Europe Economics

The Cost of Capital for the Irish Communications Sector — Final Report

May 2020

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1 Introduction

On 31 May 2019 ComReg published its consultation[1] "Review of Weighted Average Cost of Capital (WACC) — Mobile Telecommunications; Fixed Line Telecommunications; Broadcasting (Market A and Market B)" (hereafter the "WACC Consultation").[2] That consultation proposed "Preliminary WACCs" for the four sectors as set out in the table below.

Table 1.1: Preliminary WACCs from ComReg WACC Consultation

Sector	Preliminary WACC
Mobile Telecommunications	6.53%
Fixed-Line Telecommunications	6.42%
Broadcasting (Market-A)	6.27%
Broadcasting (Market-B)	6.27%

Source: Table 1 of the WACC Consultation

The WACC figures of Table 1.1 were based on recommendations provided by Europe Economics in a report[3] which was also published in May 2019 (hereafter the "May 2019 Report"). This document provides an update of the WACC estimates provided in our May 2019 Report in light of the following.

- During the consultation process a number of respondents[4] expressed views on methodological aspects concerning the estimation of WACC parameters, as well as parameter values. This report reflects upon and responds to issues raised by respondents during the consultation process.
- In November 2019 the European Commission published a Notice[5] (hereafter "the EC Notice") and an accompanying paper[6] (hereafter "the EC Working Paper") that set out the Commission's proposed methodology for estimating the WACC in the EU electronic communications sector. This report reflects upon the EC documents in a number of ways. First, we endorse some of the EC recommendations and adopt them in our analysis. Second, in those areas where we disagree with the EC, we explain and substantiate the rationale for the disagreement.
- The cut-off date used in our May 2019 Report was 31 December 2018. The analysis presented here is based on more recent market data with a cut-off date of 29 November 2019.

1.1 Coronavirus/COVID-19 crisis and the data cut-off used in this document

The analysis in this document was produced before the coronavirus/COVID-19 crisis arose. There was subsequently a delay in finalisation as it was considered whether the new situation implied some clear change in the WACC for the Irish communications sector. The view Comreg has taken has been that there may be

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[1]   ComReg 19/54
[2]   https://www.comreg.ie/publication/review-of-the-weighted-average-cost-of-capital/
[3]   https://www.comreg.ie/publication/review-of-weighted-average-cost-of-capital-consultant-report/
[4]   Respondents to the consultation were: Eircom, 2rn, RTE, Alto, NBI, Three, Sky, and Vodafone.
[5]   European Commission (2019), "Commission Notice on the calculation of the cost of capital for legacy infrastructure in the context of the Commission's review of national notifications in the EU electronic communications sector", *Official Journal of the European Union*, (2019/C 375/01).
[6]   European Commission (2019), "Accompanying the document: Commission Notice on the calculation of the cost of capital for legacy infrastructure in the context of the Commission's review of national notifications in the EU electronic communications sector", *Commission Staff Working Document*, SWD(2019) 397 final.

an impact but that the direction of impact is ambiguous – the COVID-19 crisis, its resolution and aftermath could be associated with a fall in Irish communications sector WACCs, a rise, or no change.

Accordingly, pending any new data or resolution of uncertainty that would allow a more precise assessment of the impacts of the current and forthcoming situations upon WACCs, it has been decided to proceed with the analysis as per this document, based on the pre-coronavirus data.

That left the question of whether the evidence should be updated from the data cutoff window used in this document – December 2019 – or to update it to end-February 2020 (the last full month before the coronavirus crisis started to have a serious impact upon markets). The decision was taken that there was little likely gain from repeating all of the analysis to update to an end-February situation that the coronavirus crisis has rendered obsolete, and in particular no good reason to believe the end-February situation would have provided a better indication of the WACCs of the Irish communications sector over the next five years than the December 2019 situation analysed here.

1.2 Remainder of this document

This document is structured as follows:

- Section 2 deals with the general methodological framework used to set the allowed return on capital.
- Section 3 deals with inflation and taxes.
- Section 4deals with the cost of equity, under ComReg's 2014 approach and a variant of the EC Notice approach.
- Section 5 deals with the cost of debt.
- Section 6 provides the overall WACC figures.
- There then follow three Appendices.

2 Framework to estimate the allowed return on capital

2.1 The WACC

In line with almost all European regulators, ComReg uses a WACC-CAPM framework for cost of capital analysis. The Weighted Average Cost of Capital (WACC) of a company is expressed as a weighted average of the cost of debt (r_D) and the cost of equity (r_E) according to the following formula:

$$WACC = (1 - g) * r_E + g * r_D$$

where g is the company's level of gearing, which is defined by the ratio $D/(D + E)$ where D and E are the company's total values of debt and equity.

We shall now explain various issues regarding the estimations of the costs of equity and of debt.

2.1.1 Models and cross-checks for the cost of equity

The WACC represents the return the investors require as compensation for investing in a firm. From a regulatory viewpoint, the WACC determination is ultimately a policy tool intended to promote regulatory objectives, balancing the interests of consumers, investors, employees of firms, the Department of Finance and regulated entities. A determination is a judgement. That judgement is informed by the results of finance models, but is not typically the mechanical output of any model.

The main workhorse tool informing regulatory judgements regarding the cost of equity in European WACC analysis is the Capital Asset Pricing Model (CAPM), and that was indeed the approach taken in our May 2019 Report.[7] The CAPM formula for the cost of equity is:

$$r_E = r_f + \beta_E * MRP = r_f + \beta_E * (TMR - r_f)$$

Where:

- r_f is the risk-free rate (i.e. return on a riskless asset).
- β_E is the equity beta (i.e. the covariance between a stock price returns, and the returns of the entire equity market)
- MRP is the market risk premium, the difference between the Total Market Return (TMR) and the risk free rate, an economy-wide parameter. In practice the Total Equity Market Return is usually regarded as a good proxy for the TMR and accordingly the equity risk premium (ERP) is used as a reasonable proxy for the MRP. This depends on the assumption that the equity market is sufficiently diverse to span all risks for the economy as a whole (i.e. any risk can be constructed by creating a portfolio of equities alone).

For some years it was standard to cross-check the results under a CAPM approach with the results under other modelling approaches, such as the Dividend Growth Model, the Fama-French Model or the Third Moment CAPM. Over the past fifteen years, the use of the Dividend Growth and Fama-French Models as cross-checks has tended to fall away, as they have been considered to produce unreliable results or such

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[7] See Appendix 1 of the May 2019 Report.

wide ranges as not to be informative. Third moment CAPM models have been considered in very specific circumstances, but rarely carried high weight.

In our May 2019 Report, following that tradition, we cross-checked our cost of equity range with two quite importantly different modelling approaches. Both our main text approach and our two cross-checks lay within the CAPM tradition, but they implemented the CAPM in importantly different ways.

- Under our main approach the WACC is thought of as an underlying equilibrium parameter, embodied in the functioning of the economy as a whole. In this approach it is not assumed that the parameters of the cost of equity can be more-or-less directly observed in financial markets. Rather, they must be inferred from broad economic and macroeconomic data and from historical experience. A key advantage of this approach is that the concept most closely reflects the theoretical ideal.
- Our two cross-checks were:

  - A variant of the estimation practice that has come to be adopted, over the past two years, by the UK regulators that are members of the UK Regulators Network (UKRN)[8]. Under this approach, it is assumed that individual parameters of the CAPM can be more-or-less directly observed in market prices, and the model of the cost of equity is then assembled from these individual more-or-less directly observed components. A key advantage of this approach is that the answer responds quickly to shifts in financial market data.
  - The then-latest iteration of the European Commission's recommended approach for estimating the WACC in the communications sector.[9]

2.1.2   Approach to the cost of debt

There are two broad approaches that can be adopted to the cost of debt. These are termed the "debt premium approach" and the "all-in cost of debt approach". Under the debt premium approach, market data is used to determine the "spread" or "premium" of corporate bonds over very low risk government bonds of equivalent maturities. The yields so produced are then added to an estimate of the risk-free rate (which may have been determined in the analysis of the cost of equity).

Under the all-in cost of debt approach, yields are estimated directly from the bonds of comparators and these yields inform the cost of debt range.

There are two key requirements to note here, which are central to which approach is more feasible:

- The debt premium approach requires that there is a determined or chosen risk-free rate (or at least a risk-free rate range).[10]
- The all-in cost of debt approach requires that there be relevant bonds to use to estimate yields directly.

In the main body of our May 2019 Report we focused upon a debt premium-type approach, with consistency in the risk-free rate used (i.e. using the same risk-free rate for the cost of equity and cost of debt), and considered an all-in-type approach (of the UKRN form) and the European Commission approach in our cross-checks.

In Ireland it has been normal regulatory practice to place considerable weight upon estimates of yields for bonds from comparator firms in other countries. Given that other countries might have a materially different

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[8]   We use the term here to refer mainly to Ofwat, Ofgem and the CAA collectively. Note that the UKRN is a formally constituted body of its own that produces reports on issues such as the WACC. The UKRN regulators do not necessarily follow every recommendation of the UKRN.

[9]   See   https://ec.europa.eu/information_society/newsroom/image/document/2018-27/05-07-2018_wacc_background_document_60A8BB89-B677-CE6F-C44D838BD437C73D_53397.pdf

[10]   Under the debt premium approach the cost of debt is given by $r_D = r_f + DP$, where DP is the debt premium, i.e. the difference between the risk-free rate and the interest rate associated with the company's debt.

risk-free rate of return (especially if, as has often been the case for communications sector comparators, they are from different currency areas), that could mean that these comparators could not be used directly via all-in yields because that would create distortions arising from differences in risk-free rates.

On the other hand, with respect to the cost of equity, the correct approach to estimating a risk-free rate per se (as versus a recommended cost of equity) is a matter of considerable dispute. For some years, as we shall see, uncertainty regarding the risk-free rate has been quite high. The longer that has continued, the weaker the case for continued sole reliance upon a debt premium approach has become.

As we shall explore in more detail in Section 5, the value of a debt premium approach, as opposed to an all-in cost of debt approach, depends at least to some extent upon how confident one can be regarding the risk-free rate. After all, in cases where we do have relevant bonds that we can observe yields, under the all-in cost of debt approach we can, in a sense, observe the cost at least approximately directly. (This contrasts with the cost of equity where, by its nature, we cannot observe the cost ex ante but instead must, of necessity, model it.) So the burden of deviating from the cost we actually observe (which is likely to be not far from the true cost of debt, even if not precisely it) should be reasonably high. In the case of Eircom, in particular, we have bond issuance data from 2019. We should not require that the determined cost of debt must precisely match Eircom's actual costs — after all, Eircom may issue its bonds with unwise or unfortunate timing on some occasions or make a poor deal, leading to its costs being above the market rate, or on some other occasion manage an especially smart deal or clever or fortuitous timing, resulting in outperforming market rates. But nonetheless, we should be concerned if our modelled cost of debt deviates very markedly from Eircom's actual debt costs. Over 2019, between the data period used for our May 2019 Report and the data period used in this report, such a marked deviation has occurred. We shall return to this issue in Section 5.

2.1.3   Taxes and inflation

Given the tax shield resulting from the ability to deduct interest expenses from taxes, calculating a pre-tax WACC involves inflating the cost of equity by a value of one less the tax rate (t). This adjustment results in a pre-tax nominal WACC figures which is calculated as follows:

$$WACC_{pre-tax} = g * r_D + \left(\frac{1-g}{1-t}\right) * r_E$$

Finally, ComReg's practice has been to use a nominal WACC. However, some regulators that might be relevant comparators use a real terms WACC, and when comparing returns across countries (especially if comparators come from a different currency zone) it may be more relevant to compare real terms WACCs than nominal WACCs. The nominal and real WACCs are related according to the following formula (the Fisher equation):

$$(1 + n) = (1 + r) * (1 + \pi)$$

where n is the nominal rate of return, r is the real rate of return, and π is the rate of inflation.

2.1.4   Division into "generic" (i.e. market-wide) parameters and specific parameters

WACC parameters can be divided into two groups:

- Generic (or "market-wide") parameters — these are economy-wide parameters that affect all firms operating in a geographically defined market. The generic parameters are:
  - The risk-free rate.
  - The total market return (TMR) and the equity risk premium (ERP).
  - The inflation rate.

- The corporate tax rate.

- Company specific parameters – these parameters are idiosyncratic to any given firm or sector in the economy. They are:

  - The asset beta.
  - The debt beta.
  - The gearing.
  - The debt premium and/or the cost of debt.

2.2 Respondents' views on the approach to set the allowed return on capital

Most stakeholders agree that the WACC-CAPM framework is appropriate to determine the allowed rate of return. One exception in this respect is represented by RTÉ DMM which expressed concerns on the use of the WACC framework in Broadcasting Market B. The company's view is that, since Market B has a small asset base in relation to its operating costs, a margin approach might be preferable.

2.3 European Commission approach to set the allowed return on capital

The EC Notice prescribes using a formulation of the WACC-CAPM framework which is identical to the one we used in our May 2019 Report and which we have summarised in Section 2.1. There are different methods by which the WACC-CAPM framework described in Section 2.1 can be implemented and, as we shall see in the subsequent sections, in some areas, the specific implementation proposed by the European Commission differs from ours. Such differences are discussed in the sections of this report that deal with those specific parameters.

2.4 Our current view approach to set the allowed return on capital

We remain of the view that the WACC-CAPM framework is the appropriate framework to use in order to determine the allowed rate of returns for the Irish mobile, fixed line and broadcasting sectors. However, as we shall explain in more detail in Section 5, we believe that, given the marked divergence that emerged, over 2019, between the modelled cost of debt based on a debt premium approach and the actual cost of debt firms face, our cross-checks on the cost of debt demand more deviation from the approach taken for our main modelled value than was the case in May 2019, and one consequence of this is that in this report we shall place more weight upon "all-in" data relative to debt premium plus risk-free rate data than was the case in May 2019.

3 Inflation and Taxes

3.1 Methodological approach to inflation

3.1.1 Inflation assumptions in the May 2019 Report

In our May 2019 Report we took the Irish Central Bank forecast for inflation in 2020 of 1.1 per cent as our lower bound for the inflation assumption is be used, and the ECB's implicit inflation target ("below 2 per cent", which we interpret as 1.8 per cent) as the upper bound. We then selected 1.3 per cent as our point estimate, giving more weight to the Irish forecast as, at the time, we expected Irish communications sector cost changes to reflect Irish economy conditions more closely than those of the Eurozone as a whole.

3.1.2 Consultation respondents' views on inflation

Only two stakeholders expressed explicit views with regards to the inflation assumption of 1.3 per cent adopted in our May 2019 Report.

Eircom proposed to increase the inflation rate assumption from 1.3 per cent towards the ECB inflation rate target (i.e. below 2 per cent), and mentioned the potential impact of Brexit on Irish prices as a justification for such a move.

NBI took an opposing view and stated that in light of the latest HCIP estimate published by the Central Statistics Office (i.e. a HCIP of 0.5 per cent for July 2019), and negative government bond yields recently observed in several Eurozone countries, the inflation assumption should be lower than the 1.3 per cent being proposed.

3.1.3 European Commission's approach to inflation

The EC Notice states that, in principle, the appropriate inflation assumption to be used is a forward looking (e.g. 10-years ahead) Eurozone-wide inflation rate. However, since 10-year ahead inflation forecasts are typically not available, a practical approach would be to rely on the 5-year ahead ECB inflation forecast.[11]

3.1.4 Our current views on inflation

We maintain our view that the Irish communications sector price changes are likely to reflect Irish economy conditions more closely than those of the Eurozone as a whole. Notwithstanding the above, we endorse the European Commission's position that the inflation rate should be forward-looking and we think that the ECB implicit inflation target (which is typically reflected by the ECB's 5-years) can be taken as a proxy for inflation expectations over the medium-to-long run. Therefore when forming a view on the inflation rate we shall place weight on both Irish inflation forecasts (for the short term) and Eurozone inflation forecasts (for the medium-to-long term).

Since the WACC is meant to be forward-looking, we disagree with the stakeholders' views that the inflation assumption should be based primarily on current inflation. For example, we object to NBI's proposal to rely

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[11] The EC Notice states that: "practice 10-year inflation forecasts are rarely available, thus shorter term forecasts may be used (e.g. inflation forecast 5 year ahead by ECB)".

on actual inflation figures (NBI's consultation response mentions a HCIP of 0.5 per cent for July 2019) as these provide a poor reflection of future inflation levels.

3.2   Update of the inflation assumption

3.2.1   Europe Economics approach

The most recent quarterly bulleting published by the Irish Central Bank[12] states that:

"Inflation forecasts in a deal scenario are for a moderate increase in prices over the forecast horizon. Conditional on the assumptions for oil prices, exchange rates and real economic activity under the deal scenario, HICP inflation is forecast to increase by 0.8, 1.1 and 1.4 per cent in 2019, 2020 and 2021, respectively.

[…] In the event of a no-deal scenario, inflation is forecast to increase by 0.8, 0.9 and 1.2 per cent in 2019, 2020 and 2021, respectively.

The UK and the European Union concluded a Withdrawal Agreement and hence "No Deal" did not occur.[13] There does remain the possibility that no free trade agreement is concluded between the EU and UK, but that would not apply until the end of 2020. We use the Irish Central Bank's inflation forecasts under a "deal" scenario for the years 2020 (when the UK remains in "transition", effectively as an ongoing non-voting Single Market member) and 2021 (thus assuming that either there is a trade deal, that transition is extended or that any impacts of the absence of a trade deal upon inflation are not large in the first 12 months), and the ECB's 5-years ahead inflation forecasts for the years 2022-2024[14] (we note that the ECB's 5-years ahead inflation forecasts is typically close to the ECB's implicit inflation target of "below 2 per cent").

This results in an average **inflation** assumption for Ireland of **1.5 per cent** over the period 2020-2024 (see table below).

Table 3.1: Inflation assumptions for Ireland over the period 2020-2024

Year	Inflation forecast	Source
2020	1.1%	Irish Central Bank (Brexit deal scenario)
2021	1.4%	Irish Central Bank (Brexit deal scenario)
2022	1.7%	ECB's 5-years ahead inflation forecasts
2023	1.7%	ECB's 5-years ahead inflation forecasts
2024	1.7%	ECB's 5-years ahead inflation forecasts
Average	**1.52%**	

Source: Irish Central Bank, and Europe Economics calculations

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[12]   https://www.centralbank.ie/docs/default-source/publications/quarterly-bulletins/qb-archive/2019/quarterly-bulletin-q4-2019.pdf

[13]   We should be clear here that "No Deal", as widely discussed for the 18 months leading up to January 2020, referred specifically to there being no Withdrawal Agreement — a scenario involving extensive disputes over contracts, the EU seeking to sue the UK to recover monies it claimed it was owed (perhaps even confiscating UK assets located in or passing through the EU), and many other features. "No deal" was not a term referring to there being no free trade agreement concluded with the EU and that is not how we use that term here. No deal is a scenario that did not occur and is now gone.

[14]   See https://www.ecb.europa.eu/stats/ecb_surveys/survey_of_professional_forecasters/html/table_hist_hicp.en.html. At the time of the writing of this report the 5-years ahead inflation forecast was 1.7 per cent.

3.2.2 European Commission approach

The European Commission Notice suggests using the 5-years-ahead Eurozone inflation forecasts published by the ECB. As of December 2019 this forecast value is 1.7 per cent.

3.3 Inflation recommendation

We recommend using an inflation assumption of **1.5 per cent**. If a range is required we recommend a lower bound of **1.1 per cent** (the Irish Central Bank's 2020 forecast) and **1.8 per cent** (broadly, the ECB's target for inflation of close to but below 2 per cent).

This differs from our May 2019 recommendation for three reasons.

- We use more recent forecasts.
- As per the EC Notice, we now make explicit use of the ECB medium/long-term inflation forecast as opposed to using a 1.8 per cent notional value interpreted as being "close to but below 2 per cent".
- We also make more systematic use of Irish Central Bank short-term forecasts.

3.4 Treatment of taxes

3.4.1 Tax assumption used in the May 2019 Report

For the purposes of setting the pre-tax WACC, in the May 2019 Report we used the Irish statutory corporation tax rate of **12.5** per cent.

3.4.2 Consultation respondents' views on taxes

There has been general agreement on the use of the statutory tax rate in the calculation of the pre-tax WACC. However Vodafone argue that the use of statutory tax rate leads to a higher WACC in fixed markets and can therefore be disadvantageous to everyone but Eircom.[15] ALTO also echoes this view by suggesting that where a company's tax rate is significantly different from the statutory tax rate then the company's effective tax rate should be used.

3.4.3 European Commission treatment of taxes

The EC Notice considers it appropriate to use the relevant domestic corporate tax rate for the purpose of calculating a pre-tax WACC.

3.4.4 Our current view on taxes

We note that regulatory precedent in Ireland overwhelmingly favours the use of the statutory tax rate in the calculation of the pre-tax WACC. The use of the domestic corporate tax rate is also endorsed by the European Commission. Therefore, for the purposes of this document, we assume the Irish statutory corporation tax rate when calculating a pre-tax WACC.

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[15] Vodafone response does not provide an explicit reason for this statement but the natural implication is that Vodafone believes that the level of actual taxes that Eircom currently pays for its fixed line operations (i.e. the effective tax rate) is lower than the statutory tax rate used for calculating the WACC.

3.5 Tax rate recommendation

The Irish statutory corporation tax rate of **12.5** per cent. We shall use this tax rate value when calculating a pre-tax WACC.

4   The Cost of Equity

4.1   Introduction

In our May 2019 Report we set out three models of the cost of equity.

- A main model, using an "equilibrium approach" that only slightly modified ComReg's 2014 approach.
- A cross-check model, based on a variant of the UKRN approach applied to Ireland.
- A second cross-check model, based on a straight rendering of the then-current EC guidance for WACC calculation in the communications sector.

In this section we shall estimate the cost of equity. We shall do that under two different methodologies.

- An approach which is in line with that used by ComReg in 2014.
- An approach which is in line with (a modified version of) the guidelines provided by the EC Notice and EC Working Paper.

These two approaches should be considered as cost of equity estimates, not different approaches to estimating individual components. To put the point differently, just as one might estimate the cost of equity using a dividend growth model, a Fama-French model, or a Third Moment CAPM model, one can also estimate the cost of equity using a Comreg 2014 CAPM approach, or a modified EC Notice approach. And just as it would not make sense to estimate the beta under the Fama-French model or the Third Moment CAPM model and use that in a CAPM model, likewise it does not make sense to consider the ComReg 2014 and EC Notice approaches to individual CAPM parameters as if they could be deployed separately. To be more explicit, we shall not estimate individual CAPM parameters (e.g. the risk-free rate) under our two approaches and then compare them and ask which is best. Instead, we shall use the two approaches *in toto* to produce cost of equity estimates and only compare our overall cost of equity results.

As we shall see, one way to understand our results will be as using one of the methods to select where, in the range of the other method, the point estimate should lie. We shall see that in terms of the overall cost of equity result, a switch to the EC Notice method (as modified in a way we shall describe below) does not represent a large departure from the application of a method similar to that ComReg used in 2014 — even though when we consider individual parameters the methodologies appear, on the face of it, quite different. Having established that the two methods produce much the same overall answer (and hence we do not need to make a strong choice between them), we shall subsequently treat the answer produced as if it were via the (modified) EC Notice method — i.e. we shall conceive of our point estimates as lying at percentiles within the (modified) EC Notice method ranges (though not the mid-point).

So, as we go through our cost of equity calculations, for each of the two approaches we discuss separately the parameters composing the cost of equity, namely:

- The risk-free rate.
- The Equity Risk Premium (ERP) and Total Market Return (TMR).
- The asset beta and notional equity beta.

Before setting out our two methodologies, we set out our approach in our May 2019 paper and stakeholder responses thereto.

