA contribution from mobile activities higher than 60%, or with a revenues contribution higher than 70%.

OPTA's methodology requires that different WACCs are calculated for each activity, so ensuring that the firms we are using for the peer group for each activity earn a sufficient amount of their profit and revenue from that activity is important for beta estimation. This is because mobile and fixed-line businesses may face different systematic risks. Fixed-line businesses are now interested in making investments in next generation networks which face substantial demand risks. Mobile operators are involved in large investments in LTE technologies.

Including some of the largest fixed-mobile operators, with an EBITDA contribution from mobile activities between 30% and 60%, could distort the beta estimation by taking into account risks not strictly related to the activity in question.

Based on the criteria above, Table 3 illustrates our choice of firms for the fixed-line and mobile peer groups. We have made our selection using the latest EBITDA and revenue numbers available, which in most cases was for the first part of 2012.

Table 3: Mobile and Fixed line peer groups

Firm	Mobile Operators	Fixed Operators
Vodafone	✓	
Mobistar	✓	
Sonaecom	✓	
Telenor	✓	
BT Group		✓
Free-Iliad		✓
TDC		✓

We are interested in estimating the WACC for a telecoms firm active in Europe. Accordingly we have checked that the firms in the peer groups earn the majority of their revenues in Europe. Even Vodafone, which has operations all over the world, earns about 70% of its revenues in Europe. The UK, Italy, Spain and Germany that all together represent the 70% of total turnover reported in Europe in the 2011. Other peers are active mainly in Europe and in particular in UK (BT), France (Free-Iliad), Belgium (Mobistar), Norway (Telenor), Portugal (Sonaecom) and Denmark (TDC).

OPTA's methodology requires that the mobile peers are active in a competitive market, meaning that each mobile peer competes with at least two other firms. Figure 1 shows the distribution of market shares held by mobile operators in countries relevant to our peer group.

Market shares can be a good proxy of market competitiveness. Figure 1 reveals similar conditions in almost all countries, whereby the leading operator competes strongly for the market leadership with one other operator (the Main Competitor). There are then a number of 'followers', which are mobile operators who entered the market later in time or buy wholesale capacity from the main operators to operate mobile virtual networks. We observe comparable circumstances where followers are now reaching a market position of at least 30% in all countries with the exception of Portugal (PT), where only 17% of the market held by other competitors. Nevertheless, even in Portugal there are more than three firms present in the market. Hence all of the mobile peers we have chosen meet OPTA's criteria.

Figure 1: Mobile subscribers: operator market shares, October 2011[4]
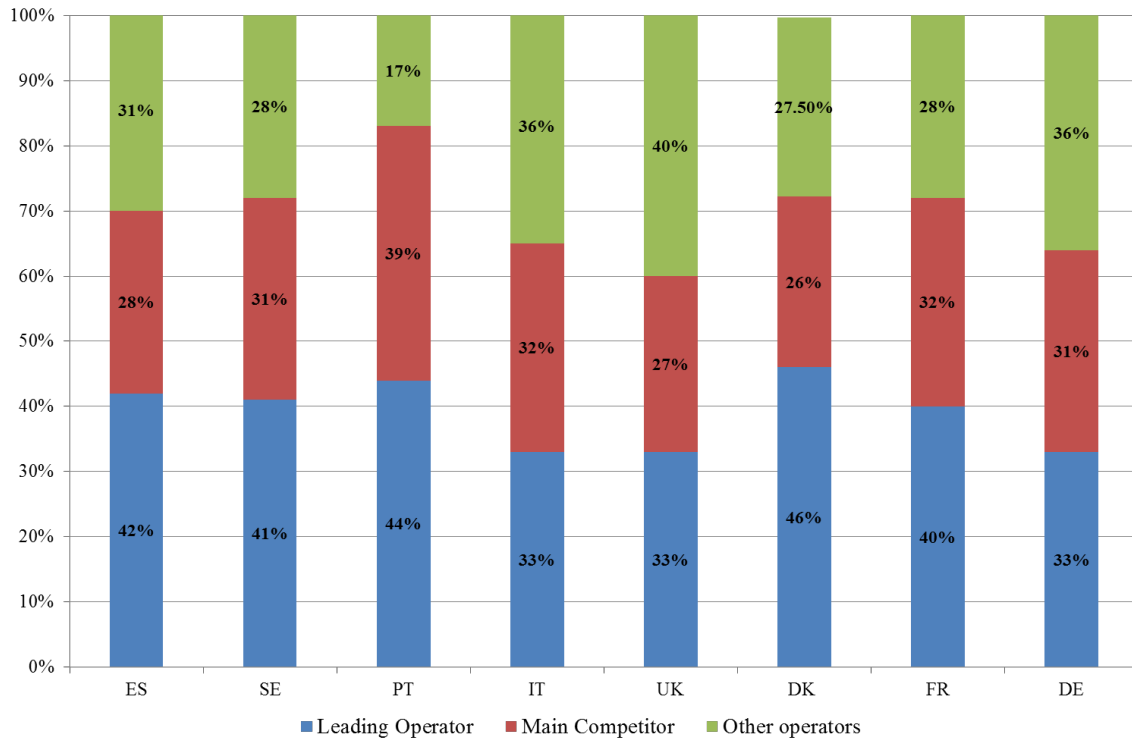
For the HFC activity, we have identified a sample of four traded firms active in European countries with large subscriber bases of cable lines for internet cable services– see Figure 2.

---

[4] Source: The Brattle Group on European Commission data (Digital Agenda Scoreboard 2012)

Figure 2: Internet Cable Connections in EU (2012)[5]
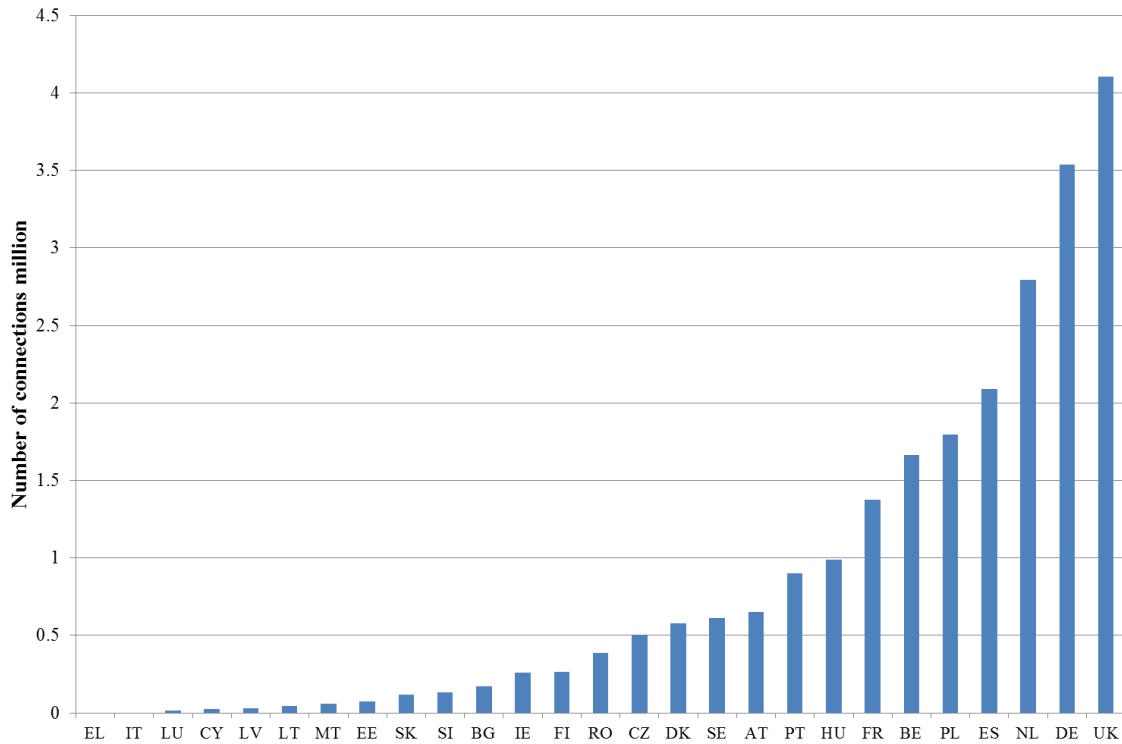
Comparables considered for the HFC activity have been chosen by looking to the most mature cable countries (i.e. UK, Netherland, Belgium and Portugal), with the aim to select operators mostly representative of the systematic risk borne by an investor in this kind of business in Europe. Table 4 illustrates the potential peers for the HFC activity.

Table 4: Potential Peers for the HFC activity

Firm	
Ziggo	✓
Virgin Media	✓
Zon Multimedia	✓
Telenet Group	✓

Virgin Media is a leading cable operators in UK and provides fixed and mobile telephone, television and broadband internet services. Telenet Group is the largest provider of broadband cable services in Belgium. Its business comprises the provision of analogue and digital cable television, high speed internet and fixed and mobile telephony services.

ZON Multimédia is a Portuguese media holding company whose main assets include a satellite, cable operator and ISP, a movie distributor (Lusomundo) and a virtual carrier of mobile phone services. Its services include cable television, cable internet and VOIP. ZON Multimédia (formerly PT Multimédia) is the spun-off media arm of Portugal Telecom.

---

[5] *Ibid.*

Ziggo NV is a Dutch firm that provides standard television, digital pay television, broadband Internet and telephony services to both private and corporate customers. However, the firm has only been publicly traded since March 2012, which means that we cannot calculate a three-year daily beta. Nevertheless, Ziggo remains useful in order to inform the gearing ratio as well as the credit rating for our hypothetical HFC operator. In the Appendix we include a more detailed description of each of the firms selected for the peer groups.

2.1. LIQUIDITY TESTS

One of the things that we use the peer group for is estimating the beta for each activity. Illiquid stocks will tend to underestimate a beta, and so we first test each firm to see if its shares are sufficiently liquid.[6] There are several possible tests for the liquidity of a traded share. One test defines a share as being sufficiently liquid for the purposes of estimating beta using daily returns if it trades on more than 90% of days in which the index trades. We have applied this test to our prospective peer groups – Table 5 shows the results.

