# Mid-Term WACC for EirGrid and ESB Network

August 2013

# Contents

# 1   Objectives and Basis of Review

## 1.1   The 2010 Determination

Europe Economics advised the CER on the WACC during the last price review for electricity transmission and distribution networks in Ireland.  Based on market data up to the data cut-off point of February 2010, Europe Economics' range estimate of the WACC was 3.2 to 5.6 per cent.  The Europe Economics point estimate of the market cost of capital (on a real, pre-tax basis) was 4.6 per cent.  The recommended regulatory WACC was somewhat higher at 5.0 per cent, drawn from a range of 4.8-5.2, deliberately "aiming up" to reflect the asymmetry of consequences for consumers if the WACC is set too low rather than too high.  The degree of aiming up proposed was less than in then-recent comparator regulatory decisions (e.g. the UK Ofwat's PR09 review for the water sector) because market conditions in late 2009 and early 2010 (the data window) had calmed markedly from those in late 2008 and earlier in 2009.  The CER consulted on a WACC figure of 5.0 per cent in August 2010.

**Table 1.1: Europe Economics estimates and recommendation of the WACC for ESB and EirGrid, based on data to the end of February 2010**

|  | Low | High | Point estimate | Recommended value |
|---|---|---|---|---|
| **Cost of equity** | | | | |
| Risk-free rate | 1.6 | 2.2 | 2.0 | |
| Equity risk premium | 4.5 | 5.4 | 5.2 | |
| Asset beta | 0.2 | 0.4 | 0.3 | |
| Equity beta | 0.4 | 1.0 | 0.67 | |
| Post-tax cost of equity | 3.4 | 7.6 | 5.5 | |
| Pre-tax cost of equity | 3.9 | 8.7 | 6.2 | |
| **Cost of debt** | | | | |
| Debt premium | 1.0 | 1.4 | 1.2 | |
| Pre-tax cost of debt | 2.6 | 3.6 | 3.2 | |
| Post-tax cost of debt | 2.3 | 3.2 | 2.8 | |
| **WACC** | | | | |
| Notional gearing (%) | 50 | 60 | 55 | |
| Corporation tax rate (%) | 12.5 | 12.5 | 12.5 | |
| Post-tax WACC | 2.8 | 4.9 | 4.0 | |
| Vanilla WACC | 3.0 | 5.2 | 4.2 | |
| Pre-tax WACC | 3.2 | 5.6 | 4.6 | 5.0 (Range 4.8-5.2) |

As set out in the CER's final decision paper of November 2010, there were very significant market developments in Ireland following the Europe Economics data cut-off point of February 2010 due to the rapid worsening of the Irish sovereign debt crisis during that period.

**Figure 1-1: Irish Bond Yields, 2008-2010**



Source: Bloomberg, EE calculation

Hence, by the time that the CER made its final determination in November 2010, the figure of 5.0 based on market data up to the end of February 2010 no longer seemed to the CER to be appropriate. Instead, the CER allowed a real, pre-tax WACC of 5.95 per cent for both Eirgrid and ESB in its final determination.[1]
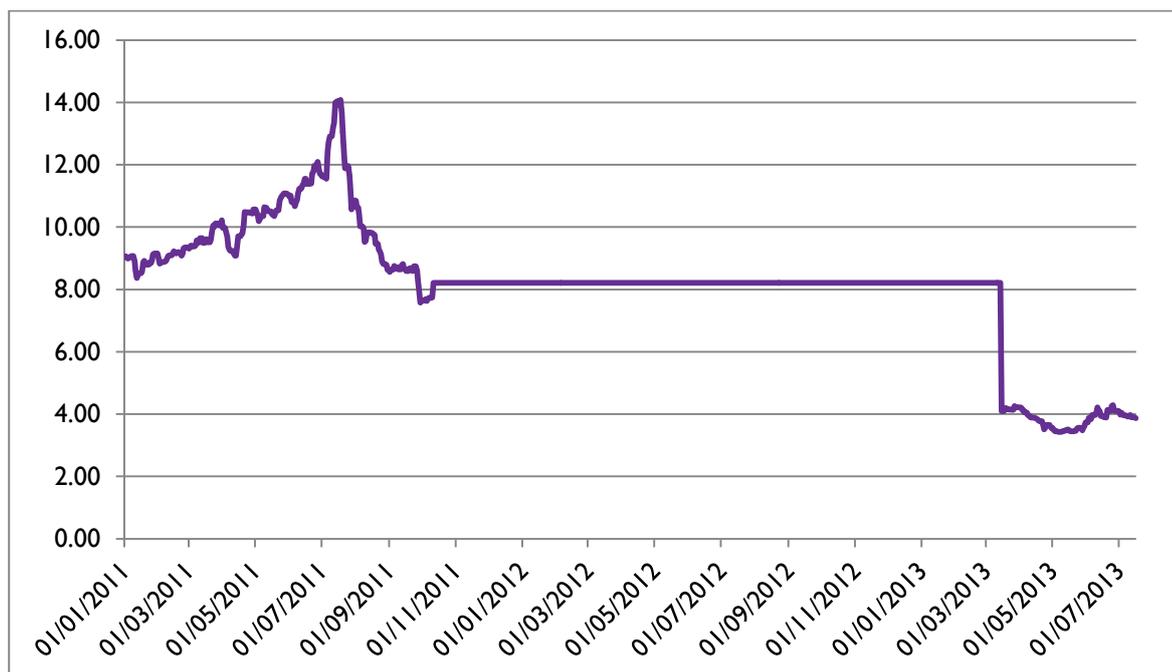
## 1.2   The Trigger Mechanism