4.2 The Cost of Equity in our May 2019 Report and consultation responses

4.2.1 The risk-free rate

4.2.1.1   The main model (Comreg 2014-style) approach used in the May 2019 Report

The risk-free rate under the main approach in May 2014 was regarded as an underlying equilibrium parameter in the economy that is inferred rather than observed, and judgement is required to take account of various distortions in the observed financial market data that might arise from factors such as quantitative easing. More specifically, we attempted to form a judgement as to the underlying equilibrium value of the risk-free rate by exploiting the theoretical relationship between changes in risk-free rates and changes in the medium-term growth rate of economies. Under the equilibrium approach, our May 2019 Report main model approach determined the risk-free rate as follows:

- First, we identified the Eurozone risk-free rate for the period prior to government bonds becoming poor proxies for the risk-free rate. In the Eurozone typical figures for the real risk-free rate were in the region of 2 to 2.5 per cent (see Table 3.1 of the May 2019 Report)

- Next we considered how the rate of growth in potential output had changed for the Eurozone for the period prior to 2007 (when government bonds were still a good proxy for risk-free rates) and subsequently. Based on the European economic forecasts available at the time of the May 2019 Report, we concluded that, relative to the pre-crisis period, the loss in annual potential GDP growth was approximately 0.4 per cent per annum.

- We then used the findings of an empirical analysis developed by Europe Economics[16] which suggests that changes in the risk-free rate and changes in sustainable growth are correlated with coefficient of around 0.7 — i.e. if potential output growth falls (increases) by 1 percentage point, the risk-free rate will fall (increase) by 0.7 percentage points.[17]

- Finally, using our 0.7 coefficient and that assumed drop in potential output growth for the Eurozone of 0.4 per cent, we concluded that the fall in the risk-free rate, relative to its pre-crisis level, was around 0.3 percentage point. So, given our range for the pre-crisis risk-free rate of around 2.0-2.5, that implies that the Eurozone real risk-free rate should by 2020 be around 1.7-2.2 per cent.

Since at the time of the May 2019 Report Ireland was experiencing a GDP growth rate materially higher than that of the average Eurozone economy, under our main approach we recommended a point estimate for the real risk free rate of 2.1 per cent, i.e. in the upper part of the 1.7-2.2 range.

As noted, we also reported two cross-check models. In these models models, the risk-free rate was estimated using the following approaches.

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[16] See Lilico, A. and Ficco, S. (2012) "The relationship between sustainable growth and risk-free rate: Evidence from UK government gilts" Europe Economics Staff Working Paper 2012.1 available at: http://www.europe-economics.com/publications/sustainable_growth_rate_working_paper.pdf. The data used in the econometric model were quarterly yields on ten-year index-linked bonds, and the actual average growth rate over the subsequent ten years. We find one series break, in the fourth quarter of 1992 with the introduction of inflation targeting, and get a correlation of 0.83. The econometric models explains movements in yields by a constant, a dummy variable for the introduction of inflation targeting, and the average GDP growth rate over the subsequent ten years. The results of this econometric model suggests that an increase (decrease) of 1 per cent in GDP growth is associated, on average, with an increase (decrease) of 0.7 per cent in risk-free rate.

[17] We note that our estimates of the structural relationship are based on data up to 2010 because, the quantitative easing measures implemented in response to the financial crisis resulted in government bonds yields post-2010 being distorted. Whilst structural relationships may be expected to be more stable than day-to-day data, over a sufficient time period they can change. That implies that we might have less confidence in the validity of a structural relationship based on pre-2010 data now than we had in 2014, since their applicability requires not only that the structural relationships have not changed but also that results based on UK evidence continue to be applicable to Ireland. That is one key reason it is helpful to consider also the alternative cost of debt approach set out in Section 5.7.

- For the UKRN-type approach we used Irish government bonds and the forward-minus-spot curves from the ECB for Europe. This gave a real risk-free rate of 0.9 per cent.
- For the European Commission approach, based on five-year average bond yields we reported a real risk-free rate of -0.59 per cent.

4.2.1.2   Consultation respondents' views on the risk-free rate

There is overall agreement across consultation respondents with the equilibrium concept methodological choice. More specifically:

- Eircom notes that the equilibrium concept is consistent with a forward looking approach and takes into account potential distortions in the observed data.
- 2rn does not provide a definite view on the theoretical merits of the equilibrium approach, but it is satisfied with the parameter estimates it produces. However 2rn does also stress that, should this approach produce in the future WACC estimates that diverge significantly from those obtained under more traditional approaches, its merit would need to be investigated in more detail.

The key exception in this regard is represented by Sky which argues that, in light of the softening monetary policy stance signalled by the ECB in June 2019 and recent development in sovereign bond markets, an equilibrium approach might overestimate the risk-free rate.

4.2.1.3   Our current approach on the risk-free rate

In our view, for the cost of equity the fundamental point set out in the May 2019 Report still applies: the uncertainties in TMR estimation for Ireland mean that the view that approaches of the UKRN or EC Notice type "let the data speak", reducing the need for regulator judgement or a need for assessing an underlying or equilibrium value, are largely chimerical.

We do, however, accept that the following point has been strengthened by macroeconomic and monetary policy developments over 2019 (reflected in the large further fall in Irish bond yields over 2019, which we illustrate below in Figure 4.2). Since its start in January 2015 (which was anticipated in and relevant to ComReg's 2014 WACC analysis), there have been several iterations of the ECB's Quantitative Easing (QE) programme. On 13 December 2018, the ECB announced that it would put an end to the asset purchase programme (and this was a relevant piece of context for our first report, which had an end-December 2018 cut-off date). Then, a year later (12 December 2019), the ECB announced a decision to restart the programme (at a monthly pace of €20bn). It is important to note that while the ECB stopped the asset purchase program during this period, it did not sell back any of the €2.57 trillion stock that it had amassed through this programme. This means that though the extension of QE was stopped its effect on government yields remained.

A quantitative easing programme is akin to a cut in policy rates in that it is a policy measure designed to reduce bond yields. The question of whether a regulatory WACC should embody such a policy-driven yields reduction or whether it should make some uplift or other adjustment to offset it depends upon the impact that such a policy should be expected to have upon prices across the economy. If monetary policy stimulus is short-term in nature, we should normally expect that it will not be fully embodied in price changes. Instead, firms will make higher profits in the period of the stimulus. The transmission mechanism of stimulus in this case will run via higher profits for firms, aiding their cash-flows. In this case it is being assumed by hypothesis that policy will be reversed within a reasonably short time, so incentives for additional investment will be limited to a combination of the short period in which returns are elevated by the stimulus itself and the longer-term in which, because of the stimulus, the economy is expected to return to normal growth (i.e. partly the stimulus works by reducing the risk of longer-term low returns in a depressed growth environment).

In such a case there is an argument for offsetting the impact of policy, for example by raising the risk-free rate via some uplift (as many analyses recommended in around 2014/15). In the early 2010s many

commentators regarded the policy situation as temporary, with quantitative easing expected to be reversed rapidly. By the mid-2010s this situation was under debate but there were reasonable judgement calls that could be made, and at that time there was the additional concern for a number of Eurozone members (including Ireland) that their government bonds data was severely distorted by sovereign default risk (Irish government bond yields at one stage reaching 14 per cent), meaning that using government bonds unadjusted was, in any event, not a robust option.

More recently, however, there have been two key developments. First, since 2015 sovereign bond yields have stabilised towards much lower levels than those experienced during the sovereign debt crisis, and are now very unlikely to include material sovereign default risk. Second, most analysis has come to regard the monetary policy situation, of near-zero rates and quantitative easing, as applying over a longer-term period. In particular, it is expected to last more than one price control period and potentially for a large portion of the lives of assets invested in over the next few years. When policy stimulus is "permanent" (i.e. applies over the long-term) the impacts on prices (and hence the correct way to account for their impact in regulatory WACC analysis) is different. Whereas firms may keep prices higher, in the presence of a short-term cut in their financing costs, because that policy is expected to be reversed, when financing costs are reduced by policy on a longer-term basis, we should expect pressures in competitive markets to bid prices down. So in this case, instead of firms tending to capture the gains from policy in the form of higher profits, those gains are transmitted through to consumers in the form of lower prices. Given that this is the process in play across the wider economy, economic regulators imposing price and revenue controls should, similarly, allow policy-induced reductions in financing costs to feed through into lower prices instead of offsetting them by upwards adjustments to the WACC.

At the same time, whilst in 2014 the relationships we had estimated between the risk-free rate and the future path of GDP were quantified on fairly recent data (up to 2010), that data is now ageing as the analysis cannot be updated for the period after 2010 (because of the very distortions in bond yields that lie at the heart of this debate). The further we get from 2010, the less certain we can be that nothing fundamental will have changed to disturb the relationships between GDP growth and the equilibrium risk-free rate that we were using then.

That means that, ideally, in order to estimate the risk-free rate, one would prefer an approach whereby one used something closer to the current yield on sovereign bonds, adjusted for forward curve expectations of future interest rate rates. We presented such a model as a cross-check in our original May 2019 Report for this review. The problem for Ireland, however, as we saw in that analysis, is that it is challenging to obtain a robust estimate of the total market return on a similarly contemporaneous market data basis that would naturally pair with up-to-date risk-free rate data. This problem does not arise with every country — e.g. it is not true of the UK. But in Ireland in recent years there have been large spikes in GDP and stock market data, which are widely attributed to distortions associated with large companies formally relocating activities into Ireland (possibly for tax or compliance purposes). That means that combining a risk-free rate estimate based on current bonds yields with a total market return based on recent dividend yields and GDP produces a range of estimates for the TMR and ERP that are so wide as not to be useful for regulatory purposes.

The alternative proposed by the European Commission is to use an average of recent years for bond yields and pair it with long-term estimates of the equity risk premium (as we shall discuss below). In our view, although it produces an at-least-arguable estimate for the risk-free rate that is closer to the true figure, as an overall approach to the cost of equity it is unsatisfactory because (as we shall see later) it tends to produce implausibly low figures for the total market return, partly because for large parts of the historic dataset, bond yields were far higher than those today. We shall return to this point in the TMR section, but its significance for now is that we do not believe that the risk-free rate approach can be considered in isolation of the overall approach to the cost of equity. Instead, as noted above, we shall estimate the cost of equity, overall, using both an approach in which the risk-free rate is estimated on an "equilibrium" basis and also an approach using an "observed asset" basis.

4.2.2   The Total Market Return (TMR) and Equity Risk Premium (ERP)

4.2.2.1   The approach used in the May 2019 Report

In a regulatory setting, there are two main approaches for treating the relationship between the total market return (TMR) and the equity risk premium (ERP). One is to first determine the TMR and to then infer the ERP by subtracting the recommended risk-free rate value from the TMR. The other is to estimate the ERP directly and then obtain the TMR as a sum of the ERP and the recommended risk-free rate. In the May 2019 Report, in our main model, the equilibrium concept estimate of the risk-free rate was implemented based on the second approach. More specifically, in the May 2019 Report we noted that:

- The latest Dimson Marsh Staunton (DMS) ERP figures were 4.7 per cent for Ireland and 4.3 per cent for Europe[18];
- Recent Irish regulatory precedent (CER PR4 price review[19]) used an ERP of 4.75 per cent.

We used the European DMS number as the lower bound and the regulatory precedent as the upper bound and proposed an ERP range of 4.3-4.75 per cent.

In order to determine a point estimate we noted that many regulators have elevated their ERP estimates in periods of recession or extended economic volatility, reflecting a Bank of England study suggesting the ERP may be 20 per cent higher in recessions. We also noted that if the ERP is 20 per cent higher than its average value in recessions, then, mathematically speaking, in non-recessions it must be lower than its long-run average so that the average is achieved.

At the time of the May 2019 Report, Ireland was not in (or about to enter) a recession, instead, it was experiencing an extended period of solid economic growth. Between 1960Q2 and 2018Q3 the Irish economy contracted, on a quarterly basis, about 15 per cent of the time. If the ERP would be elevated by 20 per cent in the 15 per cent or so of the time the economy is contracting, and its average value is 4.7 (DMS figures), then when the economy is growing the ERP must be about 4.55. We then rounded that to 4.6 and use 4.6 as our point estimate of the Irish ERP.

The ERP value of 4.6 per cent, in combination with the risk-free rate recommendation of 2.1 per cent implied a Total Market Return (TMR) of 6.7 per cent.

In our cross-check models we reported alternative approaches:

- one based on dividend growth modelling for Ireland, giving a TMR of 7.93 to 10.33 per cent;
- one based on the approach, at that point, of the European Commission, which gave a TMR of 3.63 per cent.

4.2.2.2   Consultation respondents' views on the ERP

With regards to the ERP, Eircom expresses the following criticisms:

- First, Eircom does not endorse the downward adjustment to the DMS long term estimate (from 4.7 to 4.6 per cent) which Europe Economics applied to account for the potential impact of the business cycle.
- Second, Eircom believes that the DMS data sources should be complemented by additional data sources. For example, Eircom notes that, a wider approach, including the Irish ERP estimates from DMS, Damodaran, and Fernandez, would generate an Irish ERP of 5.95 per cent.

Similarly to Eircom, Three considers the ERP estimate of 4.6 per cent to be too low, and not in line with recent regulatory precedents and international trends. For examples, Three notes that Italy has recently

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[18]   This figures were based on the 2018 Credit Suisse Global Investment Returns Yearbook.

[19]   https://mk0cruiefjep6wj7niq.kinstacdn.com/wp-content/uploads/2015/07/CER15296-Decision-on-TSO-and-TAO-Transmission-Revenue-for-2016-to-2020-1.pdf

determined an equity risk premium of 6.07 per cent, and that Duff & Phelps has increased its US Equity Risk Premium recommendation from 5.0 per cent to 5.5 per cent[20].

4.2.2.3 Our current approach on the ERP and TMR

Whilst in our view both backwards-looking and forwards-looking models can play a role in informing the TMR and ERP, in the case of Ireland we believe that more weight should be placed upon DMS-type models. The range implied by dividend growth models (DGM) for Ireland is simply too wide to be useful and includes values simply too high to be credible. (Both of these points were set out in our May 2019 report[21] and we maintain our view.)

We are ultimately attempting to assess a WACC that will inform prices for Ireland, so although we do believe it is appropriate to note developments across Europe (and thus have our TMR and ERP informed by their European values — as indeed we did for the risk-free rate — e.g. by using pan-Eurozone or pan-European figures as one point in our range), we believe it is appropriate to also place weight upon Irish data where that data seems reliable and credible.

We note that both Eircom and Three favour complementing DMS data with additional data sources which would result in a higher ERP estimate compared to the 4.7 per cent we proposed in our May 2019 Report. Our view is that, within the equilibrium concept we proposed, the ERP estimates provided by DMS are relevant but the DMS TMR could also be used. In what follows we take account of both the DMS ERP and the DMS TMR in our 2014 Method.

A key reason why alternative ERP estimates are higher than that provided by DMS is due to the fact that these alternative estimates are obtained with reference to a materially lower risk-free rate value which is typically based on prevailing government bonds' yield. However, the equilibrium concept risk-free rate estimate we propose here is higher than prevailing yields on government bonds and is much closer to the long-term risk free rate series used by DMS. Therefore, within the context of the equilibrium approach one can use either or both the DMS ERP and DMS TMR value (with some appropriate judgement on the weights to be applied to each if answers differ).

By contrast, and to reinforce the point above, we note that although for example, in its PR19 Final Determinations[22] the UK regulator Ofwat proposes an ERP of 7.89 per cent[23], that was in the context of a real risk-free rate of -1.39 per cent, so its TMR is 6.5 per cent. Our view is that, if the ERP being estimated is not in the context of an estimate of an equilibrium risk-free rate, but is instead calculated relative to a bonds-market-data-led risk-free rate estimate, it is the TMR not risk-free rate that is relevant. We shall return to this point in our discussion below of the EC Notice approach.

4.2.3   Asset and equity beta

4.2.3.1 The approach used in the May 2019 Report

We provide below an overview of the beta approach taken in our May 2019 Report with regards to the following areas:

- The choice of comparators.
- The beta estimation approach.

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[20] See https://www.duffandphelps.com/insights/publications/valuation-insights/valuation-insights-first-quarter-2019
[21] See Section 12.4 of the May 2019 Report.
[22] https://www.ofwat.gov.uk/wp-content/uploads/2019/12/PR19-final-determinations-Allowed-return-on-capital-technical-appendix.pdf
[23] This is the CPIH-deflated ERP figure reported in Table 1.1 of https://www.ofwat.gov.uk/wp-content/uploads/2019/12/PR19-final-determinations-Allowed-return-on-capital-technical-appendix.pdf

Comparators' set

The set of comparators used in our May 2019 report to determine the beta for the mobile, fixed line, and broadcasting sectors are summarised in the table below.

Table 4.1: Comparators' set used in the May 2019 Report

Company	Country of exchange	Mobile / Fixed-line	Broadcasting
American Tower Corp	US		√
British Telecom	UK	√	
Cellnex	ES		√
Crown Castle	US		√
Deutsche Telekom	DE	√	
EI Tower	IT		√
KPN	NL	√	
Orange	FR	√	
SBA Communications	US		√
Telefonica	ES	√	
Telia	SE	√	
TIM	IT	√	
Swisscom	CH	√	
Vodafone	UK	√	

The choice of the telecom (mobile and fixed line) comparators in Table 4.1 was justified on the ground that these are publicly listed companies headquartered in Europe that generate revenues from mobile and fixed line activities. The comparators' set we used for broadcasting includes also US-based companies as there is a scarcity of European based firms providing broadcasting services. In our May 2019 Report we noted comparators in our sample provide both mobile and fixed line services. Therefore, in order to estimate separate betas for mobile and fixed line we have adopted an approach in which we gave different weights to different companies — with weights determined according to the share of revenues generated by each company from the mobile and fixed line segment — in order to inform our views on the beta.

Beta estimation

In our May 2019 Report we based beta estimates on 2-years of daily return data. As a cross-check we did also provide 5-years beta estimates based on weekly return data (see Section 13.4 of the May 2019 Report). Raw equity betas were estimated though ordinary-least-squares (OLS) by regressing the log-returns against a Europe-wide market index[24]. No adjustment (e.g. Blume, Dimson, or Vasicek adjustments) were made to the raw beta estimates.

Unlevered betas were obtained by multiplying raw equity betas by $(1 - gearing)$, where the gearing measure used was two-year rolling average of firms' net debt over enterprise value.

4.2.3.2 Consultation respondents' views on beta

We provide below an overview of consultation respondents' views regarding:

- Representation of regulatory precedents
- The choice of comparators.

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[24] The index used was the Europe total market return index provided by Thomson Reuters.

- The beta estimation approach.

Regulatory precedents

In its initial response to the consultation Eircom stated that our May 2019 Report provided incomplete an erroneous presentation of regulatory precedents on beta. More specifically:

- In relation to regulatory precedents in the mobile sector, Eircom noted that our May 2019 Report compares Ofcom's 2015 asset beta point estimate (i.e. 0.6) to Ofcom's 2018 lower bound estimate (i.e. 0.55), hence giving the false impression that there might have been a fall in asset beta in the mobile sector. Eircom also identified an additional regulatory precedent in in Belgium (asset beta of 0.6 in 2015) and one in Italy (asset beta of 0.47 in 2018) that were omitted in the May 2019 Report.
- In relation to the fixed line sector, Eircom noted that some of the regulatory precedents reported in our May 2019 reports were outdated (because regulators had since then revised their estimates), and there were additional precedents that were omitted.

Whilst noting that (as per our approach in our May 2019 Report) we use regulatory precedents only as a cross-check to our calculations based on direct market evidence, rather than using the regulatory precedent to derive the results themselves, we have taken account of the points raised by Eircom. Specifically, we have updated regulatory precedents for the mobile and fixed-line sector so as to include only the most recent determinations (i.e. from 2015 onwards). These are presented below.

Table 4.2: **Recent regulatory precedents for mobile asset betas**

	Unlevered Beta
Belgium (2015)	0.60
France (2017)	0.62
UK (2018)	0.65*
Italy (2018)	0.47
Belgium (2019)	0.75
Average	**0.62**

Notes: the value of 0.65 is the mid-point of the 0.55-0.75 asset beta range recommended by Ofcom
Source: Various regulatory determinations.

Table 4.3: **Recent regulatory precedents for fixed-line asset betas**

	Unlevered Beta
Belgium (2015)	0.45
Italy (2015)	0.43
France (2017)	0.48
UK (2018)	0.59
Sweden (2018)	0.55
Portugal (2019)	0.48
Italy (2019)	0.53
Average	**0.50**

Notes: Equity betas only reported for Portugal, France, and Sweden; asset beta calculated as figure implied by equity beta and gearing for these countries; range for Sweden calculated assuming a 40% gearing.
Source: Various regulatory determinations.

We note, with regard to the UK (2018) regulatory precedents for the fixed-line sector beta, Eircom suggests using BT Group's unlevered beta of 0.78. We disagree with Eircom on this point. Since Ofcom has disaggregated BT Groups' beta into "Openreach copper network" beta (0.59), and "Other UK telecom business" beta (0.73), and since the latter includes also mobile and bundle services, we think that the former is more relevant for the purpose of determining the systematic risk of fixed line business.

Based on the tables presented above:

- the regulatory precedent range for the asset beta in the mobile sector is between 0.47 and 0.75, with an average value of 0.62; and
- the regulatory precedent range for asset beta in the fixed-line sector is between 0.43 and 0.59, with an average value of 0.50.

Comparators' set

With regards to mobile and fixed line comparators, Eircom has criticised the comparators' set we used in our May 2019 Report as it regards it incomplete and inappropriate. More specifically:

- Eircom proposes excluding three companies (namely BT, KPN, and Swisscom) from our mobile comparators set on the ground that they do not generate sufficient revenues (i.e. less than 40 per cent of the total revenues) from mobile activities, and identifies four additional mobile comparators (Elisa, Telenor, Tele2, and Veon) whose mobile revenues account for more than 40 per cent of total revenues.
- Eircom expands our fixed line comparator set with the inclusion of eight additional operators (Elisa, Telenor, Tele2, NOS, Hellenic Telecom, Proximus, Telecom Austria, and Telenet).
- Finally, we note that, whilst Eircom's mobile comparators' set includes only firms that generate at least 40 per cent of their revenues from mobile activities, its fixed line comparators set includes all telecom operators (i.e. Eircom does not apply any revenue-based threshold to determine an appropriate sub-set of comparators for the fixed line activities).

With regards to broadcasting comparators, 2rn views only two of the peers considered in our May 2019 Report (namely EI Tower and Cellenex) as relevant for the purpose of estimating beta. More specifically 2rn notes the following:

- Crown Castle and SBA Communications do not provide any broadcasting infrastructure services (instead they provide infrastructure for wireless communications) and therefore are not relevant.
- American Tower does provide broadcasting infrastructure services, however, the majority of its operations are outside Europe, and therefore its systematic risk exposure might not be representative of that of European broadcasting service operators.

Beta estimation

Eircom expresses a series of criticism with the estimation methodology we adopted in the May 2019 Report. The main criticism appears to be related to the choice of the estimation window. Whilst we propose estimating based on 2-years of daily return data, Eircom's preference is for beta estimates based on 5-years of weekly return data. Eircom provides a number of justifications for this choice. These can be summarised in the following points:

- A longer time window increases the accuracy of the estimates.
- A longer time period decreases the risk of beta estimates being affected by uninformative volatility.
- A longer time window places less weight on recent macroeconomic events such as distortions caused by quantitative easing and concerns related to uncertainty about the impact and path of Brexit.
- A 5-year window better reflects the business cyclicality of the economy, and financial conditions over the lifetime of assets.
- A 5-year window takes long lifetime of investments decisions into account.

In addition to providing raw equity beta estimates, Eircom provides also Blume-adjusted estimates and notes that the Blume adjustments are widely used in the finance industry for investment decision appraisals. The evidence from Blume-adjusted betas is then used by Eircom to form a view on the appropriate beta range.

Notwithstanding the preferences highlighted above, Eircom's beta analysis provides evidence based on a variety of alternative approaches. More specifically, Eircom's analysis presents the following evidence:

- 2-year daily beta estimates and data and 5-year weekly beta estimates.
- Unadjusted (raw) beta and Blume-adjusted beta estimates.
- Average and median betas calculated across three alternative comparators' sets for the mobile (namely Eircom's proposed set of comparators, the comparators' set we used in our May 2019 Report, and a set encompassing these two sets), and two alternative sets for fixed line (Eircom's proposed set and the set we used in our May 2019 Report).