Table 5: Summary of liquidity tests

	% of days that the company trades	Average daily value traded, €
BT	97%	43,172,962
Iliad	99%	9,749,311
TDC	96%	8,403,878
Vodafone	97%	183,451,128
Mobistar	99%	6,909,560
Sonaecom	99%	516,787
Telenor	97%	43,605,174
Virgin Media	97%	71,371,042
Telenet Group	98%	7,552,888
Zon Multimedia	99%	1,513,326

All of the selected firms display sufficient liquidity so none are excluded from the beta calculation.

---

[6] For example, suppose that the true beta of a firm was 1.0, so that every day the firm's true value moved exactly in line with the market. But the firm's shares only change price when they are traded. Suppose that the firm's shares are traded only every other day. In this case, the firm's actual share price will only react to news the day after the market reacts. This will give the impression that the firms value is not well correlated with the market, and the beta will appear to be less than one. Using weekly returns to calculate beta mitigates this problem, since it is more likely that the firm's shares will be traded in the week. However, using weekly returns have other disadvantages, such as providing fewer 80% less data points over any given time period.

3. GEARING AND CREDIT RATING

In estimating the cost of debt, we choose a credit rating which is consistent with the representative gearing for a telecoms firm active in the Netherlands. Among the most important factors which determine the credit rating, apart from the line of business, is the level of debt or gearing and the country or countries in which the firm is mainly active. The latter has become more important since the emergence of the sovereign debt crisis in the Eurozone.

The Netherlands has the highest S&P credit rating of AAA. If the country in which the telecom firm is active has a good rating, this may reflect lower economic risk for the firm. The rating is partially based on macro-economic factors in each country that may mean more reliable cash flows for a firm operating within that country. As we are interested in the cost of debt for Dutch telecoms firms we look at other telecoms firms which are active in countries which also have the highest level of credit rating, and therefore face similar macroeconomic risks.

In contrast, it could be misleading to compare the ratings of telecoms firms that are active in countries with lower debt ratings. For example, Spain currently has a BBB- rating. It is possible that a Spanish telecoms firm with a 50% gearing may have a lower rating and higher cost of debt than a Dutch telecoms firm with 50% gearing– but this would not be a relevant comparison.

Another issue which is somewhat specific to the mobile sector is the use of long-term operating leases which can affect the apparent gearing of the firm. In essence, a firm can chose to borrow money and build its own network of masts, transmitters etc. Or it can sign a long-term operating lease to use a third-parties network. The operating lease would commit the mobile firm to make fixed payments for a period of perhaps 10 or 20 years. The latter arrangement of using an operating lease instead of debt will appear to give the firm less debt and hence a lower gearing on its balance sheet. However, from an economic perspective, a firm which has borrowed €1 billion to build a network or a firm that has signed an operating lease with payments with a present value of €1 billion are the same. The operating lease will have the same effect as debt on the observed equity beta. Therefore, when calculating the gearing we should account for the presence of operating leases. Specifically, we discount the commitments under the operating lease at the firm's cost of debt, and then treat the present value of the commitments as debt in the gearing calculation. Failure to account for the operating leases could give the impression that some firms have higher gearing than others, whereas in practice this only reflects a different choice between the use of debt or an operating lease.[7]

Figure 3 illustrates the gearing of the mobile peer group with and without operating leases accounted for. While including operating leases makes little difference to Sonaecom, it increases Mobistar's gearing by about 10 percentage points. Therefore we include the effect of operating leases when unlevering the betas, and in the calculation of average leverage.

---

[7] Note that if all mobile firms applied the same approach and uniformly used operating leases, we would not need to worry about this issue. The operating lease would simply be another fixed cost. It is the flexibility to choose between debt and operating leases which creates the potential problem.

Figure 3: Effect of including operating leases on the latest gearing of Mobile firms
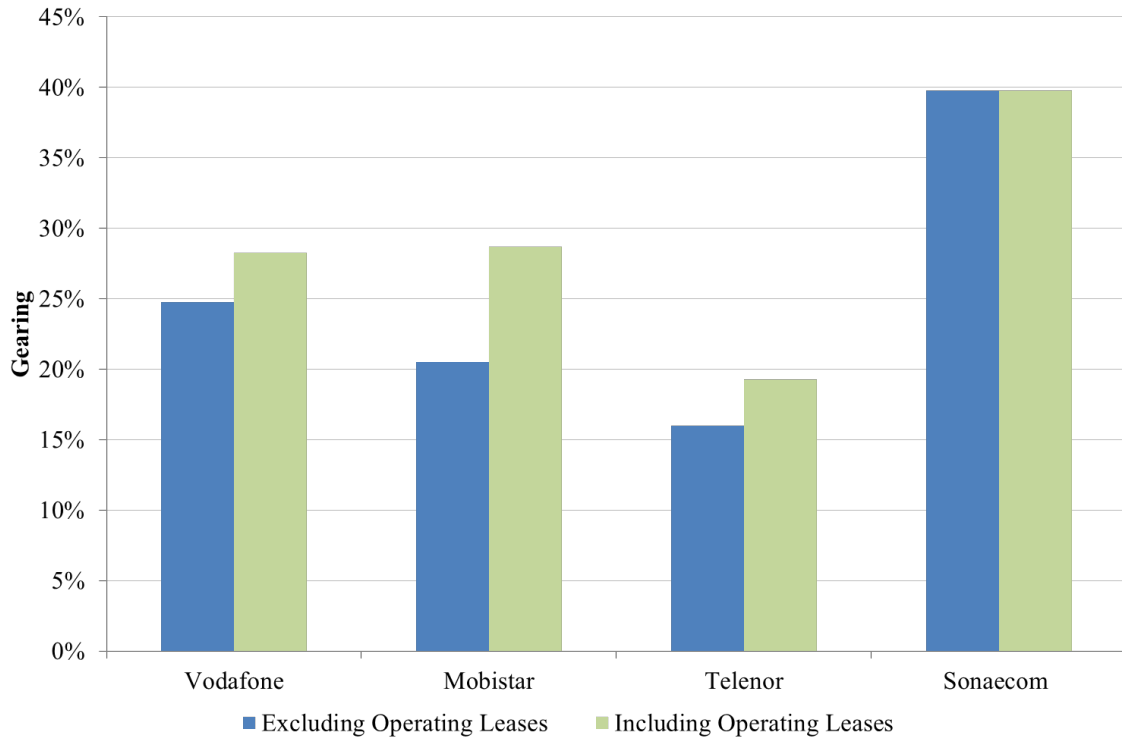
In Table 6 we illustrate the relationship between credit ratings and gearing for a range of European telecoms firms which are mainly active in countries with either a AAA rating (being the UK, Norway, and Germany) or an AA rating (Belgium and France). We have also included some mixed mobile/fixed-line operators which are not included in the peer groups as a reference point. Note that in Table 6, the gearing is reported for the period in 2012 for which the credit rating applied, so that the gearing and credit rating are consistent. This will differ from the three-year average gearing, which we use to unlever the betas. When unlevering the betas, it makes sense to use the average gearing over the period for which the beta is calculated.

Table 6: Gearing (Net Debt + Operating Leases / Assets) and credit ratings of telecoms firms in countries rated AA or higher

Firm	State Where Firm Operates [A]	Rating of State [B]	Gearing [C]	Rating of firm [D]
Mobile Operator				
Vodafone	UK	AAA	28%	A-
Mobistar	BE	AA	29%	A-
Telenor	NOR	AAA	19%	A-
Average			25%	
Fixed Operator				
BT Group	UK	AAA	34%	BBB
TDC	DK	AAA	41%	BBB
Iliad SA	FR	AA+	15%	n/a
Average			30%	
HFC Operator				
Virgin Media	UK	AAA	54%	BB
Ziggo	NE	AAA	35%	BB
Telenet	BE	AA	43%	B+
Average			44%	
Fixed & Mobile Operator				
Belgacom	BE	AA	17%	A
Telia Sonera	SE	AAA	26%	A-
Deutsche Telekom	DE	AAA	50%	BBB+
France Telecom	FR	AA+	55%	A-
Average			37%	

Notes nd Sources:

[B]: Standard and Poors Sovereigns Ratings.

[C]: Bloomberg

[D]: Standard and Poors Corporates Rating List: Telecom Services.

Mobistar is part of The France Telecom Group. Mobistar does not have issued Corporate Bonds. We assume that Mobistar debt relies on Corporate Bonds issued by France Telecom, so took the same Credit Rating as France Telecom.

Figure 4 shows the same data in Table 6 graphically. It appears that:

- There is a relationship between gearing and credit rating:
    - the average gearing of firms with a rating of A/A- is 29%;
    - the average gearing for firms with a rating of BBB/BBB+ is 41%;
    - the average gearing for firms with a rating of BB/B+ is 44%
- Mobile firms have a lower level of gearing and higher credit rating than the fixed-line or HFC firms.
- The HFC firms in the peer group seem to have consistently lower levels credit ratings, even though their levels of debt are not substantially different from the levels of debt seen for some fixed-line and mixed fixed-line-mobile firms.