In view of the considerable uncertainty over the WACC at the time of the determination, the CER stated that this could be adjusted (in either direction) if conditions had changed by the midterm of the review period. More specifically, the CER stated:

> "This increase to return on capital is the most significant departure from the consultation paper that the CER has made to the allowable revenue for the DSO. The increase in the WACC reflects the increased costs that are faced by the DSO to finance its business. This may be a temporary issue and if there is a significant change in circumstances, the CER would propose to review, at the midterm of the review period, the level of WACC to see if an adjustment is required for the remaining period of the Price Review. An adjustment, if required, could be an increase or a decrease depending on how circumstances have changed."

Since the Irish government recommenced issuing bonds in March 2013, Irish yields have returned to more normal levels — indeed to levels below those pertaining at the time of the 2010 data window — as illustrated below.

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[1] We note that, according to CEPA's submission to this mid-term WACC review, the underlying final determination for ESB should be interpreted as 5.75 per cent, but uplifted by 0.20 per cent based on an Opex allowance swap — CEPA, 2013, *Mid-Term WACC Review EirGrid* p2-3

**Figure 1-2: Irish Bond Yields, 2011-2013**



Source: Bloomberg

This near-normalisation of government bond yields was interpreted as a change in circumstances, and the mechanism was therefore triggered.

## 1.3 Scope and Nature of the Mid-Term Review

The 2010 determination was made in the context of significant economic volatility, which created particular uncertainty over the components used to estimate the WACC. CER raised its determined cost of capital markedly above the figure it had initially consulted on. This was done, necessarily, in the absence of a decisive evidence base upon which to determine the extent to which conditions merited such an increase. At the time, it was argued by some parties that the elevation was too high, and by others that it was too low. Moreover, the economic outlook from the 2010 determination was also uncertain. The purpose of the mid-term review was therefore to allow either an increase in the cost of capital if it became clear that it was insufficiently high, or a decrease if economic conditions ameliorated significantly.

We understand that the proper objective of the review is therefore to consider whether a WACC of 5.95 per cent remains an appropriate figure for the entire control period and, if it is not, to propose a new WACC figure for the remainder of the period (2014 and 2015). An alternative approach would have been to introduce a quasi-indexation mechanism with the WACC updated each year.[2] In that case, there would be a series of newly-updated forward-looking WACC estimates for each year of the control. Our understanding is that the mid-term review trigger mechanism is *not* a quasi-indexation mechanism, but rather a review of the appropriateness of the WACC for the period as a whole.

Given that it was the evolution of macroeconomic disturbances that drove both the introduction of the trigger mechanism and the inception of the mid-term review, the asset beta is not the primary focus of our attention. That is not to say that, given evidence of a demonstrable change in asset beta or compelling evidence that the asset beta determined in 2010 was wrong, we would not recommend a change in asset beta for the review. But it does imply that we believe it appropriate to have a presumption in favour of

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[2]    We note that this was the approach the CER adopted in respect of its 2012 BGN determination.

retaining the 0.3 asset beta from the previous determination rather than a reconsideration of that figure from scratch. An example of a change that would not induce us to recommend altering the asset beta for this mid-term review purpose would be a modest downward or upward trend, since 2010, in asset betas determined by regulators for companies in related industries.