Based on the arguments illustrated above, Eircom places most weight on 5-years weekly betas, and draws the flowing conclusions:

- The unlevered beta for the mobile sector ranges between 0.59 (average 5-year weekly beta across all comparators) and 0.62 (average 5-year Blume-adjusted weekly beta across all Eircom's preferred set of comparators). Eircom claims that, since the median value of the 5-year Blume-adjusted weekly beta across its preferred comparators' set is 0.66, the higher end of the 0.59-0.62 range should be favoured. Consequently it recommends an unlevered beta for the mobile sector of 0.61. We note that this value is also identical to the average 5-year weekly beta across Eircom's comparators' set.
- The unlevered beta for the fixed line sector ranges between 0.59 (average 5-year weekly beta across all comparators) and 0.63 (average 5-year Blume-adjusted weekly beta across all comparators). Eircom then chooses a point estimate of 0.60 (i.e. towards the lower end of the 0.59-0.63 range) citing evidence from regulatory precedents (average beta from precedents is 0.58), the range proposed by a Brattle Group study[25] (the range is 0.50-0.67) and the median value of 5-year Blume-adjusted weekly beta (the median value is 0.65). We note that 0.60 is also identical to the median value of 5-year weekly beta across Eircom's comparators' set.

4.3 The Cost of Equity under the ComReg 2014 Approach

4.3.1 The ComReg 2014 Approach risk-free rate

When forming a view on the risk-free rate in our May 2019 Report we relied on the economic forecasts provided by the European Commission Winter 2019 Forecast (published in February 2019[26]). Since then new economic forecasts figures have become available. These were published in November 2019 in the European Commission Autumn 2019 Forecasts[27]. A comparison of these recent forecasts with the Winter 2019 forecasts is provided below.

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[25] The Brattle Group (2016) "Review of approaches to estimate a reasonable rate of return for investments in telecoms networks in regulatory proceedings and options for EU harmonization", prepared for *the European Commission* and available at https://op.europa.eu/en/publication-detail/-/publication/da1cbe44-4a4e-11e6-9c64-01aa75ed71a1.

[26] https://ec.europa.eu/info/sites/info/files/economy-finance/ip096_en.pdf

[27] https://ec.europa.eu/info/sites/info/files/economy-finance/ip115_en_0.pdf

Figure 4.1: GDP growth forecasts (%) — Winter 2019 forecasts vs Autumn 2019 forecasts
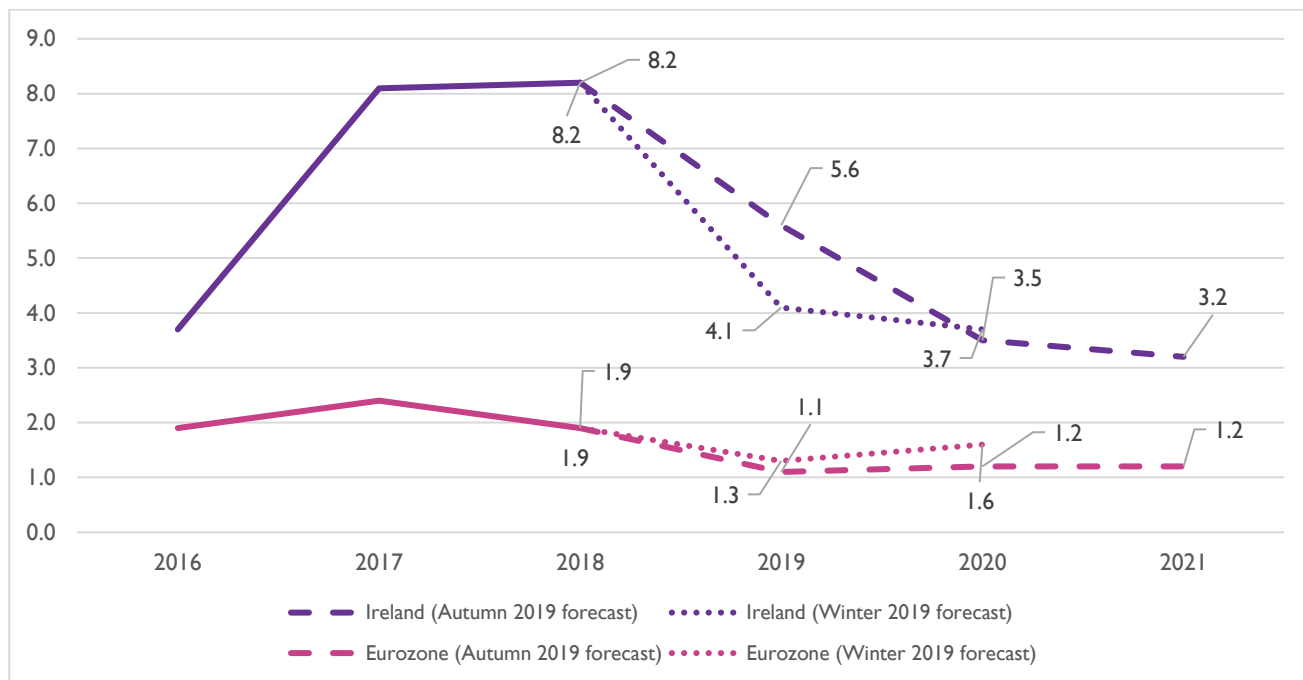
Source: European Commission

Growth prospects for Ireland have improved for 2019 and only slightly deteriorated for 2020. Irish GDP growth for 2021 is expected to be lower at 3.2 per cent. Based on the latest forecast figures, in Ireland the average expected growth for 2019-2021, is 4.1 per cent. The average expected growth for Ireland we predicted in our May 2019 Report was 4.9 per cent (this figure was based on growth forecasts over the period 2018-2020[28]).

Growth prospects for the Eurozone have also deteriorated compared to figures used in our May 2019 Report, and the Eurozone is expected to grow at 1.2 per cent by 2021. Furthermore, Irish bond yields dropped markedly between our previous end-2018 data window and the end of November 2019, as we can see in the following chart, further reinforcing the view that the risk-free rate should be downgraded.

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[28] At that time, growth figure for 2018 was forecasted to be 6.8, compared to the actual 2018 growth figure now recorded at 8.2 per cent.

Figure 4.2: Nominal yield of 10-year Irish government bonds (%) — daily data
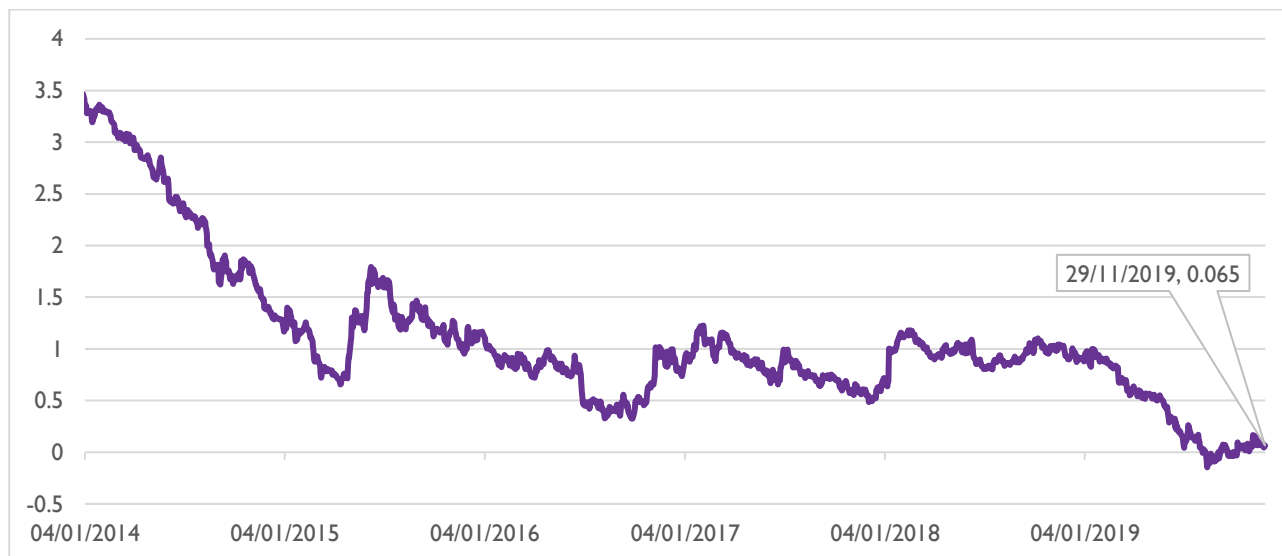
Source: Thomson Reuters

In the May 2019 Report we considered how the potential rate of growth in output has changed for the Eurozone for the period prior to 2007 (when government bonds were still a good proxy for risk-free rates) and the post-crisis period. Based on the European Commission's Autumn 2018 forecasts[29], potential growth forecasts over the next couple of years were around 0.3 per cent below the pre-crisis level. Given the deterioration of Eurozone growth prospects observed in the Winter 2018 forecasts, in our May 2019 Report we assumed that the annual output growth loss could be as large as 0.4 per cent.

A more recent assessment of the loss in potential annual output growth for the Eurozone was published in the Spring 2019 forecast[30], which suggests that the loss in potential annual output growth is indeed around 0.4 per cent (see figure below).

Figure 4.3: Contributions to potential growth, Euro area as of Spring 2019
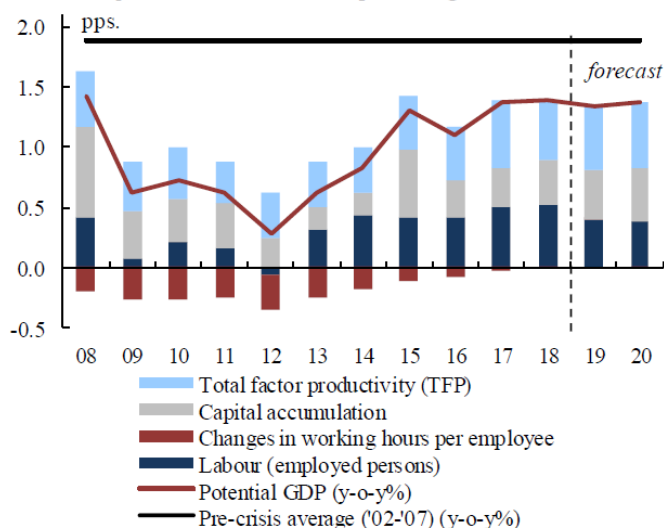
Source: Graph I.41, European Commission Spring 2019 forecasts.

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[29] https://ec.europa.eu/info/sites/info/files/economy-finance/ip089_en_0.pdf

[30] This was the most recent forecast available at the time the analysis of this section was compiled. See Section 1.1 for an explanation of why certain analysis was not updated to include 2020 figures.

Given the further deterioration in Eurozone growth prospects suggested by the latest forecasts, we conclude that the output gap could be as high as 0.6 per cent.

Using the 0.7 coefficient derived from the Europe Economics' econometric model on the relationship between changes in the risk-free rate and changes in sustainable growth[31], the implied fall in the risk-free rate, relative to its pre-crisis level, is around 0.42 per cent. So, given our range for the pre-crisis risk-free rate of around 2.0-2.5, that would imply that the Eurozone risk-free rate by 2020 should be around **1.6-2.1 per cent**. This is a downward revision in the range from the 1.7-2.2 per cent range assumed in our May 2019 Report.

In our May 2019 Report we proposed a point estimate of 2.1 per cent (i.e. towards the high end of the 1.7-2.2 range) to reflect the fact that growth prospect for Ireland were much higher than that of other Eurozone peers. Now we favour a real rate point estimate of **1.75 per cent** to reflect particular risks to Ireland's growth associated with the UK's departure from the EU. We note that (as with various other variables) this value will be subject to annual updating.

4.3.1.1   Conclusion on the 2014 ComReg Approach risk-free rate

Our recommendations regarding the risk-free rate are as follows:

- A **real risk-free** rate **range** of **1.6-2.1** per cent.
- A **point estimate real-risk free rate** of **1.75** per cent.

Given our inflation assumption of 1.5 per cent with a range of 1.1 to 1.8 per cent (see Section 3.3 for a detailed discussion of our position on inflation), this results in:

- A **nominal risk-free rate range** of **2.72-3.94** per cent.
- A **point-estimate nominal risk-free** rate of **3.28** per cent.

The key differences from our May 2019 report are:

- a drop in expected Eurozone and Irish growth rates;
- a changed view about where Ireland sits in relation to Eurozone growth rate risk (with Ireland now treated as being exposed to more downside growth risk than was the case in our May report);
- a change in the forecast inflation rate.

4.3.2 The ComReg 2014 Approach ERP and TMR

In our May 2019 Report, in our main approach we adopted an ERP of 4.6 per cent. In combination with our real risk-free rate of 2.1 per cent that implied a real Total Market Return (TMR) of 6.7 per cent. In our cross-checks the TMR ranged between 3.63 and 10.33 per cent (an unhelpfully wide range).

According to the latest DMS estimates published in the 2019 Credit Suisse Global Investment Returns Yearbook, the ERP for Ireland is 4.5 per cent (this is a downward revision from the 4.7 per cent value estimated in the 2018 Credit Suisse Global Investment Returns Yearbook). In our May 2019 Report we recommended an ERP value of 4.6 per cent (i.e. below the 4.7 DMS estimate) in order to reflect the fact that, since ERP estimates tend to be elevated in period of recessions, mathematically speaking, the ERP should be lower than the long term average in periods of expansion. We think that the economic outlook for Ireland has become more uncertain (e.g. due to the potential medium-term impact of Brexit) and therefore the merit of an adjustment to the ERP figures is now less justifiable. We note that Eircom had criticised the downward adjustment we applied in our May 2019 Report. We stress that, whilst we remain of the view that such an

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[31]   See Lilico, A. and Ficco, S. (2012) "The relationship between sustainable growth and risk-free rate: Evidence from UK government gilts" Europe Economics Staff Working Paper 2012.1 available at: http://www.europe-economics.com/publications/sustainable_growth_rate_working_paper.pdf.

adjustment is in principle correct we no longer believe that it is justifiable in light of the most recent economic developments in Ireland.

The risk-free rate and equity risk premium can change for structural or cyclical reasons. When such changes are cyclical, we should expect that shifts in the individual components of the TMR will be more than those in the TMR overall. (So, for example, suppose that a country had a TMR of 6.5 and cyclical factors cut the risk-free rate from 2.0 per cent to 1.5 per cent, then the ERP might tend to rise to offset most or all of the effect — e.g. perhaps here from 4.5 to 5.0 per cent). When such changes are structural, we should expect that the shifts in one component will not be offset by a countervailing shift in the other. So if, for example, the drop in the risk-free rate from 2 to 1.5 per cent were due to a drop in a country's sustainable growth rate, we might expect that the TMR would fall by around 0.5 per cent.

In this case, we have seen that since the time of our May 2019 Report there may have been some structural shift, but only a modest one at best (around 0.1 per cent). The rest of our drop in the risk-free rate reflects cyclical factors such as the risk of Eurozone recession or short- to medium-term impacts of Brexit (though Brexit may also be associated with long-term structural shifts in the Irish economy).

Accordingly, at this stage we shall downgrade the real **TMR** only modestly — indeed, not even in line with the DMS drop in the ERP — by 0.05 per cent to **6.65 per cent**. In combination with our assumption of a real risk-free rate of 1.75 per cent that implies a rise in the ERP to **4.9** per cent**.**

4.3.2.1   Conclusion on the ERP and TMR

Our ER and TMR recommendation is as follows:

- A **real TMR** of **6.65 per cent.**

Given our inflation assumption of 1.5 per cent (see Section 3.3 for a detailed discussion of our position on inflation), this results in:

- A **nominal TMR** of **8.25 per cent**

Our ERP recommendations is as follows:

- An **ERP range** of **4.55-5.05 per cent** — note that these value are derived by subtracting, respectively, the upper bound real risk free rate (2.1 per cent) and the lower bound real risk free rate (1.6 per cent) from the real TMR (6.65 per cent). Note that this means the higher of our ERP range figures is in fact part of our "lower bound" estimate in tables later, and the lower ERP figure is part of the "upper bound" estimate.
- A **ERP point estimate** of **4.9 per cent** — this value is derived by subtracting our real risk-free rate point estimate (1.75 per cent) from the real TMR (6.65 per cent).

4.3.3   Asset and equity beta

We provide below an overview of our current view regarding:

- The choice of comparators.
- The beta estimation approach.

Comparators' set

In light of the proposals made by stakeholders and EC recommendations (see Section 0 for a detailed discussion of the EC recommendations regarding the choice of comparators), we have updated our view on the appropriate comparators' set. We discuss this separately for the mobile and fixed line, and broadcasting sector.

Mobile and fixed line sectors

In principle we have no objection to Eircom's proposal to expand the set, though we make the standard observation that there is a trade-off in comparator sets between a wider range of firms reducing the risk of statistical noise distorting results and a wider set of less relevant firms meaning the comparators are less relevant. In that context, we note that Telenor and Veon (two of the additional comparators proposed by Eircom) have significant activities outside Europe.[32] Whilst in some contexts the set of available comparators may be sufficiently narrow that one cannot set aside non-European comparators (indeed, we face precisely that issue in respect of the Broadcasting sectors), when there are a sufficient range of European comparators available we consider it non-ideal to use US firms to assess the systematic risk exposure faced by a European telecom operator. It is true that (as we shall explore further below) none of the European comparators is pure-play, but the addition of US comparators would not change that.

We endorse the EC Notice proposals for selecting relevant comparators and therefore the approach we have taken to construct the comparators' set is as follows:

- We have considered an initial "long-list" of firms that includes:

    - comparators we had proposed in our May 2019 Report;
    - additional firms proposed by Eircom; and
    - firms contained in the indicative list set out in the EC Working Paper.

- We have checked each of these firms against the five criteria proposed by the European Commission.
- Our final comparator set includes only firms from the long-list that fulfil the EC criteria.

The result of this procedure is summarised in the table below:

Table 4.4: Candidate comparators for mobile and fixed line sectors

Long list	Country of exchange	Fulfilment of criteria	Fixed-line revenues share
TDC A/S	DK	✗	Major acquisition in 2018. The company is now delisted.
British Telecom	UK	√	
Deutsche Telekom	DE	✗	More than 50% of revenues generated outside Europe
Elisa	FI	√	
Hellenic Telecom	GR	✗	Non-investment grade. Rated Ba2 by Moody's
KPN	NL	√	
NOS	PT	√	
Orange	FR	√	
Proximus	BE	√	
Swisscom	CH	√	
Tele2	SE	√	
Telecom Italia	IT	✗	Non-investment grade. Rated BB+ by S&P
Telfonica	ES	√	
Telkom Austria	AT	√	
Telenet	BE	✗	Non-investment grade. Rated BB- by Fitch
Telenor	NO	✗	More than 50% of revenues generated outside Europe
Telia	SE	√	

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[32] According to the companies; annual reports, Telenor and Veon generate respectively 53 per cent and 86 per cent of their revenues outside Europe.

Veon	NL	✗	More than 50% of revenues generated outside Europe
Vodafone	UK	√	

In order to estimate beta parameters separately for the mobile and fixed line sectors, we have adopted three different approaches:

- Weighted average approach — The first approach is identical to the one we used in our May 2019 Report and consists of estimating weighted averages of the telecom operator's beta where the weights are proportional to the share of revenues each company generates from mobile activities and from fixed line activities[33].

- Sector index approach (Method A) — The second approach consists in constructing two separate industry return indices (a mobile sector return index and a fixed line return index) by calculating a weighted averages of the operators' daily returns with weights proportional to each firm market capitalisation and the share of revenues each firm generates from mobile activities and from fixed line activities[34]. The mobile sector and fixed line betas are then estimated by regressing each of the two sector returns indices against a wide market index.

- Sector index approach (Method B) — Our third approach is a variation of the second approach (in the sense that we construct two sector return indices proportional to the firms' market capitalisation), but here we assign a weight of zero to firms that generate less than a given percentage of revenues from either mobile or fixed activities, and we then normalise the share of revenues each firm generates from mobile activities and from fixed line activities so as to ensure that this is zero for a firms that meets precisely the threshold, and one for a firm that generates all its revenues from that activity[35].

We note that each of the approaches listed above uses companies' revenue shares across different segments to estimate separate unlevered betas that are as representative as possible of a notional pure-play entity.

The final set of comparators we propose together with the split of revenues according to the segment where these are generated is provided in the table below.

Table 4.5: Final comparators set for mobile and fixed line

Company	Country of exchange	Mobile revenues share	Fixed-line revenues share[36]	Other telecom revenues share
BT	UK	22.48%	28.56%	48.97%
Elisa	FI	60.33%	39.67%	0.00%
KPN	NL	25.90%	30.21%	43.88%
NOS	PT	48.29%	17.66%	34.06%
Orange	FR	42.96%	41.33%	51.72%
Proximus	BE	33.23%	16.36%	50.41%
SwissCom	CH	26.19%	26.70%	47.11%

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[33] Assume there two companies: Company A has a 50 per cent share of mobile in its total revenue and Company B with 25 per cent share of mobile in its total revenue. The weighted average would be (50/75)*Asset Beta A + (25/75)*Asset Beta B

[34] Assume there are two companies: Company A has a market capitalisation of 8 billon and a 50 per cent share of mobile in its total revenue and Company has a market capitalisation of 12 billion with 25 per cent share of mobile in its total revenue. The mobile return index would be [(8*0.50)/(8*0.50+12*0.25)]*Return A + [(12*0.25)/(8*0.50+12*0.25)]*Return B.

[35] The thresholds used are 40 per cent of revenues generated from mobile activity and 25 per cent of revenues generated from fixed line activity. These thresholds are chosen to try to reflect natural breaks in the data (ie points where there is a grouping of comparators above or below or both, with a break between them) whilst also ensuring that there are a reasonable number of firms above the threshold.

[36] Fixed-line includes fixed line and broadband.

Telefonica	ES	73.94%	22.13%	3.93%
Tele2	SE	40.71%	27.35%	31.94%
Telekom Austria	AT	45.17%	37.81%	17.01%
Telia	SE	44.55%	16.83%	38.62%
Vodafone	UK	73.84%	26.16%	0.00%

Broadcasting sector

2rn criticises our beta estimation for the broadcasting sector on the basis that it is based on two comparators (namely Crown Castle, and SBA Communications) that provide broadcasting infrastructure services, and one company (i.e. American Tower) that conducts the majority of its operations outside Europe. We also note that, a strict application of the EC Notice methodology would result in using only Cellnex as comparator since EI Tower (the only other European-based broadcasting firm) was recently delisted. Whilst we accept the principle underpinning 2rn's critique, we note the following.

- First, given the limited number of European pure-play broadcasting comparators, there is a merit in increasing the peer group to include companies that operate in the same sector albeit in a different geographical area, even whilst acknowledging that this is non-ideal.
- Second, Crown Castle and SBA Communications provide infrastructure for wireless communications and, as such, they manage and operate assets (e.g. radio towers, mast radiators, transmitter station, tower array, antennas etc.) that are similar to those of a broadcasting operator (indeed, there is likely to be supply-side substitutability of these assets, such that their cost risk is likely to be extremely similar). We therefore believe that systemic risk exposure they face is informative of risk in a broadcasting operator.

Notwithstanding the above, we accept 2rn's submission that we should place more weight on European broadcasting operators and the way we do so is as follows:

- First, as we shall see in Figure 4.8 at the time of de-listing, the beta value of EI Tower was relatively close to that of Cellnex. Therefore, we assume that, had EI tower not been delisted, its beta value would have evolved in line with that of Cellnex. We therefore assume that the hypothetical beta value for EI Tower at the end of November 2019 differs from that of Cellnex by the same amount that was observable at the time of the de-listing.
- Second, as we shall see in Section 4.3.3.3, when making our recommendation on the appropriate asset beta for the broadcasting sector, we place most weight on Cellnex.

Beta estimation

We maintain our preference for estimating raw equity betas based on 2-years of daily return data, and we provide below a series of arguments in support of this choice.

Preference for daily data

The main advantage of estimating betas based on daily data is represented by the large samples size over which estimates are obtained. As noted by the EC Working paper, a potential shortcoming associated with the use of high frequency data is due to the possibility that market-wide information is reflected into stock prices with some delay (a phenomenon also known as "thin-trading"). If the information-updating process that leads to movements in the stock price is materially slower than the information-updating process that leads to movements in the market index (e.g. it takes more than a day for new information to be fully reflected in the stock price), then daily beta estimates would be downward biased. However, we do not think lack of liquidity to be a material issue for any of the comparators we propose using here, and we note that both Eircom and the EC share the same view. More specifically:

- Eircom has conducted a liquidity test based on bid-ask spread analysis and concluded that all stocks are sufficiently liquid.[37]
- The EC Working Paper states at page 41 that: "*Typically, electronic communications companies are traded in national stock markets and sufficiently liquid to derive betas using daily returns*".