Figure 4: Gearing vs S&P Credit Rating for different business activities
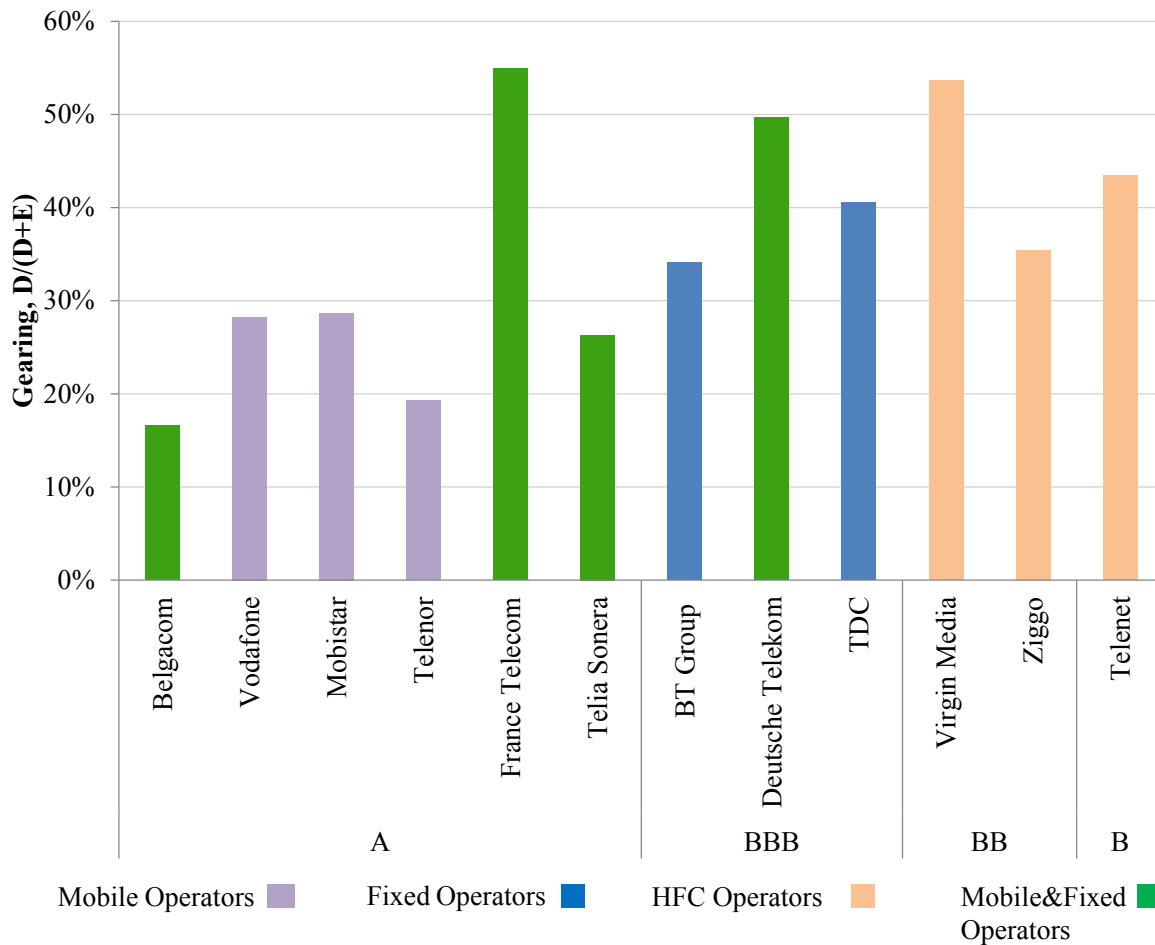
Given the data above, for the mobile activity a reasonable level of gearing – including operating leases – is 25%, with an associated credit rating of A-. As a practical matter, Bloomberg does not produce a generic cost of debt for firms rated A-. Hence we will take the simple average of the cost of debt for firms rated A and BBB, the two ratings which bracket the A- rating. For the fixed-line activity, a reasonable level of gearing is 30%, with an associated BBB credit rating.

As noted above, the HFC activity peer group has consistently lower credit ratings (BB or B+) than other telecoms firms, and a relatively high level of debt. While BB is only one credit rating lower than BBB, it also represents the transition from 'investment grade' debt to 'speculative grade' or junk debt. Accordingly, while the probability of default for a BBB rated firm is only around 1% over a 4 year period, this probability jumps to around 7% for a firm with a BB rating.[8] To reflect this, the average cost of debt jumps by about three percentage points.

However, we note that the HFC activity does not have an intrinsically high cost of debt. We do not know why the firms in the sample have chosen a high gearing which attracts a high cost of debt. Perhaps this is a temporary situation, or the firms have some constraints in raising new equity which are specific to them. In any case, it should be possible to structure an HFC firm with a lower level of debt, obtain a higher rating and therefore a much lower cost of debt and WACC. Building in the high cost of debt that we see in our peer group of HFC firms to the HFC activity could overstate the WACC. Therefore as well as calculating a WACC based on the HFC peer group – a 'specific' HFC WACC – we also calculate a 'generic' HFC WACC. We calculate the generic HFC WACC by assuming that if an HFC firm had a gearing of 30% it could obtain a BBB rating – instead of a BB rating.

Since we understand that OPTA is interesting in calculating the WACC for particular activities – rather than specific firms – then it would be more appropriate to apply the generic HFC WACC. However, if OPTA needs a WACC for a specific firm, then OPTA should use the specific cost of debt of that firm, even if the cost of debt seems high.[9]

We note that the final WACC results are not sensitive to the choice of gearing, as long as the firms maintain a given credit rating. As gearing increases, the proportion of relatively cheap debt in the WACC formula increases. However, increased debt means more risk for equity holders, which results in a higher equity beta and a higher cost of equity. These two effects offset one another almost exactly.[10] For example, we estimate that for the mobile operators, as the assumed gearing changes from 10% to 40% (with a constant cost of debt) the after tax nominal WACC only changes from 4.9% to 4.8%. This illustrates that as long as the target level of debt and the credit rating assumed are consistent with one another, and the credit rating is reasonable given the country in which the firms operate, then the accuracy of the resulting WACC should not be dependent on the precise choice of gearing.

---

[8] Figures based on idealized default probability: Moody's Investors Service, "Global Project Finance - Generic Project Finance Methodology", December 20, 2010.

[9] To do otherwise could risk bankrupting the firm in question. Allowing firms to pass through their cost of debt creates a 'moral hazard' in that they may borrow 'too much' knowing that the costs can be passed through. In this specific case the risk of moral hazard appears low, because the revenue from regulated activities is only a very small fraction of the telecoms firms' overall revenues in the Netherlands. In industries where firms derive a much larger share of revenues from regulated activities, regulators deal with this issue by insisting that regulated firms maintain an investment grade credit rating, thereby bounding the cost of debt.

[10] The insensitivity of the WACC to the financing choices under certain assumption is known as the Modigliani–Miller theorem.

4. RISK-FREE RATE

The methodology specifies a risk-free rate based on a three-year average of the 10 year German and Dutch government bonds. Figure 5 below shows the movement of the bond yields over the prior three years. We note that, as a result of the economic crisis and subsequent easing of monetary policy, the risk free rate has declined substantially over the three year reference period.

The three-year average yield is 2.68% for the 10-year Dutch government bond and 2.55% for the 10-year German government bond. This yields a simple average risk-free rate of 2.62%.

Figure 5: Yield on Dutch and German Government 10 Year Bonds
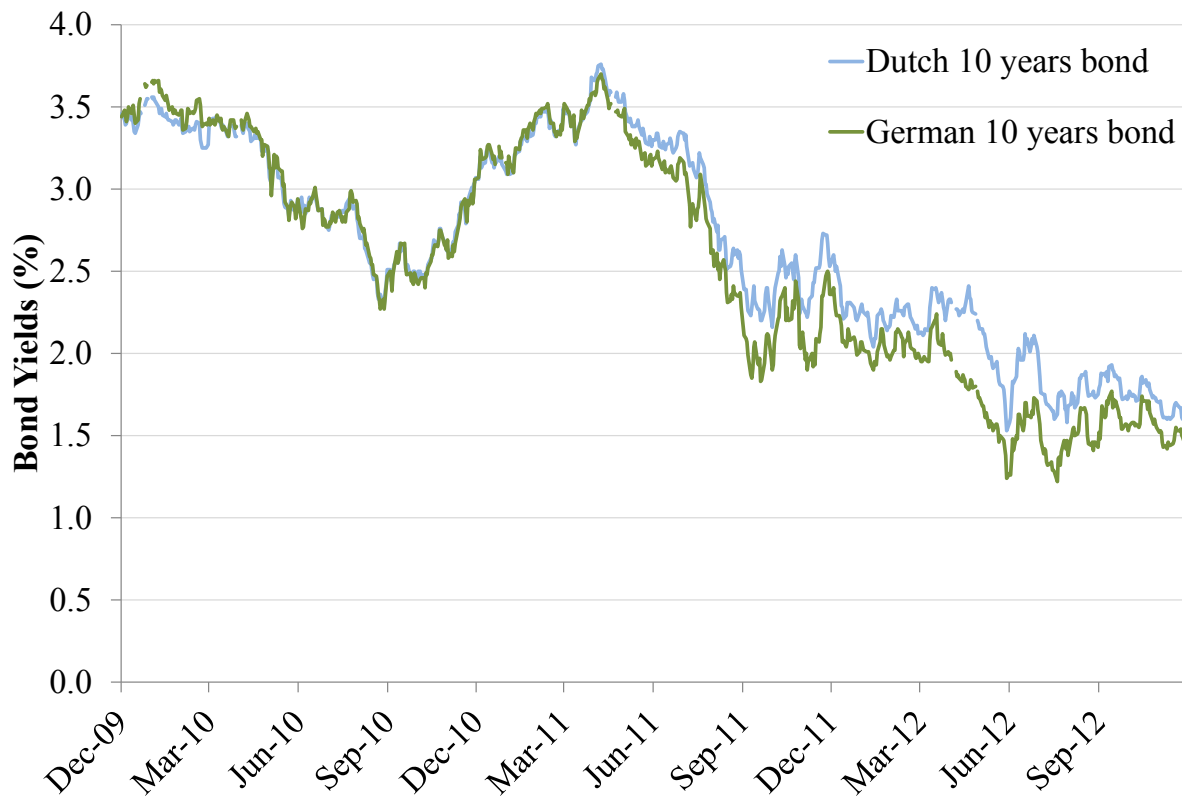
5. COST OF DEBT

To estimate a cost of debt for the regulated firms, we consider the yield on debt issued by other rated European companies. The methodology specifies that the allowed cost of debt is the average spread of the regulated firms' debt over the risk-free rate over the last three years. Accordingly, the period over which the spread is averaged is consistent with the period over which the risk-free rate is calculated.

Figure 6 illustrates the spread of rated debt with 10 years maturity above the German risk free rate. We note that the 3 year time horizon misses the major impacts of the crisis caused by the Lehman collapse in September 2008.

A-rated debt has remained reasonable stable over the three year reference period, moving in a band between 1.0.-1.5%. While the yield spread on BBB+ Industrial debt has been more volatile, is has recently narrowed to become very similar to that of A rated Utilities. BBB rated debt has also recently narrowed but maintained a small premium; the data available as of December 2012 indicates that the spread of BBB rated industrials is only 0.7% above that of A rated industrials.

As discussed in section 3, the most significant difference in the cost of debt is the divide between investment grade debt and speculative grade debt. Figure 6 shows that cost of debt with a BB rating is significantly higher than the cost of debt with an investment grade rating of BBB or better.

Figure 6: Credit Spread on European Rated Debt[11]
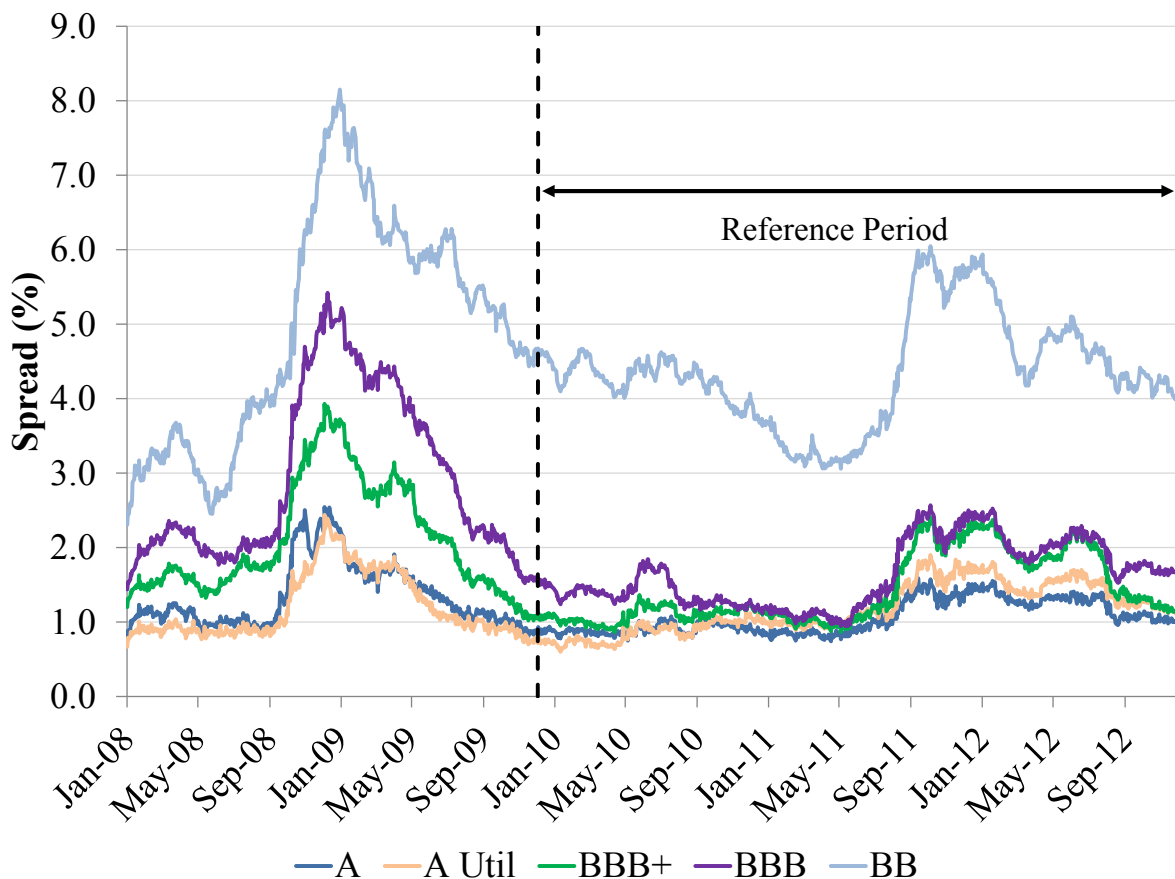
Table 7 below summarises the average of the three year spread for each rating band. We estimate A- rated debt as the simple average spread of A-rated industrials and BBB+ rated industrials.

---

[11] Source: Bloomberg.

Table 7: Three-year Average Spread on Rated European Companies

A Industrial	1.06%
A Utility	1.18%
BBB+ Industrial	1.42%
BBB Industrial	1.64%
BB Industrial	4.36%
Implied A- Industrial	1.24%

Source: Bloomberg

We calculate that the average spread of the yields over the risk free rate for the past three years for the chosen credit rating for each activity. We apply the resulting spreads to the risk free rate to give an overall cost of debt for the different activities. Following the methodology, an additional premium of 15 basis points is added to account for issuance fees and other non-interest costs of debt. The above calculations result in a cost of debt of 4% to 7%. Table 8 illustrates the cost of debt calculation.

Table 8: Allowed Cost of Debt

	A-	BBB	BB	
Risk Free Rate [1]	2.62%	2.62%	2.62%	
Spread of Debt [2]	1.24%	1.64%	4.36%	
Non-interest Fees [3]	0.15%	0.15%	0.15%	
Cost of Debt [4]	4.01%	4.41%	7.12%	[1]+[2]+[3]

6. COST OF EQUITY

The methodology specifies that the cost of equity will be estimated by applying the Capital Asset Pricing Model. The CAPM expresses the cost of equity for a business activity as the sum of a risk-free rate and a risk premium. The size of the risk premium depends on the systematic risk of the underlying asset, or project, relative to the market as a whole.[12]

As discussed above, we measure the systematic risk of each activity by reference to the peer group of firms which are publicly traded and derive the majority of their profits from the activity in question.

6.1. MARKET INDICES

The relative risk of each company must be measured against an index representing the overall market, defined as the covariance of returns between the company and the chosen market index. The methodology specifies a broad Eurozone index. Our recent report for the NMa discusses the reasons

---

[12] Further information on assumptions and theory underlying the CAPM can be found in most financial textbooks; see Brealey, Myers, Allen, *"Principles of Corporate Finance"*.

for the use of a Europe wide index in more detail, but in essence the idea is that the typical investor in a Dutch telecoms firm would be diversified across Europe.[13] Therefore a European index is the correct reference point for measuring the systematic risks of the activity.

6.2. PEER GROUP EQUITY BETAS

The methodology specifies a three year daily sampling period for the beta. Table 9 details the unadjusted or 'raw' equity betas.

Table 9: Raw Equity Betas

	Country	3 Yr			
		Beta	SE	Low	High
Fixed Line Operators Peer Group					
BT	UK	0.81	0.04	0.73	0.90
Iliad	France	0.46	0.03	0.39	0.53
TDC	Denmark	0.36	0.03	0.30	0.43
Mobile Operators Peer Group					
Vodafone	UK	0.46	0.03	0.40	0.53
Mobistar	Belgium	0.49	0.04	0.40	0.57
Sonaecom	Portugal	0.71	0.05	0.61	0.80
Telenor	Norway	0.82	0.04	0.74	0.89
HFC Operators Peer Group					
Virgin Media	UK	0.69	0.05	0.59	0.79
Telenet Group	Belgium	0.62	0.04	0.54	0.70
Zon Multimedia	Portugal	0.85	0.12	0.62	1.08

6.3. THE DIMSON ADJUSTMENT

When calculating betas using daily returns, there is a risk that the response of a firm's share price may appear to react to the market index the day before or the day after. This could occur because of differences in market opening times and trading hours, or differences in the liquidity of the firm's shares vs. the average liquidity of the market. If such an effect is present, it could affect a beta which is calculated using only the correlation between the return on the firm's share on day D and the return on the market index on the same day.

The "Dimson" adjustment is a standard test which deals with this effect. The Dimson adjustment estimates betas by performing the same regression against the market index as for a standard beta, but uses the company returns from either one day ahead or one day before that of the market.[14] If the market is perfectly efficient, then all information should be dealt with on the same day, so that a beta measured using the company returns from either one day ahead or one day before that of the market

---

[13] *Loc. Cit.* footnote 1.
[14] More days of leads and lags can be applied, but in this case we look at only one.

index return should be uncorrelated, giving a beta of zero. A beta significantly different from zero[15] suggests that information about the true beta may be contained in trading the day before or after the day for which the market return is calculated.

The Dimson beta adjustment combines the beta estimates from the day ahead and day before with the original beta estimate to give an overall beta which includes the information provided in the adjacent days.

We have performed this test for the firms in our peer groups. The results are presented in Table 10. We note that the adjustment is significant for none of the firms in the sample, suggesting that information on systematic risk is not contained within the adjacent days.

We perform a further series of standard diagnostic tests to assess if the beta estimates satisfy the standard conditions underlying ordinary least squares regression, which are outlined in the Appendix. Once we have applied the corrections the betas should be robust to autocorrelation and heteroskedasticity. The results are presented in Table 11, and are the betas applied in the WACC calculation.

Table 10: Dimson Adjustments

	Country	OLS Beta	Dimson Beta	Dimson SE
Fixed Line Operators Peer Group				
BT	UK	0.81	0.91	0.07
Iliad	France	0.46	0.56	0.06
TDC	Denmark	0.36	0.43	0.06
Mobile Operators Peer Group				
Vodafone	UK	0.46	0.46	0.05
Mobistar	Belgium	0.49	0.59	0.08
Sonaecom	Portugal	0.71	0.64	0.08
Telenor	Norway	0.82	0.82	0.06
HFC Operators Peer Group				
Virgin Media	UK	0.69	0.78	0.09
Telenet Group	Belgium	0.62	0.62	0.07
Zon Multimedia	Portugal	0.85	0.91	0.09

---

[15] Significance is taken at the 5% level.

Table 11: Robust Regressions Results

Company	Beta	Standard Error
Fixed Line Operators Peer Group		
BT	0.82	0.05
Iliad	0.46	0.04
TDC	0.36	0.04
Mobile Operators Peer Group		
Vodafone	0.46	0.04
Mobistar	0.49	0.04
Sonaecom	0.71	0.06
Telenor	0.82	0.04
Cable Operators Peer Group		
Virgin Media	0.78	0.10
Telenet Group	0.62	0.04
Zon Multimedia	0.85	0.06

6.4. VASICEK CORRECTION

The methodology applies the Vasicek adjustments to the observed equity betas. This adjustment takes account of a prior expectation of the equity beta. In this case, we have used a prior expectation of the beta of 1.0, which is the market average. We considered applying the critique of Lally,[16] which among other things argues for using a prior expectation of the beta which is specific to the activity in question. However, we could find no objective way of determining the prior expectation of beta. Accordingly, we have adopted the more neutral assumption of the prior expectation of a prior expectation of beta of 1.0.