Therefore, whilst acknowledging that the use of daily returns can be problematic in the presence of thinly traded stocks, we do not think such an issue to be material in this context. Consequently, we favour estimating betas based on daily data because this improves the statistical robustness of the estimates, and allows the estimation to be based on more recent market information (see below for further details on this point).

Preference for a 2-year time horizon

Whilst we agree that the use of five years of data would generally lead to more constant beta estimates (i.e. estimates that tend to display less variation through time), we do not think that promoting parameter constancy should be the primary regulatory objective here.[38] If beta constancy were the main objective then regulators should favour estimating betas over very longer time-horizons (e.g. 20 or more years of data). Our position is that the beta should be viewed as a forward-looking parameter, and that the main aim for a regulator is to form a view on the beta value that is likely to be prevailing during the course of the future price control. With this objective in mind, we think that estimating betas based on 2-years of daily data strikes the right balance between a short enough estimation period to be relevant on a forward-looking basis whilst having enough data points to ensure statistical robustness. We also note that the EC Working Paper, at page 33, quotes a number of academic studies that concluded that a time-horizon of between 4-9 years is appropriate when estimating beta with relatively low frequency data (e.g. weekly or monthly returns data) whilst a time horizon between 2 or 3 years is appropriate when using relatively high frequency data (e.g. daily returns).

We now reinforce that view as to the right balance with the following analysis. Let us assume a price control period of 5-years, and assume that the "true beta" over the price control period is represented by the covariance between stock-price returns and market returns over that same period.[39] The questions we ask ourselves is: what beta estimation time horizon provides the best *forecaster* of future true betas? After all, in estimating the WACC for firms we are not in principle aiming to estimate their WACC *now*. Rather, we are attempting to estimate what the WACC will be over the period of the price control. In principle, even if we regard the 2-year daily beta as the best concept of what beta is *now*, that is a conceptually separate question from what concept of the beta now provides the best forecast for the true beta that will prevail over the price control.

The experiment is based on betas estimated for the set of comparators of Table 4.5, and is structured as follows:

- Step 1. First, for each day *t* in our sample[40] we defined the "true beta" over the future price control as the beta estimated based on 5-years ahead daily returns data.

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[37] We note that the liquidity test conducted by Eircom does not included Vodafone. Being one of the largest telecom operators in Europe, and a constituent of the FTSE100 we do not believe that liquidity to be an issue for Vodafone.

[38] Beta constancy, in the sense we use that term here, although it is sometimes referred to as "beta stability" should not be confused with another concept sometimes referred to as "beta stability", namely a lack of tendency for beta to shift very suddenly by large amounts for short periods with such shifts being later totally or near-totally reversed. "Beta stability" in this latter is of at least some value (in that such rapidly-reversed changes may well not reflect genuine shifts in underlying real risk) but is again not overwhelmingly important in a context in which sensible judgements are applied in interpreting the data — since an analyst can see a sudden shift and take account of it in interpreting results to make recommendations.

[39] Note that this is equivalent to a 5-year daily beta estimated at the last day of the price control period.

[40] The samples contains daily data starting from 1 January 2001 to 29 November September 2019.

- Step 2. We then measure recursively, (i.e. for each day in our sample) the absolute difference between the "spot beta" (i.e. the beta estimated at day *t* using a certain amount of past return data) and the "true beta" of the future price control so as to calculate the average error of prediction of the "spot beta". The "spot betas" we have considered are daily betas estimated based on 1, 2, 3, and 5 years of past returns data.
- Step 3. The steps above allow us to determine the average error of prediction of different "spot betas" (i.e. estimated with different time horizons) but only for one asset. Therefore, in order to increase the statistical representativeness of this experiment, we have replicated Step 2 for each comparator firm.
- Step 4. The average predictive errors of different "spot betas" have then been calculated across all comparator.

The result of this exercise are summarised in the table below.

Table 4.6: Average predictive error of spot betas estimated on different time horizons

Company	1-year spot beta	2-year spot beta	3-year spot beta	5-year spot beta
BT	0.111	0.086	0.088	0.088
Elisa	0.168	0.136	0.125	0.110
KPN	0.141	0.154	0.174	0.179
NOS	0.161	0.113	0.085	0.086
Orange	0.126	0.150	0.174	0.198
Proximus	0.116	0.102	0.116	0.139
SwissCom	0.093	0.092	0.089	0.091
Telefonica	0.110	0.109	0.120	0.126
Tele2	0.179	0.141	0.123	0.118
Telekom Austria	0.131	0.157	0.168	0.163
Telia	0.133	0.142	0.148	0.143
Vodafone	0.202	0.215	0.225	0.220
Average across firms	**0.139**	**0.133**	**0.136**	**0.138**

Source: Thomson Reuters and Europe Economics calculations.

As we can see from the results of the table above, on average, across our comparators set, the spot value of a 2-year beta is better at predicting the "true beta" over the future price control compared to spot betas estimated on other time horizons (e.g. 1-year, 3-years, and 5-years).

Market index

We endorse the EC Notice proposal of estimating betas based on a Europe-wide market index when we are using non-Irish stocks. The index we have chosen is the Stoxx Europe TMI[41], i.e. one of the indices recommended by the EC Notice.

We note that, relative to the Stoxx Europe TMI index, the Thomson Reuters Europe index used in our May 2019 Report, which was dollar-denominated, would have tended to produce lower beta estimates, in the period under consideration, for those of our comparator firms with costs and revenues denominated mainly in euros. Given that there were a number of key firms with non-euro-denominated cash-flows (eg sterling-denominated for BT and Swiss-franc denominated for Swisscom), the use of a dollar-denominated index placed comparators on a common footing relative to one another, reducing the tendency for the beta estimate to be more influenced by firms from one country or another as currencies fluctuated. However,

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[41] The specific versions of the index used is the Stoxx All Europe Total Market Gross Return index (denominated in EURO).

given that in the period relevant for our two-year beta estimates the euro experienced a fairly significant up-and-down cycle versus the dollar, rising from \$1.05 in January 2017 to \$1.25 in February 2018 and back to \$1.10 by end-November 2019 it is legitimate to question whether the use of a dollar-denominated index is appropriate in this case, as such material currency fluctuations might have depressed beta estimates for euro-denominated comparators without necessarily reflecting fundamentals in the sector or the wider economies, except relative to the US.

Accordingly, as indicated, in the calculations below we have adopted one of the EC Notice-recommended indices.

Adjustments

We endorse the EC's view that raw beta estimates do not require any Blume or Vasicek adjustment. In our view the Blume adjustment is conceptually flawed and arbitrary. In the case of the Vasicek adjustment, although it is conceptually sound in principle, the scale of such adjustment is typically very small for regulated firms (well within the natural range of uncertainty of results) and the application of such small adjustments has the cost of decreasing the transparency of the estimation process, risking introducing a source of calculation error, and even in principle does not add materially in terms of estimation efficiency.[42]

Gearing, debt beta and asset beta

The gearing measure used to unlevered raw equity betas is the same recommended in the EC Notice, namely net debt over enterprise value (ND/EV) as available from Thomson Reuters. When un-levering raw equity betas we use the average of ND/EV over the same time horizon of the raw equity beta that we un-lever. So for example, in order to un-lever a 2-years rolling raw equity beta we use a 2-years rolling average of ND/EV.[43]

4.3.3.1 Current unlevered beta estimates (i.e. asset beta with zero debt beta) for mobile and fixed-line sectors

We start by providing the beta evidence based on our preferred approach. This includes:

- 2-years daily unlevered betas for all comparators.
- Weighted averages (for mobile and fixed line) of 2-years daily unlevered betas where the weights are proportional to the share of revenues each company generates from mobile and fixed line activities.
- 2-years daily unlevered betas (for mobile and fixed line) estimated based on the weighted average mobile sector return and fixed line returns indices we have constructed according to Method A (see Section 4.3.3).
- 2-years daily unlevered betas (for mobile and fixed line) estimated based on the weighted average mobile sector return and fixed line returns indices we have constructed according to Method B (see Section 4.3.3).

The two years daily unlevered betas for all comparators are displayed in the chart below. As we can see, as of 29 November 2019, with the exception of two outliers (namely Tele2 and Telekom Austria), unlevered betas across comparators range between 0.37 (Orange) and 0.54 (Vodafone).

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[42] We refer to pages 80 and 81 of the EC Working Paper for a detailed discussion of why this is the case.
[43] With regards to debt beta, in 2014 we assumed a zero debt beta and continue to do so here.

Figure 4.4: 2-years daily unlevered beta of comparators
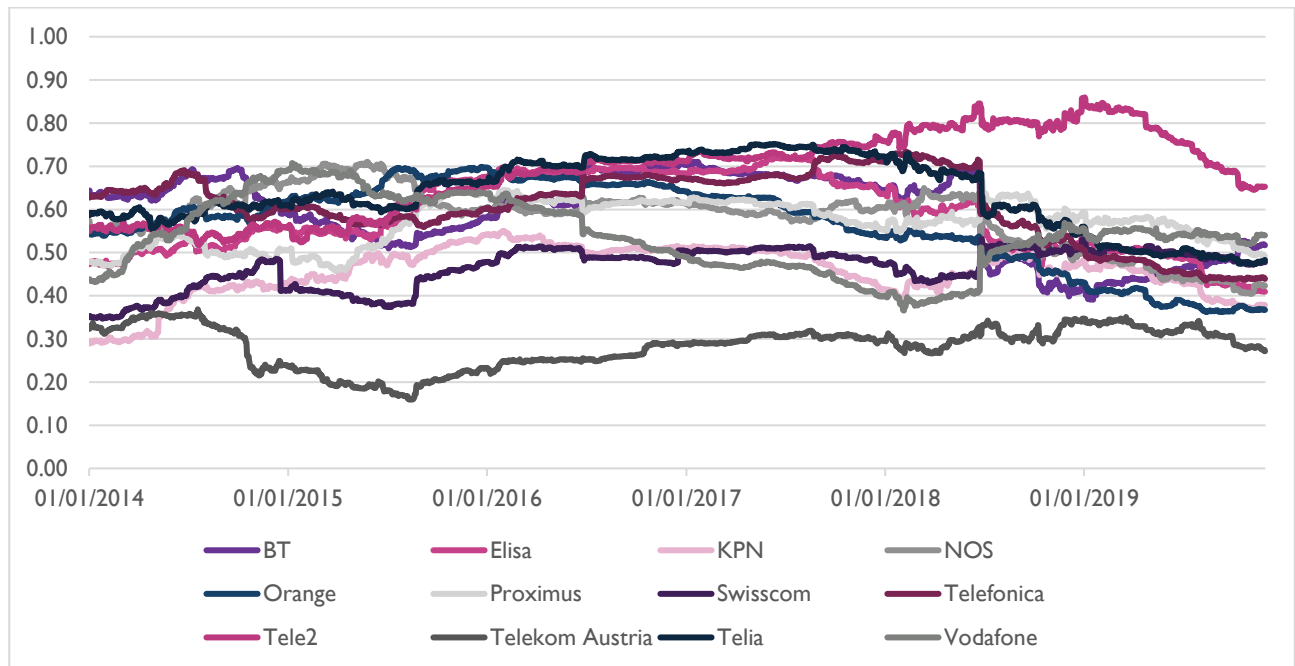
In the chart below we present the weighted average of the 2-years daily unlevered betas. As of 29 November 2019, the weighted averages are 0.45 for the mobile sector, and 0.44 for the fixed line sector.

Figure 4.5: Weighted average 2-years daily unlevered beta for mobile and fixed line.
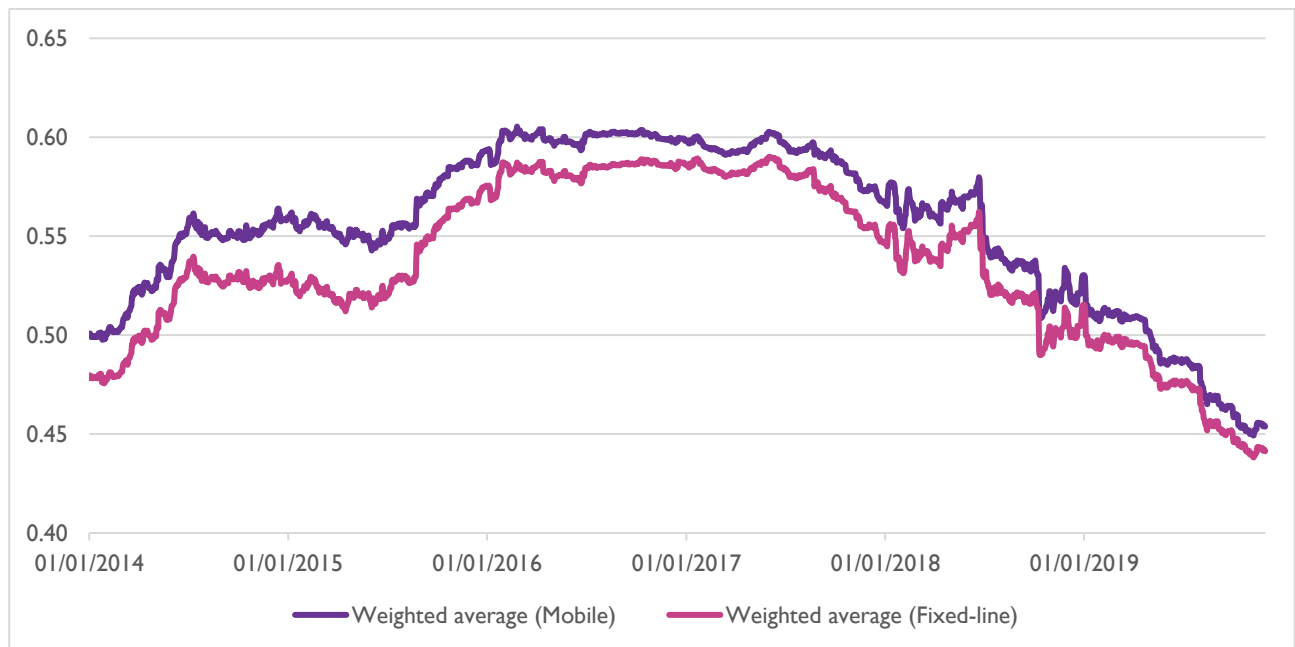
We conclude by presenting the 2-years unlevered betas calculated based on the mobile sector and fixed line sector return indices we have calculated. Under Method A, the beta values at the end of November are 0.47 for the mobile sector and 0.45 for the fixed line sector.

Figure 4.6: 2-years daily unlevered beta for mobile and fixed line sectors (Method A)
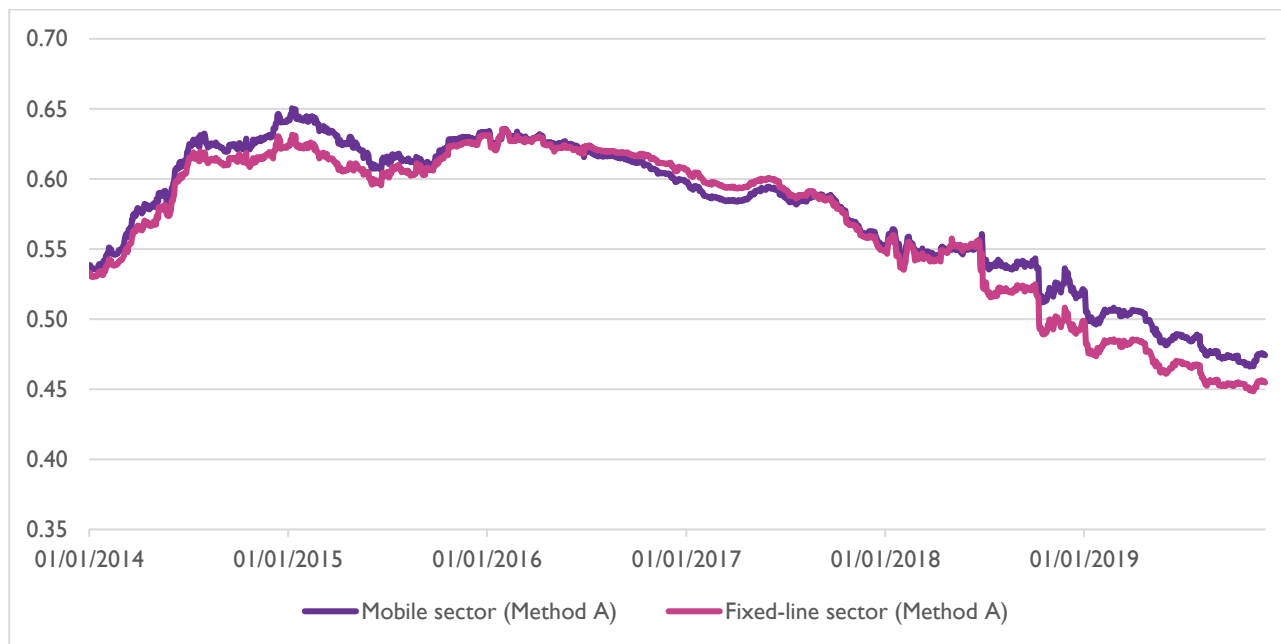
Source: Thomson Reuters, companies' annual reports, and Europe Economics calculation.

Under Method B (see chart below), the beta values at the end of November are 0.49 for the mobile sector and 0.40 for the fixed line sector.

Figure 4.7: 2-years daily unlevered beta for mobile and fixed line sectors (Method B)
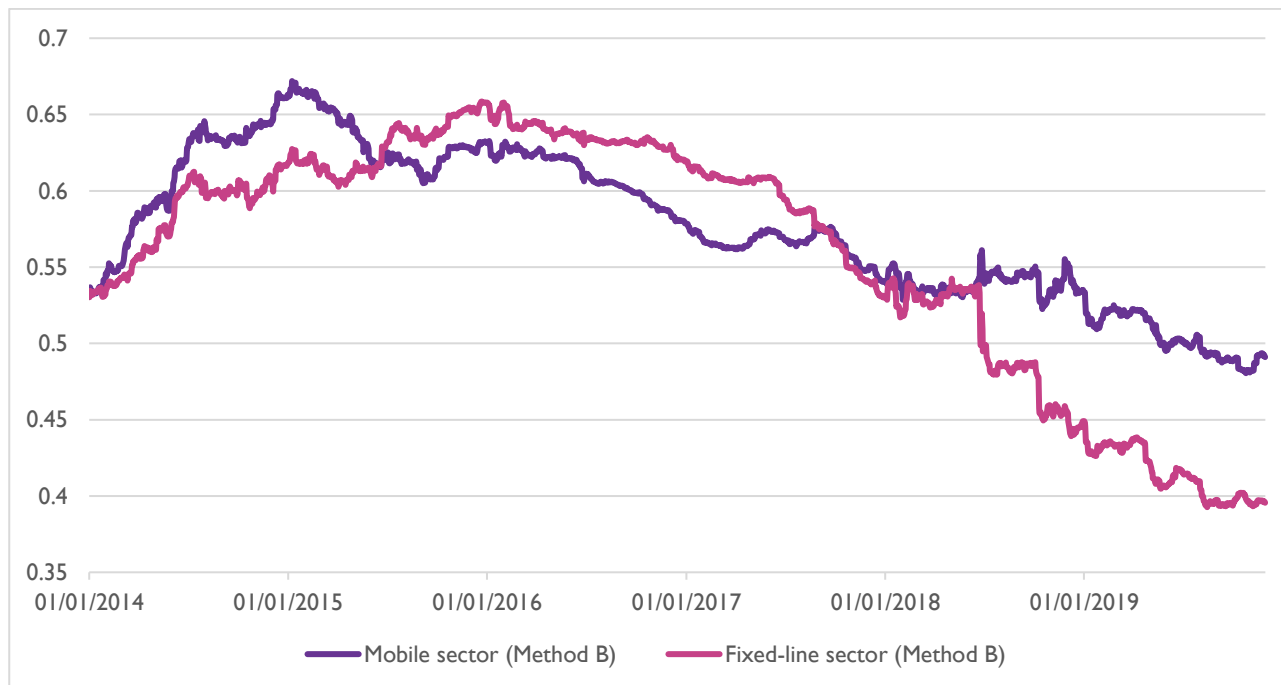
A summary of the unlevered beta evidence presented above is provided in the following table

Table 4.7: Summary of unlevered beta (asset beta with zero debt beta) evidence (spot values at 29-November-2019)

Company / Sector	2-year daily unlevered beta (Europe Economics' approach)

BT	0.52
Elisa	0.41
KPN	0.38
NOS	0.42
Orange	0.37
Proximus	0.49
Swisscom	0.48
Telefonica	0.44
Tele2	0.65
Telekom Austria	0.27
Telia	0.48
Vodafone	0.54
Simple average	**0.45**
Weighted average (mobile)	**0.45**
Weighted average (fixed line)	**0.44**
Mobile sector (Method A)	**0.47**
Fixed-line sector (Method A)	**0.45**
Mobile sector (Method B)	**0.49**
Fixed-line sector (Method B)	**0.40**

Source: Thomson Reuters, companies' annual reports, and Europe Economics calculation.

4.3.3.2   *Current unlevered beta estimates (i.e. asset beta with zero debt beta) for broadcasting sector*

As we have already pointed out in Section 4.3.3 given the limited number of pure-play European broadcasting comparators, there is a merit in estimating beta based on a peer group that includes, both, non-European broadcasting operators, and European companies that provide infrastructure for wireless communications as these are likely to face a systemic risk exposure similar to that of broadcasting operators.

Figure 4.8: 2-years daily unlevered beta for the broadcasting sector
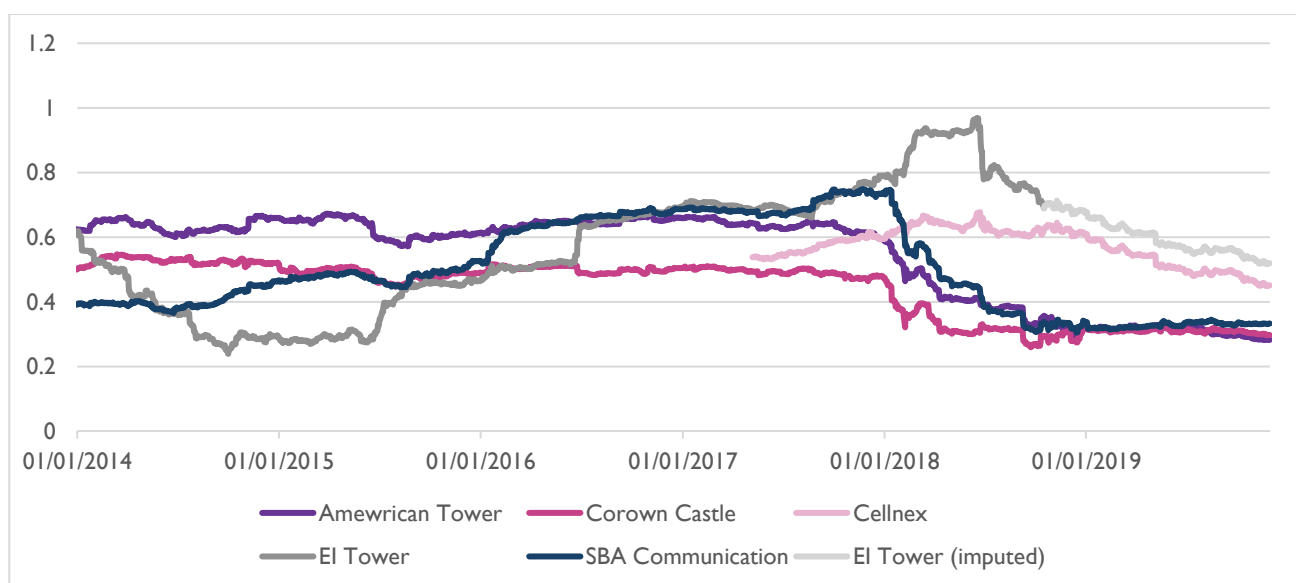
Source: Thomson Reuters, and Europe Economics calculation.