The Vasicek adjustment moves the observed beta closer to 1 by a weighting based on the standard error of the beta, such that values with lower errors will be given a higher weighting. The prior expectation of the Beta given in other consultant reports is 1, which we apply here. For the prior expectation of the standard error we use the standard error on the overall market.[17] Table 12 illustrates the effect of the Vasicek adjustment.

---

[16] Lally, Martin, *"An Examination of Blume and Vasicek Betas"*. Financial Review, August 1998.
[17] The standard error on the FTSE 100 index is used as a proxy for the European market, and is reported by the LBS. Valueline reports the standard deviation of all stocks in the US market.
As we are using the market average beta for our prior expectation, it is consistent to use the standard deviation of the distribution of the betas underlying the market population as the prior expectation of the standard error.

Table 12: Effect of the Vasicek adjustment

Company	Country	Estimate of Beta	Standard Error	Vasicek Beta
Fixed Line Operators Peer Group				
BT	UK	0.82	0.05	0.82
Iliad	France	0.46	0.04	0.46
TDC	Denmark	0.36	0.04	0.37
Mobile Operators Peer Group				
Vodafone	UK	0.46	0.04	0.47
Mobistar	Belgium	0.49	0.04	0.49
Sonaecom	Portugal	0.71	0.06	0.72
Telenor	Norway	0.82	0.04	0.82
Cable Operators Peer Group				
Virgin Media	UK	0.78	0.10	0.79
Telenet Group	Belgium	0.62	0.04	0.62
Zon Multimedia	Portugal	0.85	0.06	0.85

Notes: The betas are adjusted to a prior estimate of 1. The prior estimate of Standard Error is assumed to be the market standard deviation. This is 0.36 for the European companies.

6.5. PEER GROUP ASSET BETAS

The measured equity beta measures the relative risk of each company's equity, which will reflect the financing decisions specific to each company. As debt is added to the company the equity will become riskier as more cash from profits goes towards paying debt in each year before dividends can be distributed to equity. With more debt, increases or decreases in firm profit will have a larger effect on the value of equity. Hence if two firms engage in exactly the same activity but one firm has a more gearing, that firm will also have a higher beta than the firm with lower gearing.

To measure the relative risk of the underlying asset on a like-for-like basis it is necessary to 'unlever' the betas, imagining that the firm is funded entirely by equity. The resulting beta is referred to as an asset beta or an unlevered beta. To accomplish the un-levering, the methodology specifies the use of the Modigliani and Miller formula.[18] Table 13 illustrates the effect of un-levering and the average asset beta by activity.

---

[18] The specific construction of this equation was suggested by Hamada (1972) and has three underlying assumptions: A constant value of debt; a debt beta of zero; that the tax shield has the same risk as the debt.

Table 13: Equity and Asset betas

Firm	Country	Gearing (D/E) [A] Bloomberg	Equity Beta [B] Section 5.6	Tax Rate [C] KPMG	Asset Beta [D] See Note
Fixed Line Operators Peer Group					
BT	UK	78.5%	0.82	28.0%	0.52
Iliad	France	16.4%	0.46	33.3%	0.42
TDC	Denmark	74.4%	0.37	25.0%	0.24
Average					0.39
Mobile Operators Peer Group					
Vodafone	UK	48.6%	0.47	28.0%	0.35
Mobistar	Belgium	24.6%	0.49	34.0%	0.43
Sonaecom	Portugal	59.4%	0.72	25.0%	0.50
Telenor	Norway	25.4%	0.82	28.0%	0.69
Average					0.49
HFC Operators Peer Group					
Virgin Media	UK	121.1%	0.79	28.0%	0.42
Telenet Group	Belgium	83.8%	0.62	34.0%	0.40
Zon Multimedia	Portugal	85.8%	0.85	25.0%	0.52
Average					0.45

Notes and Sources
[D]=[B]/(1+(1-[C])x[A])

6.6. EQUITY BETAS

The sample asset beta is re-levered to the relevant gearing of the regulated asset described in Section 3. Table 14 shows the equity beta for each activity.

Table 14: Equity beta for each activity

		Fixed Line Operators	Mobile Operators	HFC Operators		Notes
				Specific	*Generic*	
Asset Beta	[1]	0.39	0.49	0.45	0.45	See Section 6.5
Gearing (D/A)	[2]	30%	25%	45%	30%	See Section 3
Gearing (D/E)	[3]	43%	33%	82%	43%	[2]/(1-[2])
Tax Rate	[4]	25%	25%	25%	25%	Dutch Corporate Tax Rate
Equity Beta	[5]	0.52	0.61	0.72	0.59	[1]x(1+(1-[4])x[3])

6.7. THE EQUITY RISK PREMIUM

The methodology specifies a 'European' ERP. That is, it uses an ERP based on the excess return of stocks over bonds for the major economies of Europe, rather than the ERP based on only the

excess return of shares in the Netherlands. More specifically, the methodology uses the simple average of the long-term arithmetic and geometric ERP as the anchor for the ERP estimate. We also present evidence on the long-term ERP in Europe using both the arithmetic and geometric realised ERP.

Table 15 illustrates the realised ERP derived from DMS data in individual European countries taken from the February 2013 DMS report. This report contains ERP estimates using data up to and including 2012. Table 15 also shows the simple and weighted average ERP for the Eurozone. All the ERPs are calculated relative to long-term bonds and the weighting is based on current market-capitalisation of each country's stock market. Hence, the ERPs of larger markets are given more weight, assuming that a typical investor would have a larger share of their portfolio in countries with more investment opportunities.

Table 15: Historic Equity Risk Premium Relative to Bonds: 1900 - 2012

	Geometric Mean [1]	Arithmetic Mean [2]	Average [3]	Standard Error [4]	Current Market Cap ($mm) [5]
Belgium	2.3%	4.3%	3.3%	2.0%	312,551
Denmark	1.8%	3.3%	2.6%	1.6%	265,105
Finland	5.3%	8.9%	7.1%	2.8%	173,907
France	3.0%	5.3%	4.2%	2.1%	1,723,289
Germany	5.2%	8.6%	6.9%	2.7%	1,599,659
Ireland	2.6%	4.6%	3.6%	1.9%	124,002
Italy	3.4%	6.8%	5.1%	2.8%	502,150
The Netherlands	3.3%	5.6%	4.5%	2.1%	306,803
Norway	2.2%	5.2%	3.7%	2.6%	295,767
Spain	2.1%	4.1%	3.1%	1.9%	583,333
Sweden	2.9%	5.1%	4.0%	2.0%	644,287
Switzerland	2.0%	3.5%	2.8%	1.7%	1,328,124
United Kingdom	3.7%	5.0%	4.4%	1.6%	3,449,459
Europe	3.4%	4.8%	4.1%	1.5%	n/a
World	3.2%	4.4%	3.8%	1.4%	n/a
Average Eurozone	3.4%	6.0%	4.7%		
Value-Weighted Average Eurozone	3.6%	6.4%	5.0%		

Sources and Notes:

[1] - [4]: Credit Suisse Global Investment Returns Sourcebook 2013, Table 9.

[5]: Bloomberg LP as of 3/1/2013.

Looking at Table 15 the simple average of the arithmetic and geometric ERP for the period 1900 to 2012 was 4.1% if all of Europe is included, and 4.7% if only Eurozone countries are included. The very low ERP in Denmark and Switzerland in particular lower the simple average ERP for all of Europe. Using the market size to weight the averages for all of Europe, the ERP for the Eurozone is

5.0%. These figures reflect the very long run and notably exclude countries in former Eastern Europe. As discussed in the previous section, we use the ERP for the Eurozone, since a Dutch investor is more likely to be diversified over the same currency zone, rather than to incur additional currency risks by diversifying within Europe but outside of the Euro zone.

ERPs forecasted on the basis of Dividend Growth Models are currently above the historically realised ERP. For example, the Bank of England produces ERP forecasts based on Dividend Growth Models, and forecasts the Euro Stoxx ERP at a little over 7%.[19] As illustrated in Figure 7, 7% is above the historically realized simple average ERP for the Eurozone, which is 3.4% and 6.0% for the geometric and arithmetic average respectively.

Figure 7: Eurozone Historical and Forecast Risk Premiums by Year
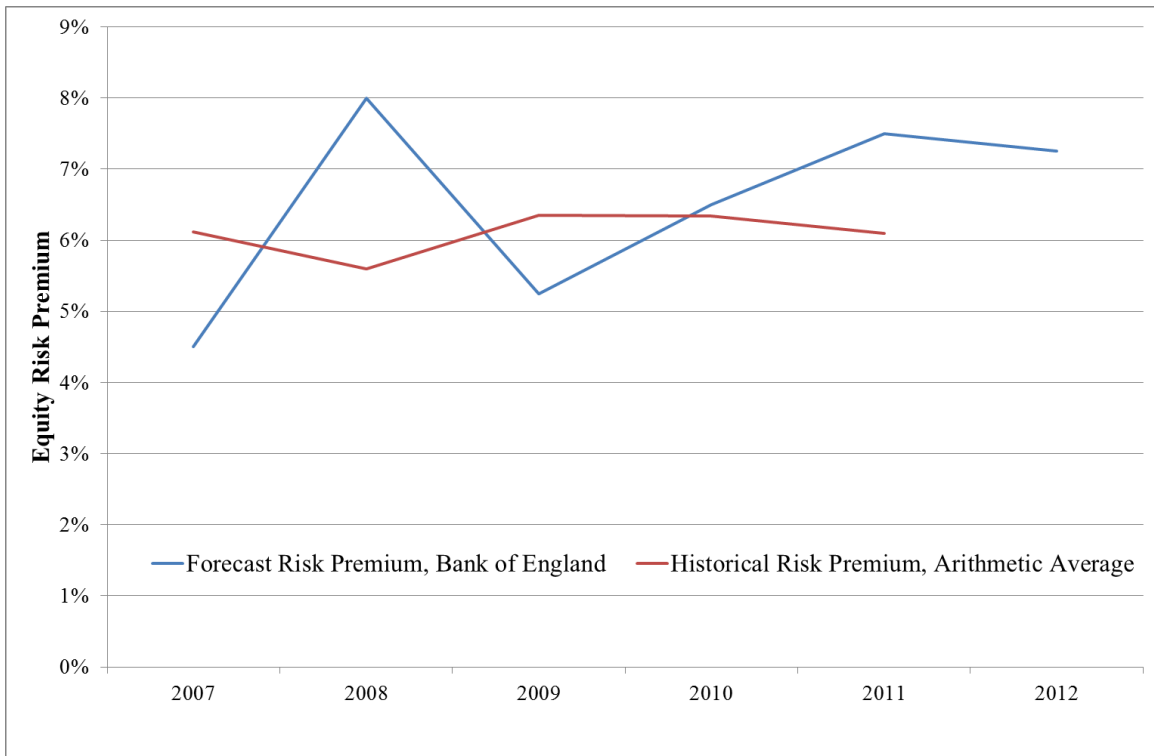
Accordingly, forecast ERP estimates based on Dividend Growth Models are above the long-term average of the arithmetic and geometric ERP for Europe. Therefore, it seems reasonable not to make any of the downward adjustments that are sometimes applied to the historical average ERP, such as adjustments for the increase in price-dividend ratios over the last 50 years, and instead take the 'raw' historical ERP estimates. Accordingly, we apply a Eurozone average ERP of 5.0%.

---

[19] Bank of England, "Financial Stability Report," June 2012, Issue 31, Chart 1.11 p. 10. The next issue of the Bank of England's Financial Stability Report is due in mid-December 2012.

7. WEIGHTED AVERAGE COST OF CAPITAL

Table 16 illustrates the overall calculation of the WACC for the different activities.

Table 16: WACC for the different activities

		Fixed Line Operators	Mobile Operators	HFC Operators		Notes
				Specific	*Generic*	
Equity Beta	[1]	0.52	0.61	0.72	0.59	See Section 6.6
ERP	[2]	5.0%	5.0%	5.0%	5.0%	See Section 6.7
Cost of Equity	[3]	5.2%	5.7%	6.2%	5.6%	[1]+[1]x[2]
Cost of Debt	[4]	4.4%	4.0%	7.1%	4.4%	See Section 5
Tax Rate	[5]	25%	25%	25%	25%	Dutch Corporate Tax Rate
Gearing (D/A)	[6]	30%	25%	45%	30%	See Section 3
Gearing (D/E)	[7]	43%	33%	82%	43%	[6]/(1-[6])
After-tax WACC	[8]	4.6%	5.0%	5.8%	4.9%	(1-[6])x[3]+(1-[5])x[4]x[6]

8. INFLATION AND TAXES

The WACC we have calculated in the previous section is a nominal after-tax WACC. To convert this to a real WACC requires an adjustment for inflation. The methodology requires that inflation consider both historic and forecast rates of inflation in the Netherlands and Germany.

Historical inflation over the prior three years amounts to 2.07% for Germany and 2.48% for the Netherlands.[20] This period matches the time horizon used for the risk free rate, which may be useful as the bond yields will have inherent assumptions on the inflation expectations of the market.

Euro-area inflation predictions are provided by the ECB, which are based on a survey of professional forecasters. The short term prediction for the upcoming calendar year is 1.9%, and the five-year prediction is 2%.[21]

The CPB also provides a short term forecast of inflation rates for the Netherlands: the predicted inflation for 2013 is 2%. The Bundesbank provides a forecast for Germany of 1.6%.[22]

Based on the considerations above, we use an inflation rate of 2%. We apply the marginal corporate tax rate for the Netherlands, which at the time of writing is 25%, to arrive at a pre-tax WACC. Table 17 illustrates the real after-tax WACCs that result when we apply the inflation rate and the marginal corporate tax rate.

---

[20] Data from Eurostat
[21] Data from the ECB
[22] Bundesbank, "Outlook for the German economy –macroeconomic projections for 2012 and 2013", June 2012.

Table 17: Real after-tax WACCs

		Fixed Line Operators	Mobile Operators	HFC Operators		Notes
				Specific	*Generic*	
After-tax WACC	[1]	4.6%	5.0%	5.8%	4.9%	See Section 7
Tax Rate	[2]	25%	25%	25%	25%	Dutch Corporate Tax Rate
Inflation	[3]	2.0%	2.0%	2.0%	2.0%	Assumed
Pre-tax WACC	[4]	6.2%	6.7%	7.8%	6.5%	[1]/(1-[2])
Pre-tax Real WACC	[5]	4.1%	4.6%	5.7%	4.4%	(1+[4])/(1+[3])-1

Appendix I – Statistical Reliability

We detail the standard diagnostic tests to assess if the beta estimates satisfy the standard conditions underlying ordinary least squares regression, which are: that the error terms in the regression follow a normal distribution and that they do not suffer from heteroskedasticity[23] or auto-correlation.[24] Failure to meet these conditions would not invalidate the beta estimates, but would have the following consequences:

1. Although OLS is still an unbiased procedure in the presence of heteroskedasticity and/or autocorrelation, it is no longer the best or least variance estimator.
2. In the presence of heteroskedasticity and/or autocorrelation, the standard error calculated in the normal way may understate the true uncertainty of the beta estimate.
3. Heteroskedasticity and/or auto-correlation may indicate that the underlying regression is mis-specified (i.e. we have left out some explanatory variable).

Heteroskedasticity

We apply White's test for heteroskedasticity. Table 18 illustrates the results.

Table 18: White's test for Heteroskedasticity

	3 yr		
	White Stat	p-value	Heterosk-edascity
Fixed Line Operators Peer Group			
BT	1.06	0.59	No
Iliad	0.84	0.66	No
TDC	8.99	0.01	Yes
Mobile Operators Peer Group			
Vodafone	8.89	0.01	Yes
Mobistar	0.53	0.77	No
Sonaecom	20.82	0.00	Yes
Telenor	4.50	0.11	No
HFC Operators Peer Group			
Virgin Media	29.88	0.00	Yes
Telenet Group	0.43	0.81	No
Zon Multimedia	0.21	0.90	No

The results indicate the presence of some heteroskedasticity in the sample. This most likely relates to the significant increase in market volatility around the heart of the crisis at the start of the sample period, and a subsequent decrease, changing the variance of the population over the sampling period.

---

[23] Heteroskedasticity means that there exists sub-populations in the sample which have different variance from others.
[24] Auto-correlation means that the error terms between periods are correlated.

Autocorrelation

We also apply the Durbin-Watson test for auto-correlation. Unsurprisingly, this test indicates a degree of autocorrelation in all of the regressions, also likely reflecting the development of the credit crisis and the changing extent of market volatility. The effect of this auto-correlation is that standard errors will over-estimate the precision of the regression. The results are presented in Table 19:

Table 19: Durbin–Watson Test for Auto-correlation

	3 yr	
	DW Stat	Serial Correlation
Fixed Line Operators Peer Group		
BT	1.681	Yes
Iliad	1.647	Yes
TDC	1.711	Yes
Mobile Operators Peer Group		
Vodafone	1.534	Yes
Mobistar	1.692	Yes
Sonaecom	1.464	Yes
Telenor	1.690	Yes
HFC Operators Peer Group		
Virgin Media	1.701	Yes
Telenet Group	1.775	Indecisive
Zon Multimedia	0.254	Yes

Prais-Winsten Regressions

To account for the inclusion of auto-correlation and heteroskedasticity in the sample a standard statistical technique is to apply a regression using the Prais–Winsten estimation tests. The results are presented in Table 20:

Table 20: Prais-Winsten Regressions Results

	Beta	Standard Error
Fixed Line Operators Peer Group		
BT	0.82	0.05
Iliad	0.46	0.04
TDC	0.36	0.04
Mobile Operators Peer Group		
Vodafone	0.46	0.04
Mobistar	0.49	0.04
Sonaecom	0.71	0.06
Telenor	0.82	0.04
HFC Operators Peer Group		
Virgin Media	0.69	0.07
Telenet Group	0.62	0.04
Zon Multimedia	0.85	0.06

The corrections for auto-correlation and heteroskedasticity do not have a significant impact on the results.

Appendix II – Description of the Peer Group Businesses

In section 2 we described our criteria for dividing up firms into fixed and mobile operators. Specifically, mixed mobile/fixed-line firms with an EBITDA contribution from mobile activities lower than 40%, or where the revenues contribution from the mobile business is lower than 30%, are allocated to the fixed-line peer group. For the mobile peer group we select operators with an EBITDA contribution from mobile activities higher than 60%, or with a revenues contribution higher than 70%. Table 21 gives a more detailed description of the activities of these peers. We have also included a description of firms which are not in the peer groups but which we have used to benchmark the cost of debt.

Table 21: Business Description of the Peers selected

Fixed Operators	Business Description
BT Group	BT Group is a principal communications services provider active in the fixed telecommunications market. The firm has four lines of business: BT Global Services, BT Retail, BT Wholesale and Openreach. We relied on the BTs FY 2011 results in order to estimate the Total revenues.
Free-Iliad	Iliad SA provides Internet access services, hosting services and others (i.e IPTV). Iliad is also focused on fixed-line telephony services and the provision of wireless fidelity (WiFi) cards. It is also entered in mobile telecommunications market in January 2012. We relied on Iliad's first half 2011 results in order to estimate the Mobile revenues and EBITDA, the total revenues and EBITDA.
TDC	TDC is an integrated fixed and mobile operators, providing telephony, Internet, TV, data communications, integration and hosting solutions, as well as related content and services. We relied on TDC's FY 2011 results in order to estimate the Mobile revenues and EBITDA, the total revenues and EBITDA.