Table 4.8: 2-year daily unlevered betas (asset beta with zero debt beta)

Company / Sector	2-years daily unlevered beta (Europe Economics approach)
American Tower	0.28
Crown Castle	0.30
SBA Communication	0.33
Cellnex	0.45
EI Tower (imputed at Nov 2019)	0.52
Simple average	**0.38**
Average Cellnex & EI Tower (imputed)	**0.49**

Source: Thomson Reuters, companies' annual reports, and Europe Economics calculation

4.3.3.3 *Conclusion on beta*

In forming our judgment on betas we place equal weight on both Method A and Method B. We can see from Table 4.7 that, for the mobile sector the beta ranges from is 0.47 (Method A) to 0.49 (Method B), whilst for the fixed line sector beta ranges from 0.40 (Method B) to 0.45 (Method A). Given the limited number of comparators, the degree of uncertainty for the broadcasting sector's beta is higher: the simple average across all comparators is 0.38, whilst the average between Cellnex and EI Tower's imputed beta is 0.49. The beta of Cellenex — to which we shall place most weight — is 0.45.

Based on this information our basset beta recommendations are as follows:

- For the **mobile sector**: an asset beta **range** of **0.47-0.49**, with a **point estimate** of **0.48** (the mid-point of the range).
- For the **fixed line sector**: an asset beta **range** of **0.40-0.45**, with a **point estimate** of **0.425** (the mid-point of the range).
- For the **broadcasting sector**: an asset beta **range** of **0.38-0.49**, with a **point estimate** of **0.45** (i.e. the Cellnex beta).

4.3.4 Conclusion on the cost of equity under the ComReg 2014 approach

4.3.4.1 *Gearing*

In order to calculate the notional equity beta, we need notional gearing figures. In our May 2019 Report the notional gearing values were chosen on the basis of market evidence as well as regulatory precedents. The gearing values used in the May 2019 Report for the fixed line, mobile, and broadcasting sectors were respectively 40 per cent, 35 per cent, and 25 per cent.

During the consultation process Sky argued that the use of a notional gearing level for the fixed line sector rewards Eircom because Eircom's actual gearing is much higher. We do not agree with this criticism. The use of a notional gearing is standard amongst economic regulators, enabling regulators not to be seen to endorse any particular level of gearing (which could give rise to pressure to bail out failing firms if high gearing led to bankruptcy) and also not to assign an excessive return allowance if a firm's actual gearing arrangements were inefficient (eg if a highly-gearing firm had, as a consequence, a very high cost of debt).

Sky's argument, if accepted, could imply a materially higher cost of debt over multiple price control periods as this would need to be estimated on the basis of a highly geared operator which is rated below investment grade, and Eircom is in fact rated B+. We shall see in a later section that, for reasons we set out there, we place some weight upon Eircom's actual cost of debt in determining the initial cost of debt for this particular

control period, but without accepting a general principle that we should always do so (which might be implied by Sky's approach to gearing). We also note that by setting the notional gearing lower, our use of Eircom's actual cost of debt in later sections, as versus the EU Notice method cost of debt, raises the WACC by less than would be the case were using a higher level of notional gearing.[44]

Finally, during the consultation process, Eircom argued that the notional gearing assumptions for the mobile sectors should be higher (i.e. 39 per cent instead of 35 per cent). In our May 2019 Report the evidence base for 35 versus 40 per cent was limited and the recommendation largely dependent on a single regulatory precedent (Ofcom). We are content to accept Eircom's recommendation, rounding it to give a notional gearing value of 40 per cent for the mobile sector.

Therefore the notional gearing assumptions we use in this report are as follows:

- **Mobile sector**: **gearing** of **40 per cent**
- **Fixed-line sector**: **gearing** of **40 per cent**
- **Broadcasting sector**: **gearing** of **25 per cent**

4.3.4.2   *Notional equity beta and cost of equity*

Based on the gearing figures listed above, the asset beta recommendations of Section 4.3.3.3, the risk free rate recommendations of Section 4.3.1.1, and the ERP recommendations of Section 4.3.2.1, the notional equity beta and cost of equity recommendations under the ComReg 2014 approach are summarised in the table below.

Table 4.9: Nominal cost of equity (post-tax) of the mobile sector – ComReg 2014 approach

	Low	High	Point estimate
Real risk-free rate	1.60%	2.10%	1.75%
Inflation	1.10%	1.80%	1.50%
Nominal risk-free rate	2.72%	3.94%	3.28%
Real TMR	6.65%	6.65%	6.65%
ERP*	5.05%	4.55%	4.90%
Asset beta	0.47	0.49	0.48
Notional gearing	40%	40%	40%
Equity beta	0.78	0.82	0.80
Nominal cost of equity (post-tax)	**6.67%**	**7.65%**	**7.20%**

Notes: *See discussion in Section 4.3.2.1 for explanation of why the lower ERP figure is part of the lower bound cost of equity estimate and vice versa for the higher ERP figure

Table 4.10: Nominal cost of equity (post-tax) of the fixed line sector – ComReg 2014 approach

	Low	High	Point estimate
Real risk-free rate	1.60%	2.10%	1.75%
Inflation	1.10%	1.80%	1.50%
Nominal risk-free rate	2.72%	3.94%	3.28%
Real TMR	6.65%	6.65%	6.65%
ERP*	5.05%	4.55%	4.90%
Asset beta	0.40	0.45	0.43

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[44] Some regulators (eg Ofwat in the UK) deploy mechanisms that either restrict the ability of regulated entities to gear up materially above the notional level or impose penalties for doing so. In our view that would be a more appropriate mechanism to address concerns above excessive gearing than would be the use of a very high level of notional gearing.

Notional gearing	40%	40%	40%
Equity beta	0.67	0.75	0.71
Nominal cost of equity (post-tax)	**6.08%**	**7.35%**	**6.75%**

Table 4.11: Nominal cost of equity (post-tax) of the broadcasting sector – ComReg 2014 approach

	Low	High	Point estimate
Real risk-free rate	1.60%	2.10%	1.75%
Inflation	1.10%	1.80%	1.50%
Nominal risk-free rate	2.72%	3.94%	3.28%
Real TMR	6.65%	6.65%	6.65%
ERP*	5.05%	4.55%	4.90%
Asset beta	0.38	0.49	0.45
Notional gearing	25%	25%	25%
Equity beta	0.51	0.65	0.60
Nominal cost of equity (post-tax)	**5.28%**	**6.91%**	**6.22%**

4.4 The Cost of Equity under the EC Approach

4.4.1 The risk-free rate

The EC Notice relies on a more financial market data-driven approach to determine the risk-free rate which consists in inferring the risk-free from the historic yields of government bonds. In order to ensure consistency, the EC Notice prescribes using the same averaging period, data frequency, and averaging method for most WACC parameters. More specifically, the European Commission's preference is for:

- using domestic government bonds with a residual maturity of 10 years;
- using an averaging period of 5-years;
- calculating average values based on the arithmetic mean; and
- using data with a weekly frequency;

Consequently, under the EC Notice's proposed methodology, the risk-free rate for Ireland is determined by the 5-year average of weekly yields obtained from Irish government bond with a residual maturity of 10-years. Under such approach, the Irish **nominal risk-free rate** at 29 November 2019 is **0.824 per cent** (see figure below). Given the inflation assumption of 1.7 per cent (see Section 2.2.2), the **real-risk free rate** is **-0.861 per cent**.

Figure 4.9: 10-year Irish government bonds (%) — weekly data
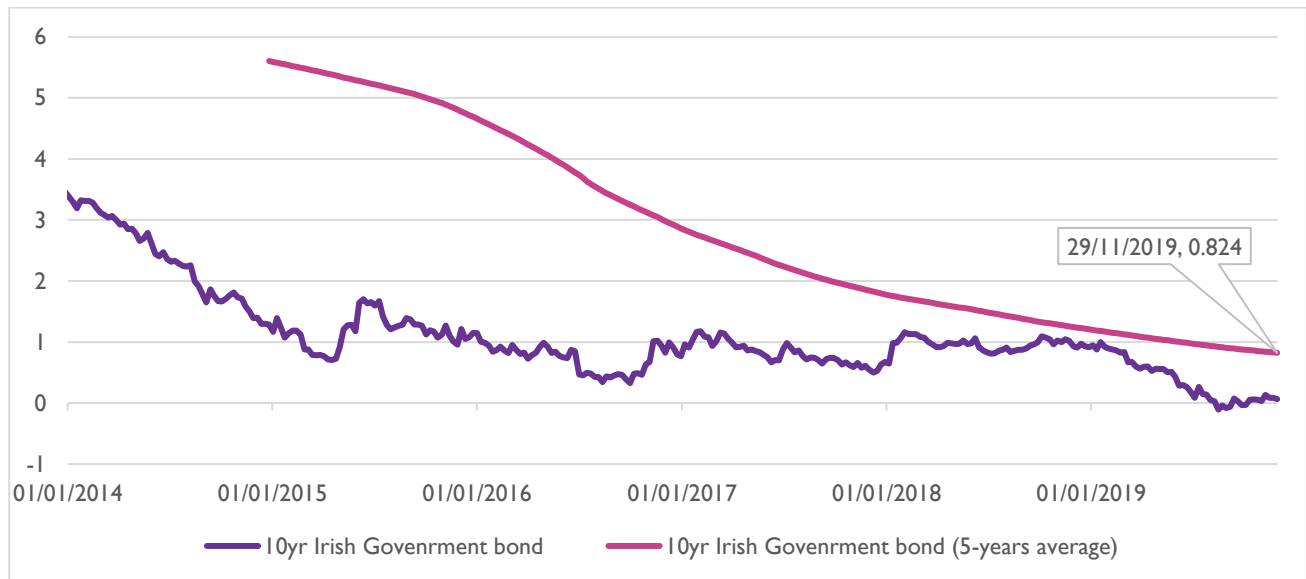
Source: Thomson Reuters, Europe Economics calculations.

4.4.2 The ERP and TMR

Under the EC Notice, the European Commission's preferred approach is to use a Europe-wide ERP (as opposed to a domestic one) to reflect the fact that:

- financial markets in Europe are increasingly integrated; and
- evidence suggests that investors in the EU telecoms sector do not display "home bias".

With regards to the ERP estimation method, the EC Working Paper expresses a clear preference for the use of long-term historical estimates (e.g. as those provided by DMS) as this approach is highly transparent, improves regulatory predictability[45], and there is not sufficient evidence suggesting other methods (e.g. dividend-growth models, or practitioners' surveys) are better at predicting future ERP values. Furthermore, the use of a long-term historical average is also more consistent with the use of relatively long averaging periods (5-years) to determine other WACC parameters (as the European Commission recommends).

The European Commission is less prescriptive with regards to the practical implementation of its preferred long-term historical average approach. In fact the EC Working Paper suggests two alternative valid approaches:

- using off-the-shelf arithmetic average ERP figures from a reliable source such as DMS; or
- calculating a weighted average EU-wide equity risk premium using historical series[46].

Although they provide a broad indication, the EC Working Paper and the EC Notice do not provide absolutely specific details of how the EC's proposed weighted average should be calculated.[47] We provide

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[45] DMS do not provide a confidence interval, though one could in principle calculate this by looking at the distribution of realised premiums that is provided in their official Credit Suisse publication. What is meant by "predictability" here is that, since the ERP estimates is based on more than a century of data, the values from one year to the other are not likely to be subject to abrupt changes.

[46] The EC Working Paper suggests that BEREC will estimate, in close collaboration with the Commission, a single EU-wide equity risk premium.

[47] The EC Working Paper, p66, states that "BEREC may chose to estimate a weighted average Union-wide equity risk premium using historical series. A simpler alternative could be to use off-the-shelf equity risk premiums from a reliable source. One such source is the DMS dataset shown above. For the equity indices, each country is weighted by market capitalisation (or, in years before data on capitalisations were available, by GDP), whereas the bond indices

below a weighted average of the most recent ERP figures sourced from DMS's 2019 Credit Suisse Global Investment Returns Yearbook, on two bases: where weights are proportional to the countries' main stock market capitalisations and where weights are proportional to the countries' GDP levels. Since four countries (namely Austria, Germany, Finland and Portugal) have historically experienced materially higher ERP values than other European peers, as a cross-check, we also provide weighted average figures excluding these countries.

Table 4.12: ERP figures of EU countries

	ERP (Arithm. Mean)	Index Market Cap (€m)	Market cap weight	GDP 2018 (€m)	GDP weight
Austria	21.10%	48,149	0.63%	385,712	2.71%
Belgium	4.10%	121,832	1.59%	459,820	3.23%
Denmark	4.90%	251,924	3.29%	301,341	2.12%
Finland	8.60%	265,570	3.47%	234,453	1.65%
France	5.30%	1,601,351	20.91%	2,353,090	16.53%
Germany	8.20%	1,042,680	13.62%	3,344,370	23.49%
Ireland	4.50%	116,828	1.53%	324,038	2.28%
Italy	6.40%	422,007	5.51%	1,765,421	12.40%
Netherlands	5.50%	627,874	8.20%	774,039	5.44%
Portugal	9.20%	65,064	0.85%	203,896	1.43%
Spain	3.60%	491,614	6.42%	1,202,193	8.44%
Sweden	5.20%	402,587	5.26%	471,196	3.31%
UK	4.90%	2,200,426	28.73%	2,419,186	16.99%
Europe (DMS)	**4.20%**				
Weighted average			**5.75%**		**6.39%**
Weighted average excl. AT, DE, FI, PT			**5.06%**		**5.11%**

Note: All figures nominal.
Source: 2019 Credit Suisse Global Investment Returns Yearbook, Eurostat, Europe Economics calculations

Depending on whether an off-the shelf figure or a weighted average (across all countries) is used, the ERP value ranges from 4.2 per cent to 6.4 per cent. In combination with the EC approach nominal risk-free rate of 0.824 per cent for Ireland, that means the EC approach nominal TMR is 5.024 to 7.224 per cent. The mid-point of this range is 6.124 per cent, which would implies, (with a the EC's inflation assumption of 1.7 per cent (see Section 3.2.2), a real TMR point estimate of 4.44 per cent.

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are GDP-weighted throughout the series." However, first the details about the weighting approach reported at page 66 are just a description of the methodology used by DMS to obtain their own Europe ERP estimate. Is the Commission proposing to use the same DMS weighting methodology by applying it to a different set of countries (i.e. EU member states only)? To us, this remains unclear. Second, if the EC is indeed suggesting using the DMS weighting methodology, what would be the source of historical equity and bond indices? The full historical series used by DMS are propriety data and not-publicly available, and moreover they do not cover the entire EU.

4.4.2.1 *Issues with an literal interpretation of the EC method regarding the ERP*

Our view is that a literal implementation of the EC approach regarding TMR and ERP is problematic for a number of reasons. The long-term historical series used to estimate the ERP (such as those provided by DMS) cover periods in which government bonds yields were materially higher than the yields levels observed in recent years. This means that an approach which relies on recent bonds market data to estimate the risk free rate and then use of long-term historical estimates of the ERP necessarily results in an implausibly low TMR estimate. For example, as illustrated above, a strict and literal implementation of the EC approach results in an implausibly low TMR estimate of 4.44 per cent, which is not in line with recent regulatory determinations. For example, in its PR19 Final Determinations[48] the UK regulator Ofwat adopts a TMR of 6.5 per cent. The UKRN recommends a real TMR for the UK of between 6 and 7 per cent.

As we already explained Section 4.2.2.3 our view is that, if the ERP being estimated is not in the context of an estimate of an equilibrium risk-free rate, but is instead calculated relative to a bonds-market-data-led risk-free rate estimate, it is the TMR not risk-free rate that is relevant. This is also in line with the UKRN's recommendation to estimate first the TMR and then infer the ERP by subtracting the risk-free rate from the TMR. Our expectation is that if and when the EC Notice is formalised into more binding guidance, it will not be at a TMR of 4.44 per cent but will instead entail a TMR much more in line with the UKRN figures — albeit reflecting EEA not UK values. For the purpose of implementing the EC approach to the ERP and TMR here, we move away from a literal reading of the current EC guidelines, and instead we propose the following.

- We follow the UKRN proposal to form view on the appropriate TMR value. The UKRN proposes a number of different methods to estimate the TMR including the use of Dividend Growth Models (DGM). In our May 2019 Report we have explored the merit of applying DGM to Ireland, but the range implied by these models is simply too wide to be useful and includes values simply too high to be credible.
- We form a view on the appropriate TMR value based on the arithmetic mean of long-term historical series provided by DMS. This specific estimation approach is consistent with EC guidelines.
- Our view is informed by both Europe-wide TMR values and Irish-specific TMR values.

In our view, such an approach is consistent with the spirit of the EC Notice in being implementable by NRAs on a common methodological basis.

According to the latest DMS figures[49] the real TMR for Europe is 6.0 per cent whilst the real TMR for Ireland is 6.7 per cent. We use these figures to determine a **real TMR range** of **6.0 per cent** to **6.7 per cent**, with a **point estimate** of **6.35 per cent** (i.e. the mid-point of the range). Since the real risk-free rate under the EC approach is -0.861 per cent, the **ERP range** is **6.86 per cent** to 7.56 per cent, with a point estimate of 7.21 per cent (the mid-point of the range).

4.4.3 Beta

We provide below an overview of the EC recommendations regarding:

- The choice of comparators.
- The beta estimation approach.

Comparators' set

The European Commission's Notice suggests that the relevant comparators' set should be composed of firms that fulfil the following criteria:

- Firms with liquid and frequently traded stocks.
- Firms that own/invest in electronic communications infrastructure.

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[48] https://www.ofwat.gov.uk/wp-content/uploads/2019/12/PR19-final-determinations-Allowed-return-on-capital-technical-appendix.pdf
[49] Credit Suisse Global Investment Returns Yearbook (2019).

- Firms with main operations located in the EU.
- Firms with investment grade credit rating (BBB- or above according to S&P rating system).
- Firms not involved in any substantial mergers and acquisitions recently.

The EC Working Paper accompanying the EC Notice provides the following indicative list of firms that may fulfil the above requirements:

- TDC A/S
- Elisa
- Orange
- KPN
- BT
- Telenet
- Tele 2
- Telekom Austria
- Telecom Italia
- Vodafone
- Telia Company
- Proximus

The EC Working Paper acknowledges that, since there is a lack of publicly traded pure-play fixed line or mobile operators in Europe, estimating WACC parameters that are representative of a notional pure-play entity is challenging. Whilst the EC Working Paper does not recommend a prescriptive approach to overcome this issue, it also notes that pure-play notional asset betas are often estimated based on operators that have a greater focus on either fixed line or mobile-only activities.

Beta estimation

The EC Notice proposes estimating raw equity betas based on 5 years of weekly return data. We set out the EC rationale behind the choice of a five year time horizon and the weekly frequency of return data are discussed below.

Time-horizon

The EC Working Paper recognises that there is a trade-off between regulatory predictability (which is enhanced by the use of longer time windows) and static efficiency (which increases with the use of shorter windows), and concludes that a 5-year estimation window strikes the right balance between the two. More specifically, the EC Working paper makes the following considerations:

- From a regulatory perspective, rather than achieving greater static efficiency by reflecting the prevailing market conditions, it is relatively more important to reward companies according to the financial conditions existing over the lifetime of its investment. Therefore, since telecom operators networks have a lifetime of around 20-30 years, the use of a relatively long time-horizon is preferable, provided that regulators maintains the same time-horizon in subsequent price control periods.
- The use of a longer time-horizon leads to more stable and predictable parameter values. In turn, a greater predictability is likely to promote and favour investments.
- Greater stability of parameters can limit the pressure on regulators to change methodology with the aim of shielding companies from excessive short-term market fluctuations. Therefore the use of a longer time horizon can also promote regulatory stability.

Data frequency

The EC Notice proposes estimating raw equity betas using five years of weekly return data. A rationale for this choice is provided by the accompanying Working Paper which notes that:

- The use of weekly return data together with the use of a 5-year time window ensures that the estimates are based on a sufficiently large sample.
- The use of weekly data is a good compromise between high-frequency data (e.g. daily) and low-frequency data (e.g. monthly) and limits the risk of distortions in estimates that can arise when traded stocks are illiquid or thinly traded.

Market index

The EC preference is for estimating betas against a broad European market index as this is likely to better approximate a fully diversified portfolio. The EC Notice then suggest list of indicative indices that could be potentially used. These are: STOXX Europe TMI, S&P Europe 350, Eurostoxx50, and MSCI Europe.

Adjustments

The EC argues against the use of any beta adjustments (such as Blume, Dimson, or Vasicek adjustments) as these are unlikely to increase the efficiency of the estimation whilst increasing unnecessarily the complexity of the regulatory approach and limiting its transparency.

Gearing, debt beta and asset beta

In order to convert the raw-equity beta estimates into an asset beta the EC Notice prescribes using the following standard formula:

$$\beta_{Asset} = g * \beta_{Debt} + (1 - g) * \beta_{Equity}$$

With regards to the debt beta and gearing values, the EC Notice states the following:

- One should either use a debt beta value of zero, or — if one decides to move away from a zero debt beta assumption — to use a value of 0.1. We report results under a zero debt beta approach (under which the asset beta is mathematically equivalent to the unlevered beta) in the main text, with implications of a 0.1 debt beta explored in an Appendix. (We shall see in the Appendix that the use of a 0.1 debt beta would result in ultimate equity betas being slightly lower, in some cases, and slightly higher in others, than those we produce under our assumptions).
- The gearing is the ratio of net debt over enterprise value (where enterprise value is the sum of net debt and equity), where the net debt to be used is the book value of a company's net debt, including the value of financial leases.

4.4.3.1 Unlevered beta (i.e. asset beta with zero debt beta) for mobile and fixed-line sectors

We provide below beta estimates based on the EC approach, i.e. unlevered betas estimated based on 5-years of weekly return data. The EC approach does not provide a prescriptive indicator on how to determine the beta of notional pure play operators from the beta evidence obtained from operators that are active in both fixed line and mobile segments. Therefore we provide 5-years weekly beta estimates for all comparators, together with a simple average and a weighted average across comparators (using the same method we adopted to produce the betas in Figure 4.5).

Figure 4.10: 5-years weekly unlevered beta of comparators
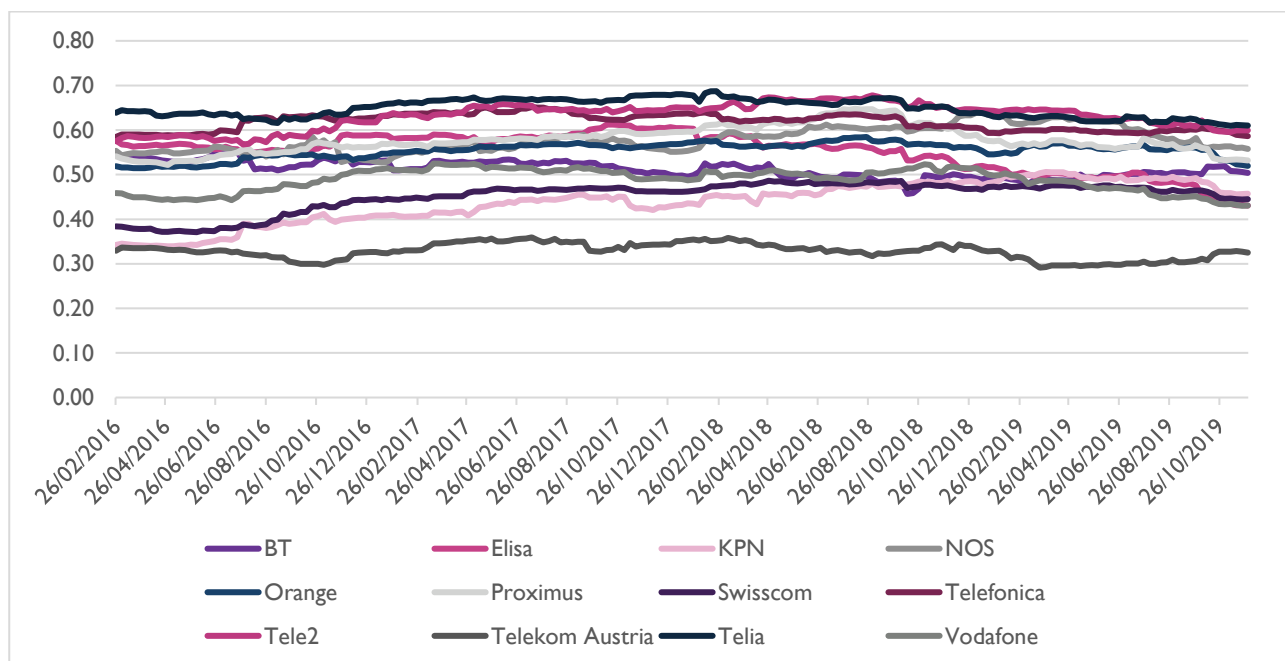
Source: Thomson Reuters and Europe Economics calculation.