Mobile Operators	Business Description
Vodafone	Vodafone Group Plc (Vodafone) is a mobile communications company operating in three geographic regions: Europe, Africa and Central Europe; Asia Pacific, and the Middle East, and has an investment in Verizon Wireless in the United States. We relied on the Vodafone's FY 2011/2012 results in order to estimate the Mobile revenues and the total revenues.
Mobistar	Mobistar SA operates in the fields of mobile and fixed telephony, asymmetric digital subscriber line (ADSL) internet and digital television. We relied on Mobistar's first half 2011 results in order to estimate the Mobile revenues and EBITDA, the total revenues and EBITDA.
Sonaecom	Sonaecom SGPS SA divides its business into two main units: Optimus, which is an integrated telecommunications operator, and the unit of Software and Systems Information Services (SSI). Additionally, the Company is active in the Online & Media sector. We relied on Sonaecom's FY 2011 results in order to estimate the Mobile revenues and EBITDA, the total revenues and EBITDA.
Telenor	Telenor ASA provides telecommunication, data and media services, such as satellite broadcasting services, General Packet Radio Service (GPRS) and mobile services. We relied on the Telenor's FY 2011 results in order to estimate the Mobile revenues and the total revenues.

Fixed-Mobile Operators	Business Description
Telecom Italia	Telecom Italia is engaged mainly in the fixed and mobile national and international telecommunications sector. It operates through five segments: Domestic; Brazil; Argentina; Media, and Olivetti. We relied on the Deutsche Bank estimations of FY 2011 results for data related to Mobile revenues and EBITDA, the total revenues and total EBITDA.
Deutsche Telekom	Deutsche Telekom AG diversifies its activities into three geographical segments: Germany, Europe and the United State.The Company's product portfolio comprises fixed-network lines, broadband lines, as well as mobile communication networks. We relied on the DT's FY 2011 results in order to estimate the Mobile revenues and the total revenues.
Belgacom	Belgacom SA provides both fixed and mobile telecommunication services, including telephony, Internet and television services for both professional and private customers. Its activities are divided into five segments: the Consumer Business Unit (CBU) ; Enterprise Business Unit (EBU); Service Delivery Engine & Wholesale (SDE&W); International Carrier Services (ICS); and Staff and Support (S&S). We relied on the Belgacom's FY 2011 results in order to estimate the Mobile revenues and the total revenues.
France Telecom	France Telecom SA (France Telecom) offers services covering fixed and mobile communications, data transmission, the Internet and multimedia, mobile telephone services, network services, integration and information management for communication applications and other services. The Company operates through the network of subsidiaries, such as Orange Dominicana, Orange Caraibes, FT Espana, Orange Catalunya, Orange Romania and affiliated companies, such as Sonatel, Korek Telecom, Medi Telecom, Orange Tunisie. We relied on the FT's FY 2011 results in order to estimate the Mobile revenues and the total revenues.
KPN	Koninklijke KPN NV (KPN) provides fixed and mobile telephony, Internet and television. We relied on KPN's FY 2011 results in order to estimate the Mobile revenues and EBITDA, the total revenues and EBITDA.
Telefònica	Telefonica SA operates through three geographic business segments: Telefonica Spain, Telefonica Europe and Telefonica Latin America. It primarily provides public and private fixed and mobile telecommunication, media and entertainment services. We relied on the Telefonica's FY 2011 results in order to estimate the Mobile revenues and the total revenues.
Telia Sonera	TeliaSonera's operations are divided into three business areas. The Mobility Services business area, the fixed and mobile Broadband Services business area and the Eurasia business. We relied on Telia Sonera's FY 2011 results in order to estimate the Mobile revenues and EBITDA, the total revenues and EBITDA.

HFC Operators	Business Description
Virgin Media	Virgin Media Inc. is is a provider of broadband Internet, television, mobile telephony and fixed line telephony services that offer a range of entertainment and communications services to residential and commercial customers throughout the United Kingdom. The source of Virgin Media's Debt Value data is Bloomberg.
Ziggo	Ziggo NV provides standard television, digital pay television, broadband Internet and telephony services to both private and corporate customers. We relied on Ziggo's 2012 Third Quarter results in order to estimate the company's Debt Value.
Zon	ZON's cable and satellite television business comprises cable and satellite television distribution; the operation of electronic communications services; Internet Protocol voice services (VOIP), and mobile virtual network operator (MVNO).
Telenet	Telenet operates on television (TV), Internet and telephony. The Company's product portfolio comprises cabled TV channel broadcasting, Internet access services, landline telephony, mobile telephony, business services, such as voice and data transmission through fiber-optic cable, coaxial cable, and wireless infrastructures.

Appendix III – Calculation of Operating Lease Leverage

Table 22: Calculation of Operating Lease Leverage

			Annual Report Timing	1	1-2	2-3	3-4	4-5	5+					
			Assumed Payment Date (years) [A]	1	2	3	4	5	6	7	8	9	10	Total
2011														
Lease of Premises, NOK mln	[1]	See note		2,078	1,756	1,553	952	729	1,807					
Lease of Satellite-and net-Capacity, NOK mln	[2]	See note		393	301	234	79	40	26					
Total, NOK mln	[3]	[1]+[2]		2,471	2,057	1,787	1,031	769	1,833					9,948
Projected 2011 Payments, NOK mln	[4]	See note		2,471	2,057	1,787	1,031	769	367	367	367	367	367	9,948
Date of Projection	[5]	See note	30-Dec-11											
Cost of Debt Calculation														
Spread of 10-year A rated Industrials	[6]	Bloomberg	1.48%											
Norwegian Govt Bond Yields	[7]	See note		3.52%	2.51%	1.51%	1.67%	1.83%	1.87%	1.92%	1.93%	1.96%	2.41%	
Estimated Cost of Debt	[8]	[6]+[7]		5.00%	3.99%	2.98%	3.15%	3.31%	3.35%	3.39%	3.41%	3.44%	3.89%	
Discount Factor	[9]	1/(1+[8])^[A]		0.952	0.925	0.916	0.883	0.850	0.820	0.792	0.765	0.738	0.683	
Discounted Cash Flows, NOK mln	[10]	[4]x[9]		2,353	1,902	1,636	911	653	301	290	280	270	250	8,848
Exchange Rate, NOK/€	[11]	Bloomberg	7.742											
Present Value of Commitment, € mln	[12]	See note	1,143											
2010														
Lease of Premises, NOK mln	[13]	See note		2,215	1,992	1,832	1,605	884	2,469					
Lease of Satellite-and net-Capacity, NOK mln	[14]	See note		249	167	110	102	95	12					
Total, NOK mln	[15]	[13]+[14]		2,464	2,159	1,942	1,707	979	2,481					11,732
Projected 2010 Payments, NOK mln	[16]	See note		2,464	2,159	1,942	1,707	979	496	496	496	496	496	11,732
Date of Projection	[17]	See note	30-Dec-10											
Cost of Debt Calculation														
Spread of 10-year A rated Industrials	[18]	Bloomberg	0.86%											
Norwegian Govt Bond Yields	[19]	See note		3.10%	2.84%	2.59%	2.82%	3.06%	2.85%	2.65%	2.58%	2.45%	3.68%	
Estimated Cost of Debt	[20]	[18]+[19]		3.96%	3.70%	3.45%	3.68%	3.92%	3.71%	3.51%	3.44%	3.31%	4.54%	
Discount Factor	[21]	1/(1+[20])^[A]		0.962	0.930	0.903	0.865	0.825	0.803	0.785	0.763	0.746	0.641	
Discounted Cash Flows, NOK mln	[22]	[16]x[21]		2,370	2,007	1,754	1,477	808	399	390	378	370	318	10,272
Exchange Rate, NOK/€	[23]	Bloomberg	7.817											
Present Value of Commitment, € mln	[24]	See note	1,314											
2009														
Lease of Premises, NOK mln	[25]	See note		1,790	1,468	1,264	1,217	1,505	2,735					
Lease of Satellite-and net-Capacity, NOK mln	[26]	See note		247	208	147	100	94	26					
Total, NOK mln	[27]	[25]+[26]		2,037	1,676	1,411	1,317	1,599	2,761					10,801
Projected 2009 Payments, NOK mln	[28]	See note		2,037	1,676	1,411	1,317	1,599	552	552	552	552	552	10,801
Date of Projection	[29]	See note	30-Dec-09											
Cost of Debt Calculation														
Spread of 10-year A rated Industrials	[30]	Bloomberg	0.88%											
Norwegian Govt Bond Yields	[31]	See note		2.94%	2.92%	2.89%	3.22%	3.55%	3.25%	2.95%	2.85%	2.65%	4.13%	
Estimated Cost of Debt	[32]	[30]+[31]		3.82%	3.79%	3.77%	4.10%	4.43%	4.13%	3.83%	3.73%	3.53%	5.01%	
Discount Factor	[33]	1/(1+[32])^[A]		0.963	0.928	0.895	0.852	0.805	0.784	0.769	0.746	0.732	0.613	
Discounted Cash Flows, NOK mln	[34]	[28]x[33]		1,962	1,556	1,263	1,121	1,287	433	425	412	404	339	9,202
Exchange Rate, NOK/€	[35]	Bloomberg	8.335											
Present Value of Commitment, € mln	[36]	See note	1,104											

Notes and Sources:
[1],[2],[5],[13],[14],[17],:Telenor Annual Report 2011, Note 33.
[4],[16],[28]: Final payment projected over 5 year period
[25],[26],[29]: Annual Report 2010, Note 33.
[7],[19],[31]:Central Bank of Norway.
[12],[24],[36]:Total Discounted Cash Flows over Exchange Rate.

			1	1-2	2-3	3-4	4-5	5+					
Annual Report Timing													
Assumed Payment Date (years) [A]			0.5	1.5	2.5	3.5	4.5	5.5	6.5	7.5	8.5	9.5	Total
2012													
Operation Leases, £ mln	[1]	See note	1,110	893	740	624	528	2,246					6,141
Projected 2012 Payments, £ mln	[2]	See note	1,110	893	740	624	528	449	449	449	449	449	6,141
Date of Projection	[3]	See note	30-Mar-12										
Cost of Debt Calculation													
Spread of 10-year A rated Industrials	[4]	Bloomberg	1.24%										
UK Gilt Yields	[5]	See note	0.54%	0.40%	0.46%	0.67%	0.93%	1.21%	1.49%	1.76%	2.01%	2.23%	
Estimated Cost of Debt	[6]	[4]+[5]	1.77%	1.64%	1.70%	1.91%	2.17%	2.45%	2.73%	3.00%	3.24%	3.47%	
Discount Factor	[7]	$1/(1+[6])\wedge[A]$	0.991	0.976	0.959	0.936	0.908	0.875	0.839	0.801	0.762	0.723	
Discounted Cash Flows, £ mln	[8]	[2]x[7]	1,100	872	709	584	479	393	377	360	342	325	5,542
Exchange Rate, €/£	[9]	Bloomberg	0.833										
Present Value of Commitment, in mln €	[10]	See note	6,656										
2011													
Operation Leases, £ mln	[11]	See note	1,225	958	746	638	602	2,344					6,513
Projected 2011 Payments, £ mln	[12]	See note	1,225	958	746	638	602	469	469	469	469	469	6,513
Date of Projection	[13]	See note	30-Mar-11										
Cost of Debt Calculation													
Spread of 10-year A rated Industrials	[14]	Bloomberg	0.79%										
UK Gilt Yields	[15]	See note	0.68%	1.13%	1.61%	2.06%	2.46%	2.82%	3.12%	3.39%	3.61%	3.80%	
Estimated Cost of Debt	[16]	[14]+[15]	1.47%	1.92%	2.40%	2.85%	3.26%	3.61%	3.92%	4.18%	4.40%	4.59%	
Discount Factor	[17]	$1/(1+[16])\wedge[A]$	0.993	0.972	0.942	0.906	0.866	0.823	0.779	0.736	0.693	0.653	
Discounted Cash Flows, £ mln	[18]	[12]x[17]	1,216	931	703	578	521	386	365	345	325	306	5,676
Exchange Rate, €/£	[19]	Bloomberg	0.879										
Present Value of Commitment in Euro	[20]	See note	6,458										
2010													
Operation Leases, £ mln	[21]	See note	1,200	906	776	614	512	2,235					6,243
Projected 2010 Payments, £ mln	[22]	See note	1,200	906	776	614	512	447	447	447	447	447	6,243
Date of Projection	[23]	See note	31-Mar-10										
Cost of Debt Calculation													
Spread of 10-year A rated Industrials	[24]	Bloomberg	0.85%										
UK Gilt Yields	[25]	See note	0.53%	1.25%	2.09%	2.79%	3.34%	3.77%	4.09%	4.32%	4.47%	4.56%	
Estimated Cost of Debt	[26]	[24]+[25]	1.38%	2.10%	2.94%	3.64%	4.19%	4.62%	4.94%	5.17%	5.32%	5.41%	
Discount Factor	[27]	$1/(1+[26])\wedge[A]$	0.993	0.969	0.930	0.882	0.831	0.780	0.731	0.685	0.644	0.606	
Discounted Cash Flows, £ mln	[28]	[22]x[27]	1,192	878	722	542	426	349	327	306	288	271	5,299
Exchange Rate, €/£	[29]	Bloomberg	0.890										
Present Value of Commitment in Euro	[30]	See note	5,956										
2009													
Operation Leases, £ mln	[31]	See note	1,041	812	639	539	450	2,135					5,616
Projected 2009 Payments, £ mln	[32]	See note	1,041	812	639	539	450	427	427	427	427	427	5,616
Date of Projection	[33]	See note	31-Mar-09										
Cost of Debt Calculation													
Spread of 10-year A rated Industrials	[34]	Bloomberg	1.70%										
UK Gilt Yields	[35]	See note	0.64%	0.96%	1.58%	2.04%	2.35%	2.57%	2.75%	2.91%	3.07%	3.23%	
Estimated Cost of Debt	[36]	[34]+[35]	2.35%	2.66%	3.28%	3.74%	4.05%	4.27%	4.45%	4.62%	4.77%	4.93%	
Discount Factor	[37]	$1/(1+[36])\wedge[A]$	0.988	0.961	0.923	0.879	0.836	0.794	0.753	0.713	0.673	0.633	
Discounted Cash Flows, £ mln	[38]	[32]x[37]	1,029	781	589	474	376	339	322	304	287	270	4,773
Exchange Rate, €/£	[39]	Bloomberg	0.926										
Present Value of Commitment in Euro	[40]	See note	5,156										

Notes ans Sources:
[1],[2],[3],[11],[12],[13]:Vodafone Annual Report 2012, Note 28.
[21],[22],[23],[31],[32],[33]:Vodafone Annual Report 2012, Note 28.
[5],[15],[25],[35]:Bank of England.
[10],[20],[30],[40]:Total Discounted Cash Flows Over Exchange Rate.

Annual Report Timing			<1	1-3		3-5		>5															
Assumed Payment Date (years) [A]			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Total
2011																							
Operation Leases, € mln	[1]	See note	27,780	26,029	26,029	18,309	18,309	246,155															
Projected 2011 Payments, € mln	[2]	See note	27,780	26,029	26,029	18,309	18,309	16,410	16,410	16,410	16,410	16,410	16,410	16,410	16,410	16,410	16,410	16,410	16,410	16,410	16,410	16,410	
Date of Projection	[3]	See note	31-Dec-11																				
Cost of Debt Calculation																							
Spread of 10-year A rated Industrials	[4]	Bloomberg	1.48%																				
Belgian Government Bond Yields	[5]	See note	0.58%	1.89%	2.83%	3.24%	3.36%	3.46%	3.62%	3.82%	4.00%	4.14%	4.24%	4.29%	4.31%	4.31%	4.29%	4.26%	4.24%	4.22%	4.21%	4.20%	
Estimated Cost of Debt	[6]	[4]+[5]	2.06%	3.37%	4.31%	4.72%	4.84%	4.94%	5.10%	5.30%	5.48%	5.62%	5.72%	5.77%	5.79%	5.79%	5.77%	5.74%	5.72%	5.70%	5.69%	5.68%	
Discount Factor	[7]	1/(1+[6])^[A]	0.980	0.936	0.881	0.832	0.790	0.749	0.706	0.662	0.619	0.579	0.542	0.510	0.481	0.455	0.431	0.410	0.389	0.369	0.350	0.331	
Discounted Cash Flows. € mln	[8]	[2]x[7]	27,220	24,361	22,935	15,225	14,457	12,289	11,587	10,858	10,155	9,500	8,902	8,373	7,897	7,465	7,076	6,721	6,377	6,052	5,736	5,438	228,625
Present Value of Commitment, € mln	[9]	See note	228,625																				
2010																							
Operation Leases, € mln	[10]	See note	27,278	25,880	25,880	20,470	20,470	265,650															
Projected 2010 Payments, € mln	[11]	See note	27,278	25,880	25,880	20,470	20,470	17,710	17,710	17,710	17,710	17,710	17,710	17,710	17,710	17,710	17,710	17,710	17,710	17,710	17,710	17,710	
Date of Projection	[12]	See note	31-Dec-10																				
Cost of Debt Calculation																							
Spread of 10-year A rated Industrials	[13]	Bloomberg	0.82%																				
Belgian Government Bond Yields	[14]	See note	1.57%	2.04%	2.50%	2.92%	3.24%	3.45%	3.62%	3.76%	3.89%	4.00%	4.08%	4.15%	4.19%	4.23%	4.25%	4.27%	4.28%	4.29%	4.30%	4.31%	
Estimated Cost of Debt	[15]	[13]+[14]	2.39%	2.86%	3.32%	3.74%	4.06%	4.27%	4.44%	4.58%	4.71%	4.82%	4.90%	4.97%	5.01%	5.05%	5.07%	5.09%	5.10%	5.11%	5.12%	5.13%	
Discount Factor	[16]	1/(1+[15])^[A]	0.977	0.945	0.907	0.863	0.820	0.778	0.738	0.699	0.661	0.625	0.591	0.559	0.530	0.502	0.476	0.452	0.429	0.408	0.387	0.368	
Discounted Cash Flows. € mln	[17]	[11]x[16]	26,641	24,460	23,464	17,674	16,776	13,780	13,066	12,377	11,703	11,060	10,463	9,895	9,380	8,885	8,434	8,002	7,602	7,221	6,857	6,511	254,252
Present Value of Commitment, € mln	[18]	See note	254,252																				
2009																							
Operation Leases, € mln	[19]	See note	23,017	17,682	17,682	17,548	17,548	231,741															
Projected 2009 Payments, € mln	[20]	See note	23,017	17,682	17,682	17,548	17,548	15,449	15,449	15,449	15,449	15,449	15,449	15,449	15,449	15,449	15,449	15,449	15,449	15,449	15,449	15,449	
Date of Projection	[21]	See note	31-Dec-09																				
Cost of Debt Calculation																							
Spread of 10-year A rated Industrials	[22]	Bloomberg	0.90%																				
Belgian Government Bond Yields	[23]	See note	0.84%	1.43%	1.97%	2.41%	2.74%	3.02%	3.27%	3.48%	3.68%	3.84%	3.97%	4.08%	4.17%	4.24%	4.29%	4.33%	4.36%	4.39%	4.41%	4.43%	
Estimated Cost of Debt	[24]	[22]+[23]	1.74%	2.33%	2.87%	3.31%	3.64%	3.92%	4.17%	4.38%	4.58%	4.74%	4.87%	4.98%	5.07%	5.14%	5.19%	5.23%	5.26%	5.29%	5.31%	5.33%	
Discount Factor	[25]	1/(1+[24])^[A]	0.983	0.955	0.919	0.878	0.836	0.794	0.752	0.710	0.669	0.630	0.593	0.558	0.526	0.496	0.468	0.443	0.419	0.396	0.374	0.354	
Discounted Cash Flows. € mln	[26]	[20]x[25]	22,624	16,887	16,245	15,408	14,679	12,270	11,610	10,968	10,329	9,727	9,161	8,627	8,127	7,663	7,237	6,839	6,468	6,113	5,786	5,473	212,240
Present Value of Commitment, € mln	[27]	See note	212,240																				

Notes and Sources:

[1],[2],[3],[10],[11],[12],[19],[20],[21]:Mobistar Annual Report 2011 and 2010, Note 19.

[5],[14],[23]:Belgium Central Bank.

[9],[18],[27]:Total Discounted Cash Flows.

Appendix IV – Phase 1 Report for NMa and OPTA