Figure 4.11: Weighted average 5-years weekly unlevered beta for mobile and fixed line
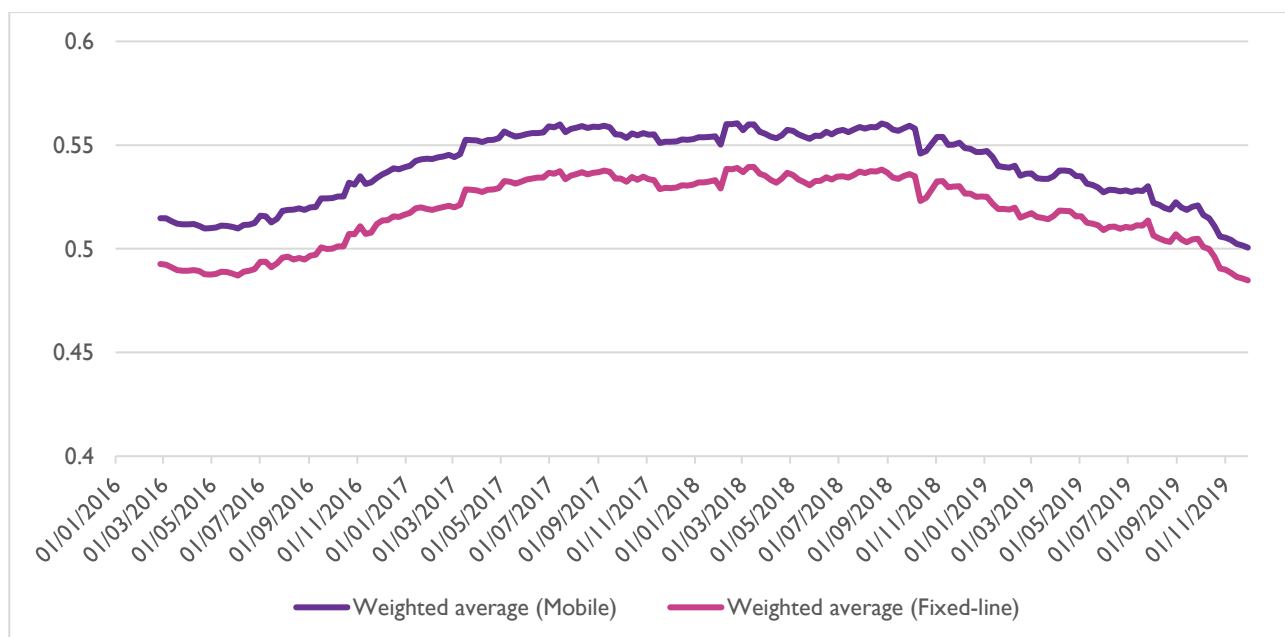
Source: Thomson Reuters, companies' annual reports, and Europe Economics calculation.

A summary of all the beta evidence under the EC approach is reported in the table below.

Table 4.13: Summary of unlevered (asset) beta evidence under EC approach (spot values at 29-November-2019)

Company / Sector	5-years weekly unlevered (asset) beta (European Commission approach)
BT	0.50
Elisa	0.43
KPN	0.46

Company / Sector	5-years weekly unlevered (asset) beta (European Commission approach)
NOS	0.56
Orange	0.52
Proximus	0.53
Swisscom	0.44
Telefonica	0.59
Tele2	0.60
Telekom Austria	0.33
Telia	0.61
Vodafone	0.43
Simple average	**0.50**
Weighted average (mobile)	**0.50**
Weighted average (fixed line)	**0.48**

Source: Thomson Reuters, companies' annual reports, and Europe Economics calculation.

Based on the weighted average figures of Table 4.13, the asset beta for the **mobile sector** is **0.50**, whilst the **asset beta** for the **fixed-line sector** is **0.48**.Unlevered beta (i.e. asset beta with zero debt beta) for broadcasting sector

A strict implementation of the European Commission approach to beta estimation for the broadcasting sector is not feasible for two reasons:

* First, there are no broadcasting operator comparators that fulfil the European Commission criteria for inclusion as relevant comparators — the only European-based comparator is Cellnex which, however, is rated below investment credit rating by S&P.
* Even if Cellnex was considered a relevant comparator, the company does not have stock price data for a sufficiently long period to allow beta estimation of over a 5-year time horizon.

4.4.4   Conclusion on the cost of equity under the European Commission approach

The notional equity beta and cost of equity estimates obtained under the European Commission approach are summarised in the table below. Notice that, since the EC approach to gearing is the same as the one we recommend the gearing figures used in the tables below are identical to those provided in Section 4.3.4. Since an implementation of the European Commission approach to beta estimation for the broadcasting sector is not feasible we do not report the cost of equity for the broadcasting sector.

Table 4.14: Nominal cost of equity (post-tax) of the mobile sector – EC approach

	Low	High	Point estimate
Real risk-free rate	-0.86%	-0.86%	-0.86%
Inflation	1.70%	1.70%	1.70%
Nominal risk-free rate	0.824%	0.824%	0.824%
Real TMR	6.00%	6.70%	6.35%
ERP*	6.86%	7.56%	7.21%
Asset beta	0.50	0.50	0.50

	Low	High	Point estimate
Notional gearing	40%	40%	40%
Equity beta	0.83	0.83	0.83
Nominal cost of equity (post-tax)	6.54%	7.13%	6.83%

Table 4.15: Nominal cost of equity (post-tax) of the fixed line sector– EC approach

	Low	High	Point estimate
Real risk-free rate	-0.86%	-0.86%	-0.86%
Inflation	1.70%	1.70%	1.70%
Nominal risk-free rate	0.824%	0.824%	0.824%
Real TMR	6.00%	6.70%	6.35%
ERP	6.86%	7.56%	7.21%
Asset beta	0.48	0.48	0.48
Notional gearing	40%	40%	40%
Notional equity beta	0.80	0.80	0.80
Nominal cost of equity (post-tax)	6.31%	6.87%	6.59%

4.5 Overall recommendation on the cost of equity

We summarise below the cost of equity ranges and point estimated obtained under the ComReg 2014 approach and under the (modified) European Commission approach.

Table 4.16: Nominal cost of equity (post-tax) under the ComReg 2014 approach and under the EC approach

	Mobile		Fixed-line		Broadcasting	
	Range	Point estimate	Range	Point estimate	Range	Point estimate
ComReg 2014	6.67%-7.65%	7.20%	6.08%-7.35%	6.75%	5.28%-6.91%	6.22%
European Commission	6.54%-7.13%	6.83%	6.31%-6.87%	6.59%	N/A	N/A

As we can see there is a significant overlap between the ranges obtained under the two alternative estimation approaches. Our recommendation is to place weight on both approaches and therefore our overall cost of equity recommendations are as follows:

- **Mobile-sector**: a nominal cost of equity (post-tax) range of **6.83 per cent** (EC approach point estimate) to **7.20 per cent** (ComReg 2014 approach point estimate), with a **point estimate** of **7.01 per cent** (mid-point of the range).
- **Fixed-line sector**: a nominal cost of equity (post-tax) range of **6.59 per cent** (EC approach point estimate) to **6.75 per cent** (ComReg 2014 approach point estimate), with a **point estimate** of **6.67 per cent** (mid-point of the range).

- **Broadcasting sector**: a nominal cost of equity (post-tax) range of the cost of **5.28 per cent** to **6.91 per cent** (ComReg 2014 approach range), with a **point estimate** of **6.22 per cent** (mid-point of the range).

One way to interpret our point estimate recommendations here for Mobile and Fixed line is as a selection from the EC Notice range. In the case of Mobile our figure lies at the 80th percentile of the EC range. In the case of Fixed line our figure lies at the 64th percentile of the range.

The nominal cost of equity (pre-tax and post-tax) ranges and point estimates are summarised in the table below.

Table 4.17: Nominal cost of equity for the mobile sector

	Low	High	Point estimate
Nominal cost of equity (post-tax)	6.83%	7.20%	7.01%
Tax rate	12.50%	12.50%	12.50%
Nominal cost of equity (pre-tax)	**7.81%**	**8.22%**	**8.02%**

Table 4.18: Nominal cost of equity for the fixed-line sector

	Low	High	Point estimate
Nominal cost of equity (post-tax)	6.59%	6.75%	6.67%
Tax rate	12.50%	12.50%	12.50%
Nominal cost of equity (pre-tax)	**7.53%**	**7.71%**	**7.62%**

Table 4.19: Nominal cost of equity for the broadcasting sector

	Low	High	Point estimate
Nominal cost of equity (post-tax)	5.28%	6.91%	6.22%
Tax rate	12.50%	12.50%	12.50%
Nominal cost of equity (pre-tax)	**6.03%**	**7.90%**	**7.10%**

4.5.1   Comparison with May 2019 figures

The below table compares the cost of equity here with those in the May 2019 consultation, and accounts for the difference.

Table 4.20: Drivers of difference from May 2019 figures

Comparison to May 2019			
	Mobile	Fixed line	Broadcasting
Pre-tax cost of equity			
May 2019	7.39%	7.42%	6.72%
This report	8.02%	7.62%	7.10%
Drivers of difference			
Inflation	+0.31%	+0.29%	+0.23%

Gearing	+0.42%	Nil	Nil
Beta	+0.64%	+0.64%	+0.37%
Generic parameters	-0.73%	-0.73%	-0.22%

We see that for Fixed line and Broadcasting the rise is smaller than for Mobile, with the difference being accounted for by the fact that gearing changed for Mobile (from 35 per cent to 40 per cent). The various methods here tend to use higher betas but lower generic parameters than was the case in May 2019.

5 Debt premium and cost of debt

5.1 Introduction

In this section we provide an update of the cost of debt. In doing so we provide a response to the submissions put forward by stakeholders, and reflect upon the methodological proposals set out in the European Commission's Notice. This section is structured as follows:

- We draw methodological considerations with respect to the cost of debt estimation.
- We consider what the appropriate debt instruments are for the purpose of estimating the debt premium.
- We present market evidence based on both our preferred approach and the EC approach.
- We conclude by providing our recommendations.

5.2 Methodological approach to estimate the cost of debt

5.2.1 Cost of debt approach in our May 2019 Report

In our May 2019 Report we reported the cost of debt on three bases:

- In the main text we presented a debt premium type approach identical to that used in 2014, whereby we added the estimated debt premium to the risk-free rate estimated through the equilibrium approach so as to obtain an equilibrium cost of debt;
- In the Appendices we presented two quasi-all-in cost of debt approaches.

  - In one, akin to the approach recommended by the UKRN, we added the estimated debt premium to the current Irish government bond yield, adjusted for the forward-minus-spot curve for Europe[50], to obtain a current market cost of debt;
  - In the other, we applied what was at the time the European Commission-recommended approach, assessing the debt premium as recommended and adding it to the European Commission's recommended risk-free rate.

The cost of debt recommendation in our May 2019 Report was based on the debt premium approach, which is also the same approach that was used by ComReg in 2014 (the quasi-all in cost of debt approach was used mainly as a cross-check). The debt premium was estimated based on the spreads between comparators' corporate bonds versus the 10-year German government bond, for euro denominated bonds, or versus the 10-year national government bond for bonds denominated in the domestic currency (in the May 2019 Report we referred to the debt premium calculated in this manner as "debt premium vs appropriate European benchmark").

5.2.2 Consultation respondents' views on the cost of debt

Stakeholders have generally agreed with — or, at the very least, they have not posed fundamental objections to — the cost of debt approach we adopted in our May 2019 Report. The only notable exception is 2rn which does not dispute the debt premium approach per se, but has two main objections to the broadcasting debt premium figure we proposed in the May 2019 Report.

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[50] As per Section 12.2 pf the May 2019 Report, we used ECB data on forward minus spot curves for 3 to 4 years ahead.

- First 2rn disagrees with our decision to not place any weight on the debt premium evidence of Cellnex and SBA Communications. We recall that in our May 2019 Report we did not place weight on Cellnex and SBA Communications as the two companies had low credit ratings and therefore may not be relevant comparators for the purpose of estimating the debt premium.

- Second 2rn claims that, since it is a much smaller company relative to the comparators considered in our analysis, the debt premium we estimated may represent an underestimation of the debt premium that would be reasonable to expect from an efficient broadcasting operator in Ireland.

5.2.3   The EC Notice proposed approach to estimate the cost of debt

The EC Notice also prescribes estimating the cost of debt based on a debt premium approach. However, there are some key differences between the implementation of this approach as suggested by the European Commission and the implementation we adopted in our May 2019 Report.

- The first and most fundamental difference is related to the risk-free rate. In our debt premium approach the risk-free rate is an equilibrium concept whilst the risk-free rate used by the EC is based on the 5-year average of weekly domestic (Irish in this context) government bond yields.

- The second difference is related to the averaging window used to determine the debt premium. We use spot daily spread figures, whilst the European Commission proposes using a 5-year average of spreads obtained from weekly data.

- The third is related to the benchmark used to calculate the spreads. Whist our debt premium recommendation was based on spreads calculated against an "appropriate European benchmark" (see Section 5.2.1 above) the EC Notice proposes to calculate the spreads versus domestic government bonds.

5.2.4   Our current view on the cost of debt approach

Traditionally, there were four key ideas underpinning the preference for a debt premium approach over an all-in cost of debt.

- First, studies conducted in the 2000s and before indicated that the spread of firms' cost of debt over the benchmark government bond tended to be more stable than the yield itself, so most movement in the cost of debt reflected movements in the government bond. That meant there would be value in estimating the debt premium (the spread) independently of the government bond and then applying that to one's risk-free rate estimate.

- Second, the use of a risk-free rate that was different for the cost of equity from the cost of debt creates the potential for a distortion in incentives for regulated firms to issue debt as opposed to equity.

- Third, if the risk-free rate were expected to change over time, there should be expected to be a near-corresponding change in the cost of debt. If the risk-free rate were not estimated on the basis of market government bond yields because there was believed to be some distortion therein, that same distortion might be expected to apply to firms' cost of debt.

- Fourth, comparators for the cost of debt are often not from the country of the regulated entity, meaning that the use of all-in yields might inappropriately incorporate a very different implied risk-free rate.

However, to apply a debt premium approach reliably we must believe that we have a fairly good estimate of the risk-free rate that is not simply most relevant for estimating the cost of equity but is, instead, fundamentally the risk-free rate to be applied across all investment instruments.

Ultimately, a debt premium approach can be seen as a kind of model of the cost of debt, whilst the all-in cost of debt can be seen as an attempt to observe the cost of debt more-or-less directly. (This contrasts with the cost of equity where, by its nature, we cannot observe the cost ex ante but instead must, of necessity, model it.) If we are going to use such a "model" as opposed to simply observing the cost of debt, we ought to have

fairly high confidence that our model produces a better answer. The burden of deviating from the cost we actually observe (which is likely to be not far from the true cost of debt, even if not precisely it) should be reasonably high.

In the case of Eircom, in particular, we have some (albeit limited) bond issuance data from 2019. We should not require that the determined cost of debt must precisely match Eircom's actual costs — after all, Eircom may issue its bonds with unwise or unfortunate timing on some occasions or make a poor deal, leading to its costs being above the market rate, or on some other occasion manage an especially smart deal or clever or fortuitous timing, resulting in outperforming market rates. But nonetheless, we should be concerned if our modelled cost of debt deviates very markedly from Eircom's actual debt costs.

We shall see, when we present our estimates below, that over 2019, between the data period used for our May 2019 Report and the data period used in this report, there has been a material movement in the bond markets data which results in a large deviation between the equilibrium cost of debt and the cost of debt derived under the alternative cross-check methodologies. Even if one regarded our 2014-type approach as the main method and the UKRN-type and European Commission-type approaches as cross-checks, in our view the large gap between our cross-check results and the debt-premium results based on the cost of equity risk-free rate has become too large for it to be sustainable to use the 2014-type approach unmodified. The data we have available on Eircom's own bond issuance might not be sufficient, by itself, to cause us to change our cost of debt estimate if our other cross-checks did not also, decisively, imply that our previous main approach was not producing a sustainable answer, but in fact those cross-checks indicate precisely that.

Instead, what we shall do is to present two debt premium approaches and one all-in cost of debt approach[51], illustrating the wide range these different approaches imply, and select a point within that range that is to some extent informed by the (somewhat limited) data we have on Eircom's own actual cost of debt as issued in 2019. One way to think about this is as deeming that, with different models and comparator-type approaches producing such a wide range of answers, we believe there is insufficient basis for deviating markedly from Eircom's actual cost of debt on this occasion — even though we emphasize that this not be taken as a precedent for believing that Eircom's actual cost of debt should be routinely used for its determined cost of debt.

5.3   Debt instruments considered

5.3.1   Debt instruments considered in the May 2019 Report

In our May 2019 Report we collected data on outstanding bonds for all the mobile operators that we deemed relevant at the time and we filtered this bonds according to the following criteria:

- The bonds were investment grades (i.e. BBB- or above according to S&P rating system).
- The bonds denominated in the domestic currency of the issuers.
- Bonds with time-to-maturity between 7 and 13 years, so as to minimise the maturity mismatch with the 10-year government benchmark we use to calculate spreads.
- Finally, we excluded bonds from Telecom Italia (which we considered a potentially relevant comparator at the time) because, following the establishment of the new coalition government in Italy, yields in the

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[51]   Specifically, these are:
- The debt premium approach which follows our interpretation of the European Commission guidelines.
- A debt premium approach where the cost of debt is calculated by adding the spread over domestic government bonds to our equilibrium risk-free rate estimate.
- A quasi-all-in cost of debt approach where the spread over domestic government bond benchmarks is added to the spot yield of Irish government bonds

Italian bond markets (sovereign and corporate) had increased significantly and this might have distorted the results of our analysis.

5.3.2 Consultation respondents' views on debt instruments to be considered

Stakeholders do not express specific views in relation to the debt instruments that should be considered for the estimation of the cost of debt. The only exception in this regard are the objections made by 2rn that we have already discussed in Section 5.2.2 above.

5.3.3 The European Commission's proposed debt instrument

The EC Notice proposes to estimate the debt premium based on corporate bonds issued by the relevant comparators. The EC Notice suggests using bonds with a time-to-maturity close to ten years, but, other than that it does not specify any additional filtering criterion.

5.3.4 Our current view on the appropriate debt instruments to consider

Mobile and fixed line sectors

Consistent with the recommendations made by the European Commission Notice, we calculate the debt premium based on corporate bonds issued by the comparators identified in Table 4.5 and with a time-to-maturity between 7 and 13 years (i.e. sufficiently close to 10-years, as required by the European Commissions). We have also applied additional criteria to select bonds that are appropriate for the analysis. The complete list of filtering criteria used is as follows:

- Bonds with time-to-maturity between 7 and 13 years (i.e. bonds that mature between Dec-2026 and December 2032) — so as to minimise the maturity mismatch with the 10-year government benchmark we use to calculate spreads.
- Bonds currently rated as investment grade by at least one of the major rating agencies (S&P, Moody's, or Fitch) — this criteria is relevant because, under certain circumstances a bond's current rating could differ from that of the issuer .
- Bonds denominated in a European/EEA currency (bonds denominated in, e.g. USD or JPY are excluded) — this allows us to calculate spreads under two alternative benchmark approaches:
  - Calculate spreads versus a European benchmark: in this case the spreads of euro-denominated corporate bonds are calculated against 10-year German government bonds.
  - Calculate spreads versus a domestic benchmark: in this case the spreads of corporate bonds denominated in their domestic currencies are calculated against 10-year domestic government bonds.
- Bonds that have the following standard characteristics (and which appear to be the most common feature amongst bonds issues by European telecom operators):
  - Bonds issued in Europe/EEA.
  - Plain vanilla fixed-coupon bonds.
  - Non-inflation linked bonds.
  - Non-convertible bonds.
  - Senior unsecured and non-guaranteed bonds.

We report in the table below the complete list of bonds identified.

Table 5.1: Relevant corporate bonds of telecom operators

Issuer	Country of domicile of the issuer	Maturity	Currency	Rating (under S&P rating system)
BT	United Kingdom	23/06/2027	Euro	BBB
BT	United Kingdom	26/09/2028	Euro	BBB
BT	United Kingdom	21/11/2031	British Pound	BBB
BT	United Kingdom	07/12/2028	British Pound	BBB
KPN	Netherlands	11/09/2028	Euro	BBB
Orange	France	11/04/2029	Euro	BBB+
Orange	France	17/09/2030	Euro	BBB+
Orange	France	03/02/2027	Euro	BBB+
Orange	France	09/09/2027	Euro	BBB+
Orange	France	20/03/2028	Euro	BBB+
Orange	France	15/01/2029	Euro	BBB+
Orange	France	16/01/2030	Euro	BBB+
Orange	France	12/09/2030	Euro	BBB+
Orange	France	04/09/2032	Euro	BBB+
Proximus	Belgium	08/09/2031	Euro	A
Swisscom	Switzerland	31/05/2027	Swiss Franc	A
Swisscom	Switzerland	15/12/2027	Swiss Franc	A
Swisscom	Switzerland	31/03/2028	Swiss Franc	A
Swisscom	Switzerland	12/10/2028	Swiss Franc	A
Swisscom	Switzerland	15/03/2029	Swiss Franc	A
Swisscom	Switzerland	28/09/2029	Swiss Franc	A
Swisscom	Switzerland	15/09/2032	Swiss Franc	A
Telefonica	Spain	22-01-2027	Euro	BBB
Telefonica	Spain	12-01-2028	Euro	BBB
Telefonica	Spain	17-10-2028	Euro	BBB
Telefonica	Spain	12-03-2029	Euro	BBB
Telefonica	Spain	17-10-2029	Euro	BBB
Telefonica	Spain	17-10-2031	Euro	BBB
Telia	Sweden	07/09/2027	Euro	BBB+
Telia	Sweden	01/04/2031	Euro	BBB+
Vodafone	United Kingdom	24/07/2027	Euro	BBB
Vodafone	United Kingdom	20/11/2029	Euro	BBB
Vodafone	United Kingdom	24/11/2030	Euro	BBB
Vodafone	United Kingdom	29/07/2031	Euro	BBB
Vodafone	United Kingdom	26/11/2032	British Pound	BBB

As a cross-check we have estimated debt premiums based also on the two following corporate bonds indices[52]:

- Thomson Reuters Europe Non-financial 10-year index, BBB — a euro-denominated corporate bond index composed of bonds issued by European non-financial firms rated between BBB- and BBB+. The index is constructed so as to have a notional maturity of 10 years.
- Thomson Reuters Europe Non-financial 10-year index, A — a euro-denominated corporate bond index composed of bonds issued by European non-financial firms rated between A- and A+. The index is constructed so as to have a notional maturity of 10 years.

Broadcasting sector

We have selected bonds issued by broadcasting comparators following the same criteria used for telecom operators' bonds, i.e. we selected plain vanilla fixed coupon bonds with standard characteristics (i.e. senior unsecured, not guaranteed, non-convertible, and non-inflation-linked) and with time-to-maturity between 7 and 10 years. We note that Cellnex (the only European comparator with active bonds) is currently rated BB+ (below investment grade) by S&P but BBB- (investment grade) by Fitch. For this reason we do not consider Cellnex's debt premium to be representative of that of an efficient investment grade European broadcasting operators[53].   For this reason, in order to determine the debt premium of an investment-grade the broadcasting operator we rely primarily on Thomson Reuters Non-financial corporate bond indices and, as a cross-check, we also the calculate the spreads of the US-based broadcasting comparators against the 10-year US Government bond benchmark.

The US-based broadcasting comparators' bonds considered for the analysis are summarised below

Table 5.2: Relevant corporate bonds of broadcasting operators

Issuer	Country of domicile of the issuer	Maturity	Currency	Rating (under S&P rating system)
American Tower	US	15/01/2027	USD	BBB-
American Tower	US	15/01/2027	USD	BBB-
American Tower	US	15/07/2027	USD	BBB-
American Tower	US	15/01/2028	USD	BBB-
American Tower	US	15/03/2029	USD	BBB-
American Tower	US	15/08/2029	USD	BBB-
Crown Castle	US	01/03/2027	USD	BBB-
Crown Castle	US	01/09/2027	USD	BBB-
Crown Castle	US	15/02/2028	USD	BBB-
Crown Castle	US	15/02/2029	USD	BBB-

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[52] The indices are constructed so as to represent the indicative yield for bonds that have a residual maturity of 10 years. The constituents of the indices must respect the following criteria:
(1) Minimum EUR/USD 200M volume outstanding.
(2) Senior unsecured.
(3) No optionality (calls/puts/conversion options).
(4) Fixed rate plain vanilla coupon only.
(5) true corporate entities - no issuers with government guarantees or those considered as agencies (SSA)
(6) latest asset rating meeting BBB+, BBB, BBB- (or equivalent) from one of 3 major ratings agencies.
(7) The sector is assigned based on the Thomson Reuters Business Classification (TRBC).

[53] For example, in January 2020 Cellenx has issued a bond which matures in April 2027 and which is rated at BB+ (sub-investment grade) by S&P. Over the short period for which it has been traded, the average spread versus the Thomson Reuters Non-financials 10yr (BBB) index is around 25 bps. Therefore the debt premium of Cellenx bond appears to be around 25bps higher than that of an comparable investment grade operator.

Crown Castle	US	15/11/2029	USD	BBB-

5.4 Debt premium evidence for mobile and fixed line sectors

5.4.1 Europe Economics' approach

In Appendix 1 we graph the spreads of individual telecom operators' bonds vs 10-year German government bond. The average spread across all bonds is **111bps.** In that same Appendix we graph the spreads of individual telecom bonds vs 10-year domestic government bonds. The average spread across all bonds is **68bps**. Here, in the main text, we present the spread of the Thomson Reuters corporate bond indices, which provide a broadly similar message. We note that since the beginning of 2019 yields on corporate bonds have decreased materially.

Figure 5.1: Spread of Thomson Reuters corporate bond indices versus 10-year German government bond (bps)
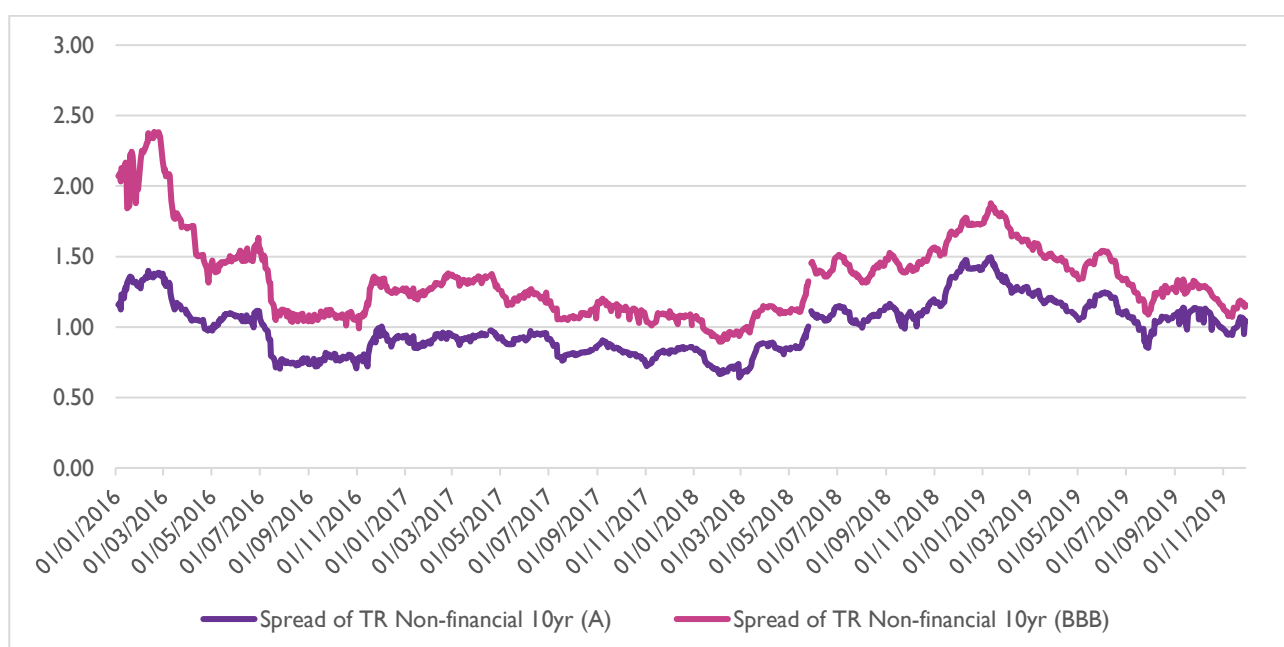
Source: Thomson Reuters and Europe Economics calculations

As of 29 November 2019:

- The spread of the Thomson Reuters Non-financial 10-year index (A) is **104bps**
- The spread of the Thomson Reuters Non-financial 10-year index (BBB) is **116bps**

The spread evidence presented above is summarised in the following table.

Table 5.3: Summary of debt premium evidence

Instrument	Time-to-maturity	Rating	Currency	Benchmark	Debt Premium
Comparators' corporate bonds	7-13yrs	BBB to A	EUR	DE bond	1.11%
Thomson Reuters Non-financials index (A)	10yr	A- to A+	EUR	DE bond	1.04%
Thomson Reuters Non-financials index (BBB)	10yr	BBB- to BBB+	EUR	DE bond	1.16%
Comparators' corporate bonds	7-13yrs	BBB to A	EUR/GBP/CHF	Domestic bonds	0.68%

For the table above we can see that the spreads versus 10-year German government bonds of the two Thompson Reuters indices range between 1.04 per cent ("A-class" rated index) and 1.16 per cent ("BBB-class" rated index), and that average spread of comparators' bonds (which are rated between BBB and A) against the German benchmark is 1.11 per cent and sits almost precisely in the middle of this range.

5.4.2   European Commission's approach

The European Commission Notice prescribes to estimate the debt premium as the spread between comparators' corporate bond yields and the domestic risk-free rate. The EC Working paper provides more details on how the debt premium estimation should be conducted in practice. More specifically, at page 44 the EC Working Paper states that the debt premium should be calculated based on corporate bonds with a residual maturity of 10 years (or sufficiently close to 10 years). Furthermore, consistently with the estimation of other WACC parameters, the debt premium should be estimated as a five year arithmetic average of data with a weekly frequency.

Given our interpretation of the EC guidelines, we have estimated the debt premium by adopting the following approach:

- We have considered all the comparators' investment grade bonds denominated in a European/EEA currency that fulfil some standard criteria (i.e. plain vanilla fixed-coupon bonds, non-inflation linked, non-convertible, senior unsecured and non-guaranteed).
- For each year over the last five year period we have restricted the bonds' set so as to include only bonds that had between 7 and 13 years of residual maturity.
- Based on this time-evolving set of bonds, we have then calculated the spreads versus the yields of the domestic 10-year government bond,[54]
- Finally, we calculate average spreads across all bonds and then obtain the 5-years average of such spread.

We note that, under our interpretation of the EC guidelines we do effectively construct a corporate bond (spread) index based on the average spread across all bonds that, at any point in time, have approximately 10 years to maturity. We and then calculate the five-year average of such index. In the chart below we show the spreads over the time-evolving set of bonds (i.e. the constituents of the index we have described above)[55].

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[54]   For BT, Swisscom, and Vodafone we used only bonds that are denominated in the domestic currencies (i.e. GBP, CHF) so as to ensure the spreads are calculated on a common currency basis
[55]   A complete list of all the bonds used to produce this chart is provided in the Appendix.

Figure 5.2: Spreads of telecom operators' bonds with residual maturity between 7-13 vs 10-year domestic government bond (bps)
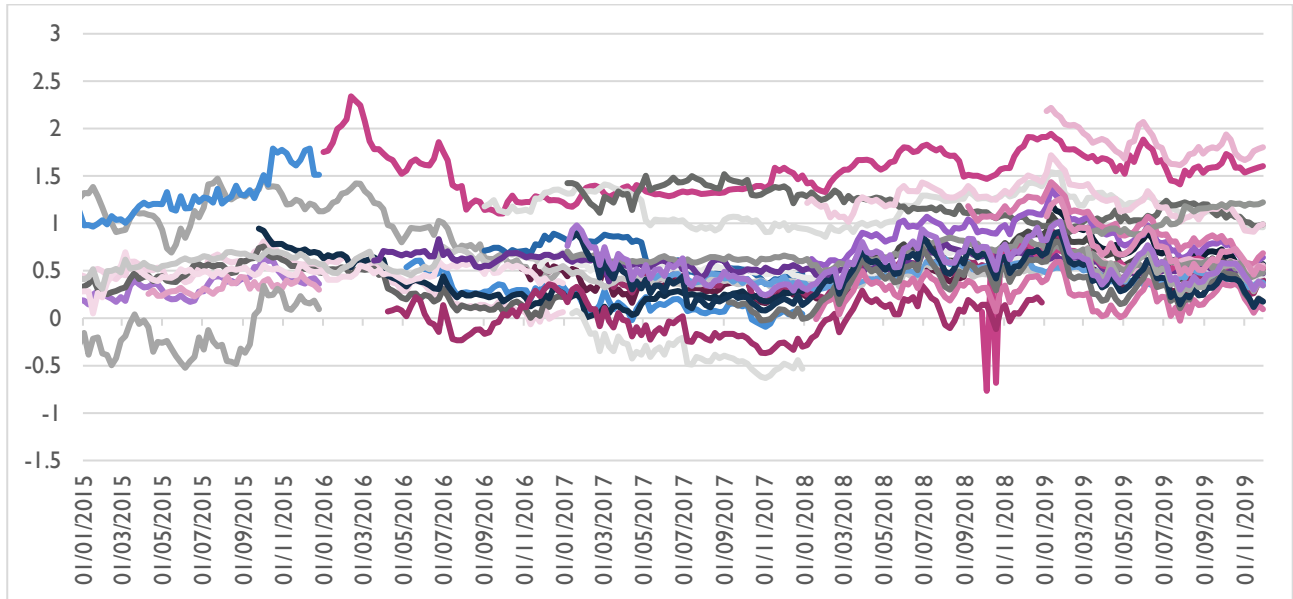
Source: Thomson Reuters and Europe Economics calculations.

The figure below shows the average spread across the bonds of Figure 5.2, together the average spread over the last 5-years.

Figure 5.3: 5-year average spreads of telecom operators' bonds (bps)
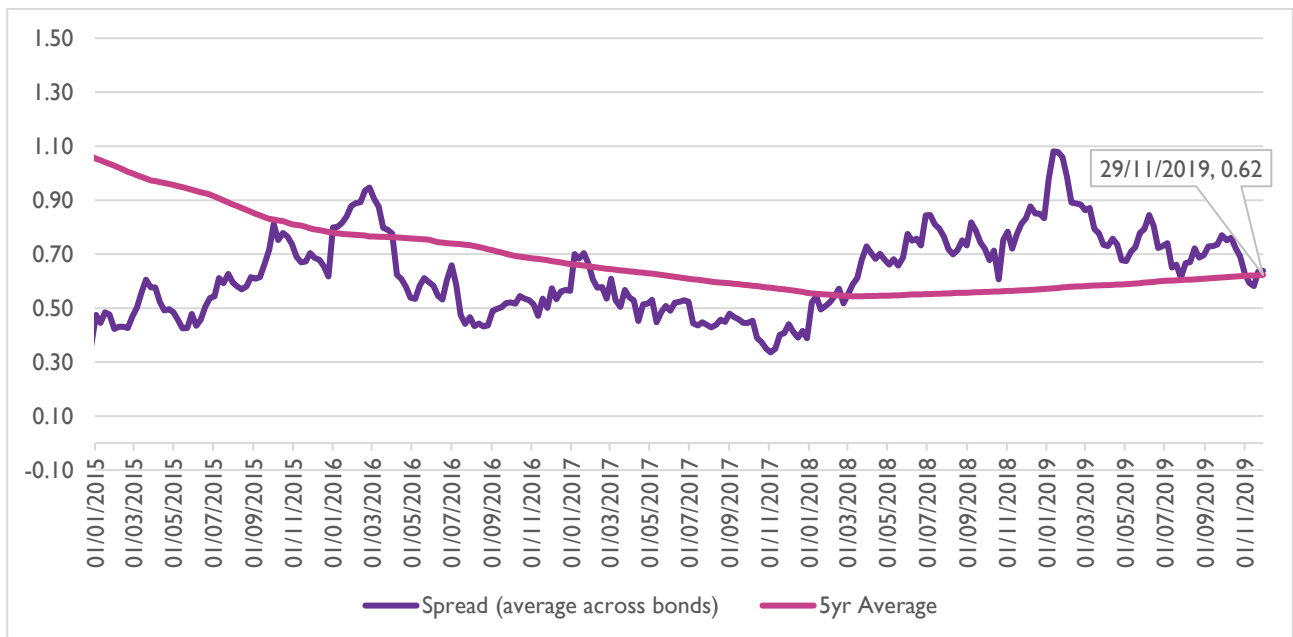
Source: Thomson Reuters and Europe Economics calculations.

As we can see from the chart above, the debt premium figure obtained under the **EC approach** is **62bps**. We note that the European Commission approach here gives a result that is similar to our domestic bonds approach.

5.5 Debt premium evidence for broadcasting sector

5.5.1 Europe Economics approach

As we noted earlier, the only European broadcasting operator for which we have data (Cellnex) is not an investment-grade rated and therefore its debt premium is not representative of that of an efficient investment grade operator. Therefore, in order to form a view on the debt premium of broadcasting operator we rely primarily on Thomson Reuters Non-financial corporate bond indices. The spread of the two Thompson Reuters indices ranges between 1.04 per cent ("A-class" rated index) and 1.16 per cent ("BBB-class" rated index), with a mid-point of 1.10 per cent. As a cross-check we have also calculated the spreads of the US-based broadcasting comparators 10-year US Government bond benchmark.

The bonds considered for the analysis are summarised below.

Table 5.4: Relevant corporate bonds of broadcasting operators

Issuer	Country of domicile of the issuer	Maturity	Currency	Rating (under S&P rating system)
American Tower	US	15/01/2027	USD	BBB-
American Tower	US	15/01/2027	USD	BBB-
American Tower	US	15/07/2027	USD	BBB-
American Tower	US	15/01/2028	USD	BBB-
American Tower	US	15/03/2029	USD	BBB-
American Tower	US	15/08/2029	USD	BBB-
Crown Castle	US	01/03/2027	USD	BBB-
Crown Castle	US	01/09/2027	USD	BBB-
Crown Castle	US	15/02/2028	USD	BBB-
Crown Castle	US	15/02/2029	USD	BBB-
Crown Castle	US	15/11/2029	USD	BBB-

The spreads are of the bonds listed above are displayed in the following chart.

Figure 5.4: Spreads of US-based broadcasting operators' bonds vs 10-year US government bond (bps)
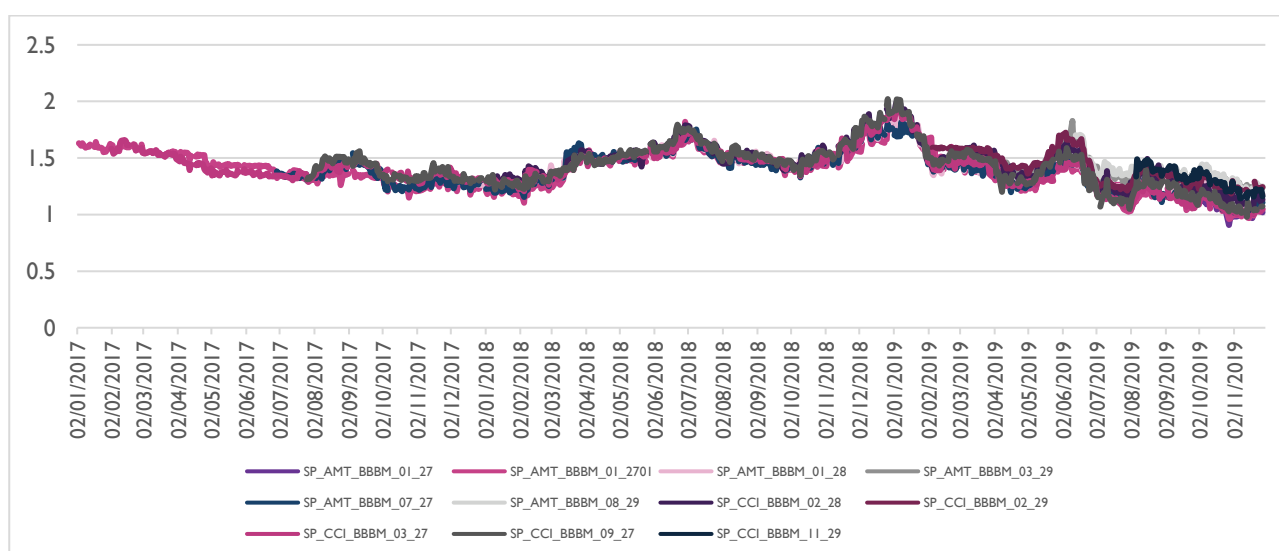
The average spread across all bonds is **113 bps**. This value falls within the debt premium range of Thomson Reuters indices and European Telecom operators (104-116bps) and therefore suggests that the debt premium of an investment-grade broadcasting operator is in line with that of a telecom operator. Therefore, for the broadcasting sector we shall use the same debt premium figures we used for the mobile and fixed line sectors, i.e.:

- A debt premium **range** between **1.04** and **1.16 per cent**
- A **point estimate** debt premium of **1.11 per cent**

5.5.2   European commission's approach

Since for the broadcasting sector there are not corporate bonds eligible for analysis under the European Commission's approach (i.e. there are no investment grade bonds issued by European broadcasting operators), and since our analysis shows that the debt premiums between mobile, fixed line, and broadcasting operators are very similar, we shall use here the same debt premium figure obtained for the mobile and fixed line sector under the EC approach, i.e. **debt premium** of **0.62 per cent**.

5.6   Eircom's actual cost of debt

During 2019, Eircom issued the following bonds.

Table 5.5: Eircom bonds issued in 2019

Issue Date	Maturity	Coupon	Tenor	Yield to Maturity	Amount Issued	10 year equivalent yield*
13-May-19	15-May-26	1.75	7 Years	2.68%	€750m	2.95%
22-Oct-19	01-Nov-24	2.625	5 Years	1.96%	€350m	2.40%
08-Nov-19	15-Feb-27	3.5	7 Years	2.63%	€350m	2.85%

Source: Thomson Reuters; Europe Economics calculations.
Note: *Ten year equivalent yield estimated by adding the differential between the Thomson Reuters 10 YTM and 5/7 YTM BBB indices yields, as of the issuance dates.

That suggests that whilst Eircom's actual nominal cost of new debt was around 3 per cent earlier in 2019, by November it had fallen to around 2.6 per cent.[56]

5.7   Cost of debt recommendation

Our recommendation is based on a range of alternative approaches.

- European Commission approach — under this approach the nominal cost of debt is **1.44 per cent.** This figure is obtained by adding the nominal risk-free rate value of 0.824 per cent (see Section 4.4.1 to the debt premium value of 0.62 per cent (see Section 5.5.2).
- Quasi-all-in cost of debt approach — under this approach the nominal cost of debt for an efficient communications operator is 0.75 per cent. This figure is obtained by adding the recent spot yield of Irish government bonds of 0.065 per cent (see Figure 4.2) to the spread of 0.68 percent obtained by comparator operators versus domestic government bonds (see Table 5.3).
- Debt premium vs national benchmark approach — under this approach the cost of debt is **3.96 per cent**. This figure is obtained by summing our 2014-approach nominal risk-free rate recommendation of

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[56]   2.6 per cent is both the actual unadjusted yield on the most recent bond and also the average adjusted yield of the two most recent bonds.

3.28 per cent (see Section 4.3.1) to the spread of 0.68 percent obtained by comparator operators versus domestic government bonds (see Table 5.3).

- Eircom's actual cost of new debt — As set out above, the (albeit somewhat limited) evidence we have available suggests that Eircom's actual cost of new debt has been around **2.6** per cent for debt issued in 2019.[57]

As noted in earlier sections, during 2019 there was a large fall in nominal bond yields. This greatly increased the difference between results obtained using a 2014-style debt premium approach based on a 2014-style risk-free rate and an approach based on an all-in observation of the actual cost of debt. As discussed above, in our view that change over 2019 was sufficiently large that, understood as a cross-check, the all-in cost of debt approach (which was discussed as a cross-check in our May 2019 report) indicates that the 2014-style debt premium approach provides too high a result to be credible.

On the other hand, a shift in the cost of debt from the 2014 determination and 2014-style approach used at the Consultation all the way to a UKRN-style quasi-all-in cost of debt approach or a EC Notice-style approach would be a large shift in one step. In particular, although the evidence from Eircom's actual cost of debt is that a 2014-style approach is markedly above what Eircom is actually paying (which was less true in 2018), an EC Notice-style approach (or, even more so, a UKRN-style approach) would result in a cost of debt well below what Eircom is actually paying.

Consequently, as we explained in Section 5.2.4, in our view the pragmatically-correct approach on this occasion is to adopt a near-midpoint (technically, just below the mid-point) between the 2014 approach and the EC Notice approach (so, although the quasi-all-in cost of debt features in our range, the EC Notice has more weight in fixing our point recommendation), an approach which produces a result matching Eircom's actual cost of debt (though we are not thereby recommending that future values should always necessarily closely align to Eircom's actual value).

Based on the reasoning above our cost of debt recommendations for the mobile, fixed line and broadcasting sectors are as follows:

- **Mobile sector**: a nominal **cost of debt range** of **0.75-3.96 per cent**, with a **point estimate** of **2.6 per cent**.
- Fixed-line sector: a nominal **cost of debt range** of **0.75-3.96 per cent**, with a **point estimate** of **2.6 per cent**.
- Broadcasting sector: a nominal **cost of debt range** of **0.75-3.96 per cent**, with a **point estimate** of **2.6 per cent**.

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[57] As a matter of comparison, the yields of Thomson Reuters Non-financial index (BBB) at the end of December 2019 is 0.96 per cent, i.e. approximately 165 bps lower than Eircom's actual cost of debt.

6 Overall WACC

Based on the analysis provided in this report the overall WACC for the three sectors are as summarised in the tables below.

Table 6.1: WACC for the mobile sector

	Low	High	Point estimate
Nominal cost of equity (post-tax)	6.83%	7.20%	7.01%
Tax rate	12.50%	12.50%	12.50%
Nominal cost of equity (pre-tax)	7.81%	8.22%	8.02%
Notional gearing	40%	40%	40%
Nominal cost of debt	0.70%	3.90%	2.60%
Nominal WACC (pre-tax)	4.97%	6.49%	5.85%

Table 6.2: WACC for the fixed-line sector

	Low	High	Point estimate
Nominal cost of equity (post-tax)	6.59%	6.75%	6.67%
Tax rate	12.50%	12.50%	12.50%
Nominal cost of equity (pre-tax)	7.53%	7.71%	7.62%
Notional gearing	40%	40%	40%
Nominal cost of debt	0.70%	3.90%	2.60%
Nominal WACC (pre-tax)	4.80%	6.19%	5.61%

Table 6.3: WACC for the broadcasting sector

	Low	High	Point estimate
Nominal cost of equity (post-tax)	5.28%	6.91%	6.22%
Tax rate	12.50%	12.50%	12.50%
Nominal cost of equity (pre-tax)	6.03%	7.90%	7.10%
Notional gearing	25%	25%	25%
Nominal cost of debt	0.70%	3.90%	2.60%
Nominal WACC (pre-tax)	4.70%	6.90%	5.98%

6.1 Approach to annual updating

As per the May Consultation, our understanding is that ComReg intends to conduct an annual update of its view of the cost of capital. Our proposed approach is expressed in terms of an adjustment to be applied to the modified EC Notice approach. Note that this adjustment reflects the other analysis in the report – thus the 2014 approach is implicitly present in updates via the adjustment even though we express the calculation in terms of the modified EC Notice approach. In mechanical terms, the approach is as follows.

- Cost of equity:

  - Mobile: Recalculate according to the (TMR-modified) EC Notice method, then take the 80th percentile of the range and use that as the cost of equity. More specifically, the cost of equity range is based on a TMR range that reflects the DMS TMR estimates for Europe and for Ireland[58]. The 80th percentile is calculated assuming that the cost of equity is uniformly distributed between the lower bound and the upper bound estimates.

  - Fixed line: Recalculate according to the (TMR-modified) EC Notice method, then take the 64th percentile of the range and use that as the cost of equity.

  - Broadcasting: We would use the (TMR-modified) EC Notice risk-free rate and TMR, with the beta calculated under our method. Had we estimated the Broadcasting cost of equity under that method here, we would have obtained a range of 4.68 to 5.80 per cent for the post-tax cost of equity (at 25 per cent gearing). Our point estimate is 6.22. That therefore lies at the 138th percentile of the range (i.e. above the top end by 38 per cent of the range). We would use that percentile value.

- Cost of debt: Recalculate according to the EC Notice method, then apply an "Irish fixed-line premium". The "Irish fixed-line premium" is the difference between our recommended value here, 2.6 per cent, and our estimate of the EC Notice approach value, 1.44 per cent — i.e. 116 basis points.

Finally, for reference, we note that over the past five years, in the case of fixed line, applying this method would have given the following results.

Figure 6.1: Application of the proposed annual update methodology to WACCs for Fixed line for 2015-2019

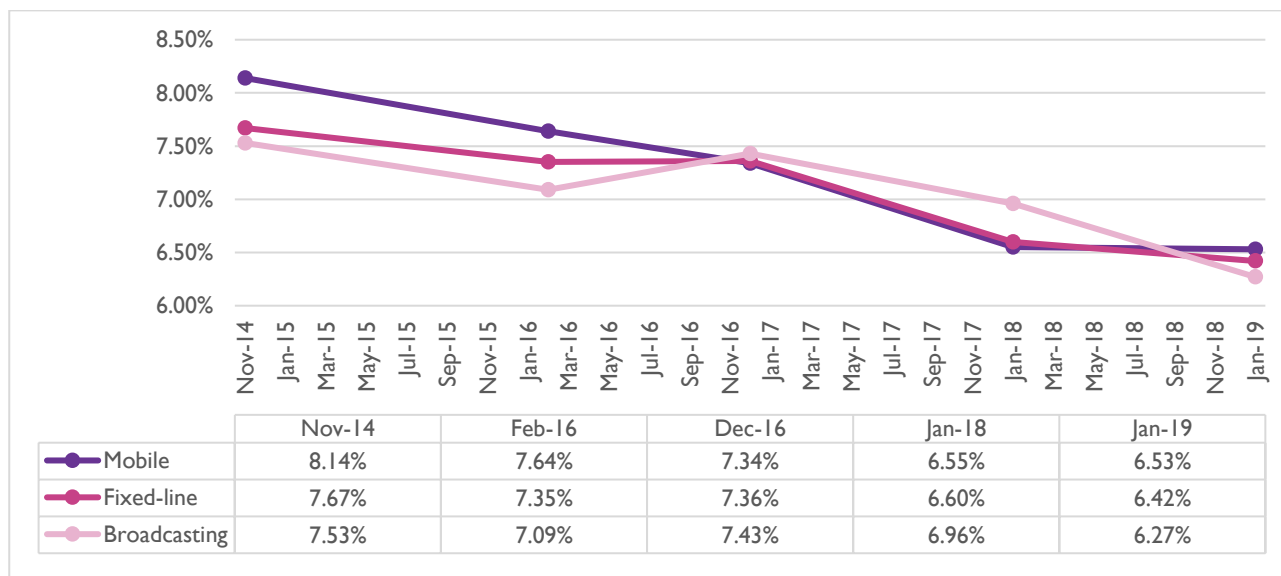|	Dec-15	Dec-16	Dec-17	Dec-18	Nov-19
Nominal cost of equity (pre-tax) - 64% percentile	8.95%	8.85%	8.91%	8.84%	7.62%
Nominal cost of debt (EC approach plus 116 bps)	6.63%	4.68%	3.50%	2.93%	2.60%
Nominal WACC (pre-tax)	8.02%	7.18%	6.74%	6.48%	5.61%
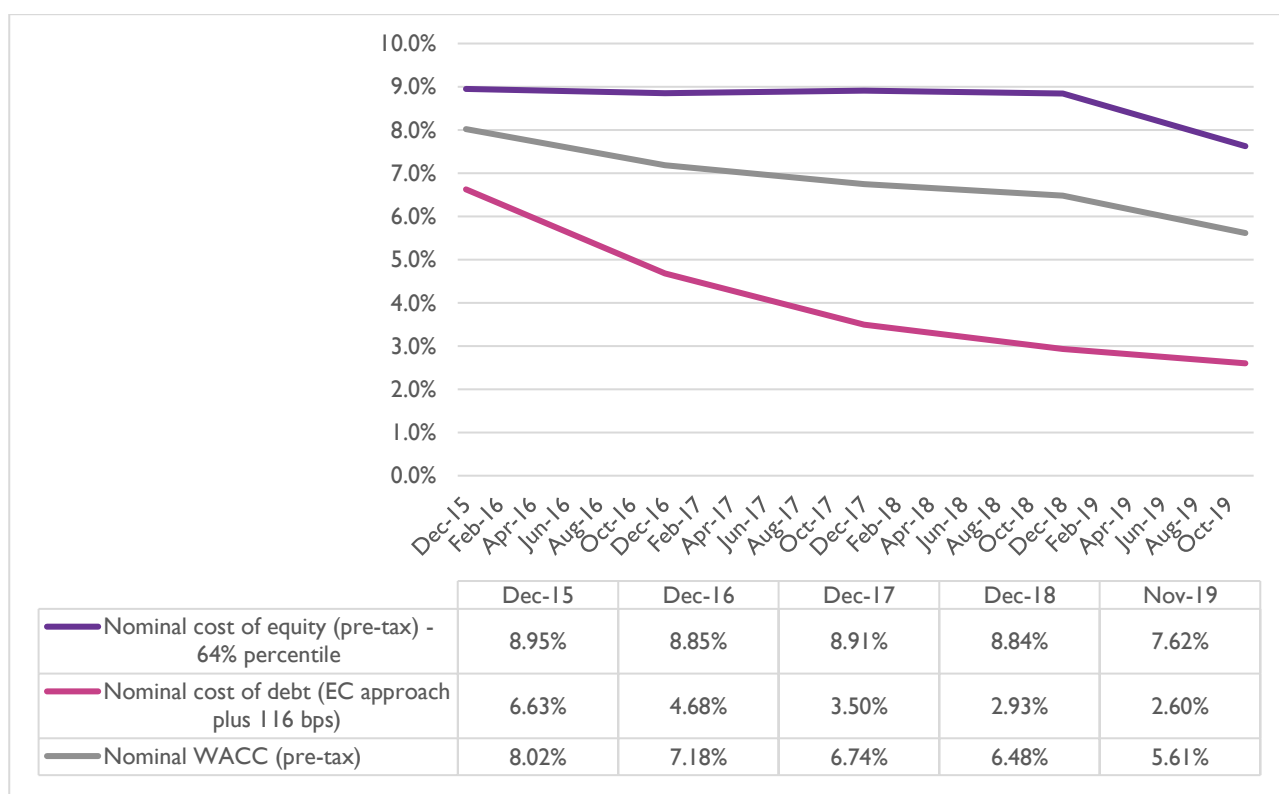
We note that the pre-tax WACC here for "December 2018" — which corresponds to the data window for our May 2019 report — is extremely close to our May 2019 recommendation (6.48 per cent versus 6.42 per

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[58] We would use ipoint estimates for both the (real) risk-free rate and beta.

cent in our May 2019 report. It is of interest to compare the above results with those of our "Evolution of the WACC since 2014" graph from our May 2019 report (Figure 1.1).

Figure 6.2: Chart presented in Figure 1.1 of May 2019 report

	Nov-14	Feb-16	Dec-16	Jan-18	Jan-19
Mobile	8.14%	7.64%	7.34%	6.55%	6.53%
Fixed-line	7.67%	7.35%	7.36%	6.60%	6.42%
Broadcasting	7.53%	7.09%	7.43%	6.96%	6.27%

We see that, relative to the indicative updating method ComReg used previously, the updating method we propose in this report would have produced:

- A marginally higher number in an early 2019 update (6.48 vs 6.42 per cent).
- A marginally higher number in an early 2018 update (6.74 vs 6.60 per cent).
- A marginally lower number in an early 2017 update (7.18 vs 7.36 per cent).
- A materially higher number in an early 2016 update (8.02 versus 7.35 per cent). This last jump is because the modified EC Notice method here would have produced much higher figures during the Eurozone sovereign debt crisis and once one goes back to an end-2015 data window the inputs to the EC Notice method include data back to 2010.

7 Appendix 1: Graphs of Bond Spreads for Individual Telecoms Operators

Figure 7.1: Spreads of telecoms operators' bonds vs 10-year German government bond (bps)[59]

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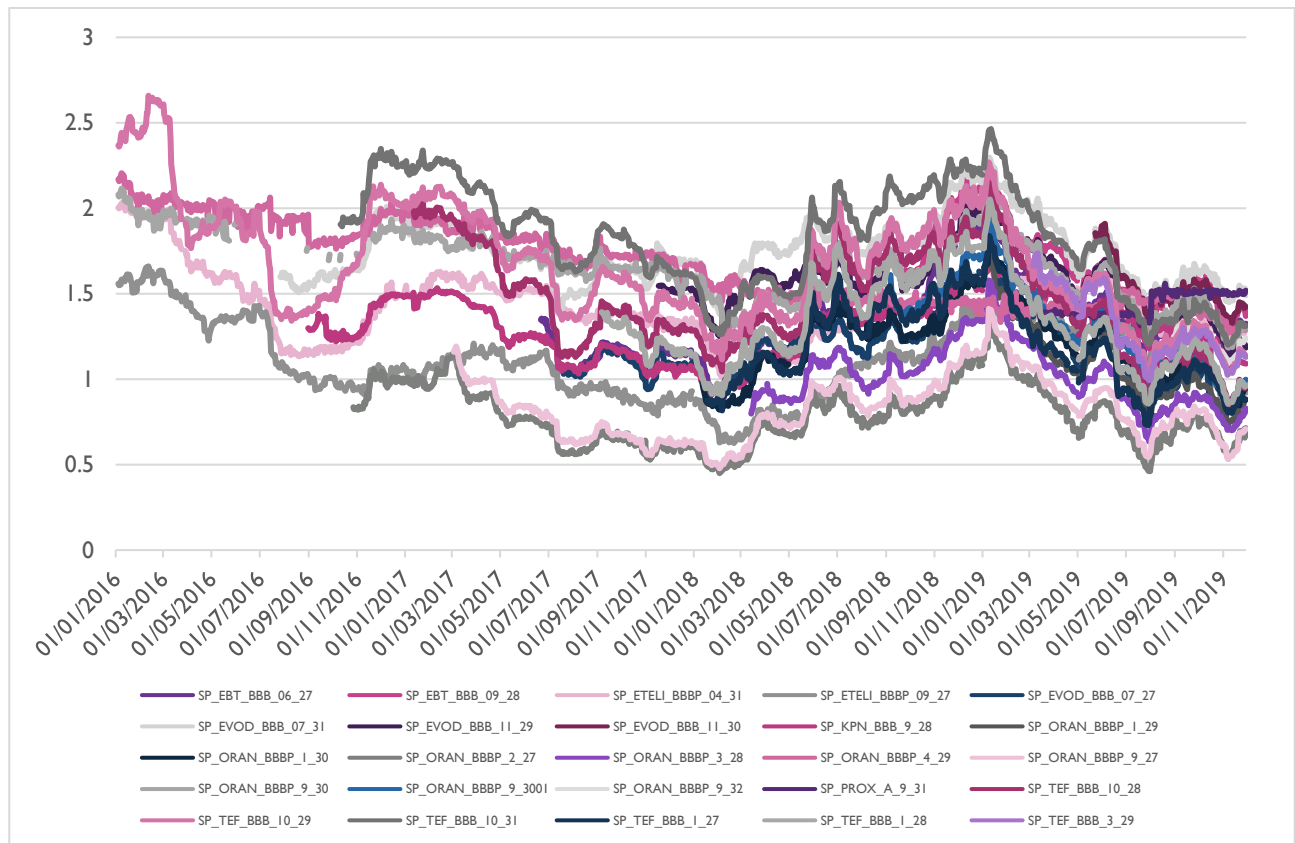
[59] This chart is produced using only bonds of Table 5.1 that are denominated in Euro.

Figure 7.2: Spreads of telecoms operators' bonds vs 10-year domestic government bonds (bps)[60]

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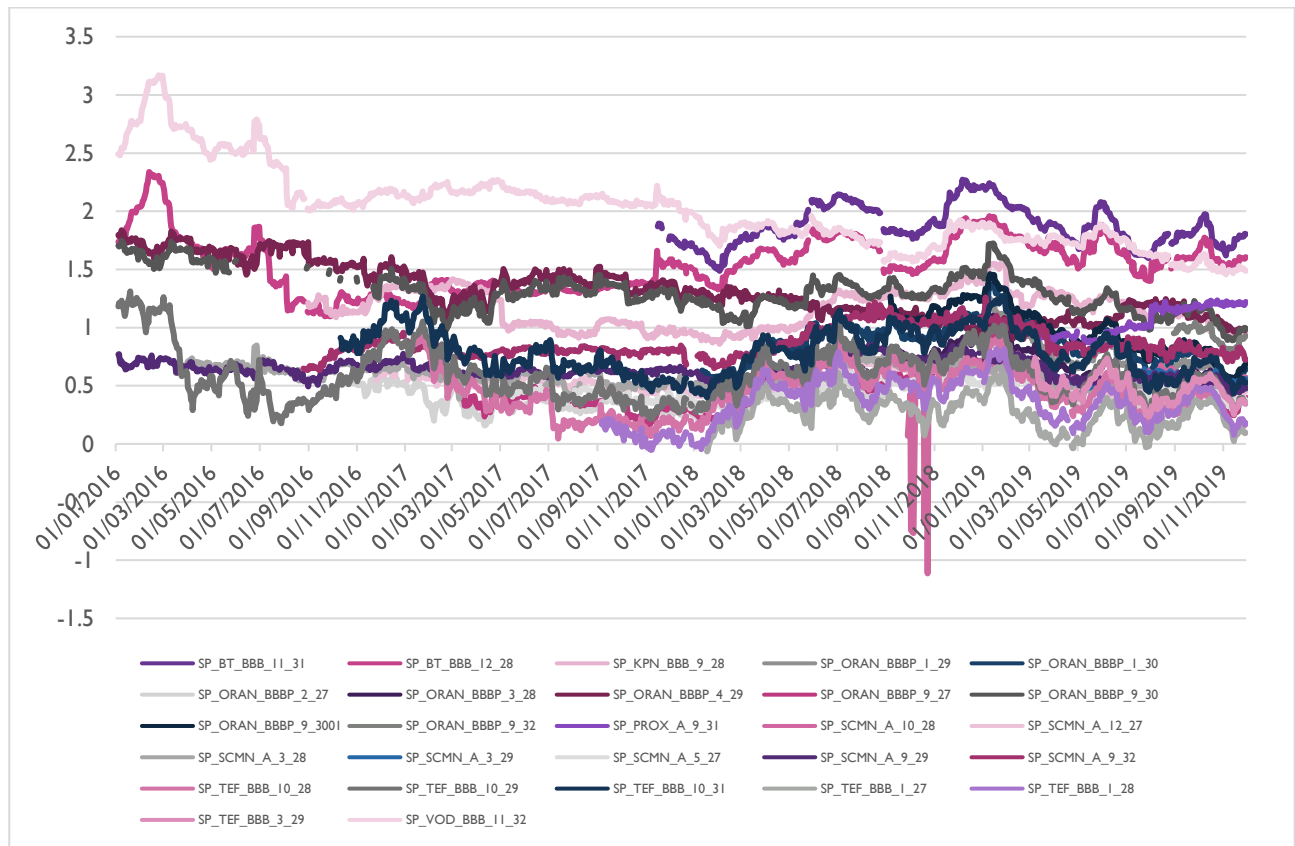
[60] For BT, Swisscom, and Vodafone we used only bonds that are denominated in the domestic currencies (i.e. GBP, CHF) so as to ensure the spreads are calculated on a common currency basis.

8 Appendix 2: Cross-Checks Using a 0.1 Debt Beta

As across-check we compare below the 2-year asset betas under two alternative debt beta assumptions: and bet beta of zero, and a debt beta of 0.1.

Table 8.1: 2-year asset betas for the mobile and fixed-line sector under alternative debt beta scenarios

Company / Sector	2-year asset beta (debt beta = 0)	Market gearing	2-year asset beta (debt beta = 0.1)
BT	0.52	35.5%	0.56
Elisa	0.41	15.0%	0.42
KPN	0.38	36.5%	0.42
NOS	0.42	31.2%	0.45
Orange	0.37	41.4%	0.41
Proximus	0.49	20.6%	0.51
Swisscom	0.48	24.0%	0.50
Telefonica	0.44	50.8%	0.49
Tele2	0.65	19.3%	0.67
Telekom Austria	0.27	38.9%	0.31
Telia	0.48	29.8%	0.51
Vodafone	0.54	36.9%	0.58
Simple average	**0.45**	**31.7%**	**0.48**
Weighted average (mobile)	**0.45**	**32.7%**	**0.48**
Weighted average (fixed line)	**0.44**	**31.9%**	**0.47**
Mobile sector (Method A)	**0.47**	**38.1%**	**0.51**
Fixed-line sector (Method A)	**0.45**	**36.4%**	**0.49**
Mobile sector (Method B)	**0.49**	**41.3%**	**0.53**
Fixed-line sector (Method B)	**0.40**	**36.7%**	**0.44**

Source: Thomson Reuters, and Europe Economics calculation

Table 8.2: 2-year asset betas for broadcasting sector under alternative debt beta scenarios

Company / Sector	2-year asset beta (debt beta = 0)	Market gearing	2-year asset beta (debt beta = 0.1)
American Tower	0.28	20.8%	0.30
Crown Castle	0.30	23.9%	0.32
SBA Communication	0.33	30.9%	0.36
Cellnex	0.45	27.5%	0.48
El Tower (imputed at Nov 2019)	0.52	14.7%	0.53
Simple average	**0.38**	**23.6%**	**0.40**
Average Cellnex & El Tower (imputed)	**0.49**	**21.1%**	**0.51**

Source: Thomson Reuters, and Europe Economics calculation

If we use the same criteria used in Section 4.3.3.3, in order to determine a range and a point estimate, then under the assumption of a 0.1 debt beta, we would obtain the following:

- For the mobile sector: an asset beta range of 0.51-0.53, with a point estimate of 0.52 (the mid-point of the range).
- For the fixed line sector: an asset beta range of 0.44-0.49, with a point estimate of 0.465 (the mid-point of the range).
- For the broadcasting sector: an asset beta range of 0.40-0.51, with a point estimate of 0.48 (i.e. the Cellnex beta).

9 Appendix 3: Corporate bonds used for implementing the EC debt premium methodology

In the table below we report the entire universe of corporate bonds that we have been considered in order to implement the debt premium methodology of the European Commission. Note that some of the bonds listed below do not have a residual maturity between 7 and 13 years in any of the last five years and therefore have not been included to calculate the spreads.

Table 9.1: Corporate bonds considered for implementing the EC debt premium methodology

Company	Maturity date	Currency	Rating (under S&P rating system)
BT	26/03/2020	British Pound	BBB
BT	25/04/2025	British Pound	BBB
BT	07/12/2028	British Pound	BBB
BT	21/11/2031	British Pound	BBB
BT	25/06/2033	British Pound	BBB
BT	25/06/2033	British Pound	BBB
BT	23/06/2037	British Pound	BBB
BT	25/06/2039	British Pound	BBB
BT	25/06/2039	British Pound	BBB
BT	25/06/2042	British Pound	BBB
BT	25/06/2042	British Pound	BBB
BT	21/11/2047	British Pound	BBB
BT	21/09/2020	Euro	BBB
BT	01/02/2021	Euro	BBB
KPN	04/10/2021	Euro	BBB
KPN	01/03/2022	Euro	BBB
KPN	30/09/2024	Euro	BBB
KPN	09/04/2025	Euro	BBB
KPN	11/09/2028	Euro	BBB
Orange	10/02/2020	Euro	BBB+
Orange	09/04/2020	Euro	BBB+
Orange	14/01/2021	Euro	BBB+

Orange	15/01/2022	Euro	BBB+
Orange	15/06/2022	Euro	BBB+
Orange	16/09/2022	Euro	BBB+
Orange	01/03/2023	Euro	BBB+
Orange	11/09/2023	Euro	BBB+
Orange	09/01/2024	Euro	BBB+
Orange	15/07/2024	Euro	BBB+
Orange	12/05/2025	Euro	BBB+
Orange	12/09/2025	Euro	BBB+
Orange	04/09/2026	Euro	BBB+
Orange	03/02/2027	Euro	BBB+
Orange	09/09/2027	Euro	BBB+
Orange	20/03/2028	Euro	BBB+
Orange	15/01/2029	Euro	BBB+
Orange	11/04/2029	Euro	BBB+
Orange	16/01/2030	Euro	BBB+
Orange	12/09/2030	Euro	BBB+
Orange	17/09/2030	Euro	BBB+
Orange	04/09/2032	Euro	BBB+
Orange	28/01/2033	Euro	BBB+
Orange	30/09/2033	Euro	BBB+
Orange	11/07/2034	Euro	BBB+
Orange	04/09/2049	Euro	BBB+
Proximus	22/03/2022	Euro	A
Proximus	04/04/2024	Euro	A
Proximus	01/10/2025	Euro	A
Proximus	08/09/2031	Euro	A
Swisscom	31/08/2022	Swiss Franc	A
Swisscom	17/04/2023	Swiss Franc	A
Swisscom	10/07/2024	Swiss Franc	A
Swisscom	14/07/2026	Swiss Franc	A
Swisscom	31/05/2027	Swiss Franc	A
Swisscom	15/12/2027	Swiss Franc	A
Swisscom	31/03/2028	Swiss Franc	A
Swisscom	12/10/2028	Swiss Franc	A

Swisscom	15/03/2029	Swiss Franc	A
Swisscom	28/09/2029	Swiss Franc	A
Swisscom	15/09/2032	Swiss Franc	A
Swisscom	24/11/2033	Swiss Franc	A
Swisscom	24/11/2033	Swiss Franc	A
Swisscom	17/04/2035	Swiss Franc	A
Swisscom	30/08/2044	Swiss Franc	A
Telia Company AB	08/11/2023	Swedish Krona	BBB+
Telia Company AB	08/12/2034	Swedish Krona	BBB+
Vodafone	26/11/2032	British Pound	BBB
Vodafone	08/08/2049	British Pound	BBB
Vodafone	12/08/2056	British Pound	BBB
Telefonica	17-Oct-2020	Euro	BBB
Telefonica	10-Feb-2021	Euro	BBB
Telefonica	26-Mar-2021	Euro	BBB
Telefonica	14-Sep-2021	Euro	BBB
Telefonica	13-Apr-2022	Euro	BBB
Telefonica	27-May-2022	Euro	BBB
Telefonica	23-Jan-2023	Euro	BBB
Telefonica	05-Feb-2024	Euro	BBB
Telefonica	17-Jan-2025	Euro	BBB
Telefonica	05-Jul-2025	Euro	BBB
Telefonica	13-Apr-2026	Euro	BBB
Telefonica	22-Jan-2027	Euro	BBB
Telefonica	12-Jan-2028	Euro	BBB
Telefonica	17-Oct-2028	Euro	BBB
Telefonica	12-Mar-2029	Euro	BBB
Telefonica	17-Oct-2029	Euro	BBB
Telefonica	17-Oct-2031	Euro	BBB
Telefonica	14-Feb-2033	Euro	BBB
Telefonica	01-Jul-2039	Euro	BBB