Bearing in mind the nature of the trigger and our understanding of the purpose of the review, in the next section we will consider the cost of capital over two separate periods. In Chapter 2 we will consider the cost of capital from 2011 to 2013, and in Chapter 3 we will determine the appropriate cost of capital over the course of 2014 to 2015.

# 2   The WACC from 2011 to 2013

## 2.1   Introduction

This section sets out our estimates of the WACC from 2011 to 2013. Given the way in which economic conditions have developed, with macroeconomic conditions calming by 2013, we have estimated separate costs of capital for the periods 2011-2012 and the first half of 2013.

## 2.2   The Purpose of Estimating a Regulatory WACC

In this mid-term review it will be particularly important to bear in mind what a regulatory WACC is and its regulatory purpose. A regulatory WACC is fundamentally an economic concept, not a financial concept or even an investment concept. The regulatory WACC is a building block in determining a regulated price cap. Regulatory price capping is intended to simulate the constraints upon pricing freedom that would be experienced by the regulated entity if it operated in a competitive or contestable market — i.e. price caps provide precisely those constraints upon pricing the absence of which is the rationale for the existence of regulatory intervention.

In the construction of that regulatory price, the WACC serves, in combination with the regulatory asset value and depreciation, two key economic roles:

- It simulates a notional user cost of assets. If the machines and infrastructure and other fixed assets in the regulatory asset base had been rented, instead of purchased, those rental costs would have appeared as operating expenditure. Since they are owned that user cost appears as a cost of ownership, via the WACC, RAV and depreciation.
- It covers the "normal profit" that a firm would make in a competitive environment, as a return to entrepreneurship.

In competitive markets the profits firms make are not constant each period. Indeed, in many industries profits vary, from period to period, by more than prices. A firm will not automatically exit a market because it makes losses in one period if it expects to make higher profits in some later periods. Neither will market prices necessarily rise just because firms expect to make losses in one period.

Thus, although the costs of raising debt and equity in financial markets at any one point in time are important information in determining a regulatory WACC, even if they could be perfectly observed they would not define the regulatory WACC. To repeat: the regulatory WACC is fundamentally an economic concept — part of the proxy for the user cost of assets and the return to entrepreneurship in a competitive market, as a building block in estimating/proxying competitive or contestable market prices — not a financing or investment concept.

Under certain conditions, financial markets can exhibit considerable volatility, even if they are working efficiently. That volatility might (and under some conditions will) imply that the costs of investing on specific days or weeks months may exceed the volatility that there would be in competitive or contestable market prices over those periods.

Hence, the question of whether a regulatorily-determined WACC was (even with the benefit of hindsight) "too high" or "too low" over some period is not, by definition, the same as the question of whether the cost of investing over that period was higher or lower than the regulatorily-determined WACC number. It is perfectly plausible, for example, that in that period in a competitive market firms might have made losses or made profits well above the normal level and yet continued to operate and compete.

These points are especially relevant in a consideration of the period 2011-2013 in Ireland, for some of that period overlapped with a very serious period of recession for the Irish economy, in which many competitive firms made significant losses, including many firms that did not exit their respective markets.

On the other hand, it should also be borne in mind that in a truly competitive market, as well as periods in which firms make losses, there are periods in which they make high profits, stimulating new entry. The process of price capping means that regulated entities have less scope for participating in such upside risk — though they will have some, especially to the extent that they can respond to higher demand by expanding volumes.

## 2.3 Risk-Free Rate

Our Technical Report sets out our approach to estimating the risk-free rate. From the literature reviewed and the analysis conducted therein, we conclude that the German 10-year bond currently represents the closest proxy for the risk-free rate relevant to Ireland, given that Ireland is part of the Eurozone and the EU's Single Capital Market.

Over the last two years, the German 10-year bond:

- has maintained its AAA credit rating;
- has the lowest yield and standard deviation compared to a group of other potential candidate risk-free rate benchmarks (French, Dutch, and Finnish bonds).

The figure below shows nominal ten year German bond yields for 2011 to 2013.

**Figure 2-1: German 10-year bond yields, 2011-2013**
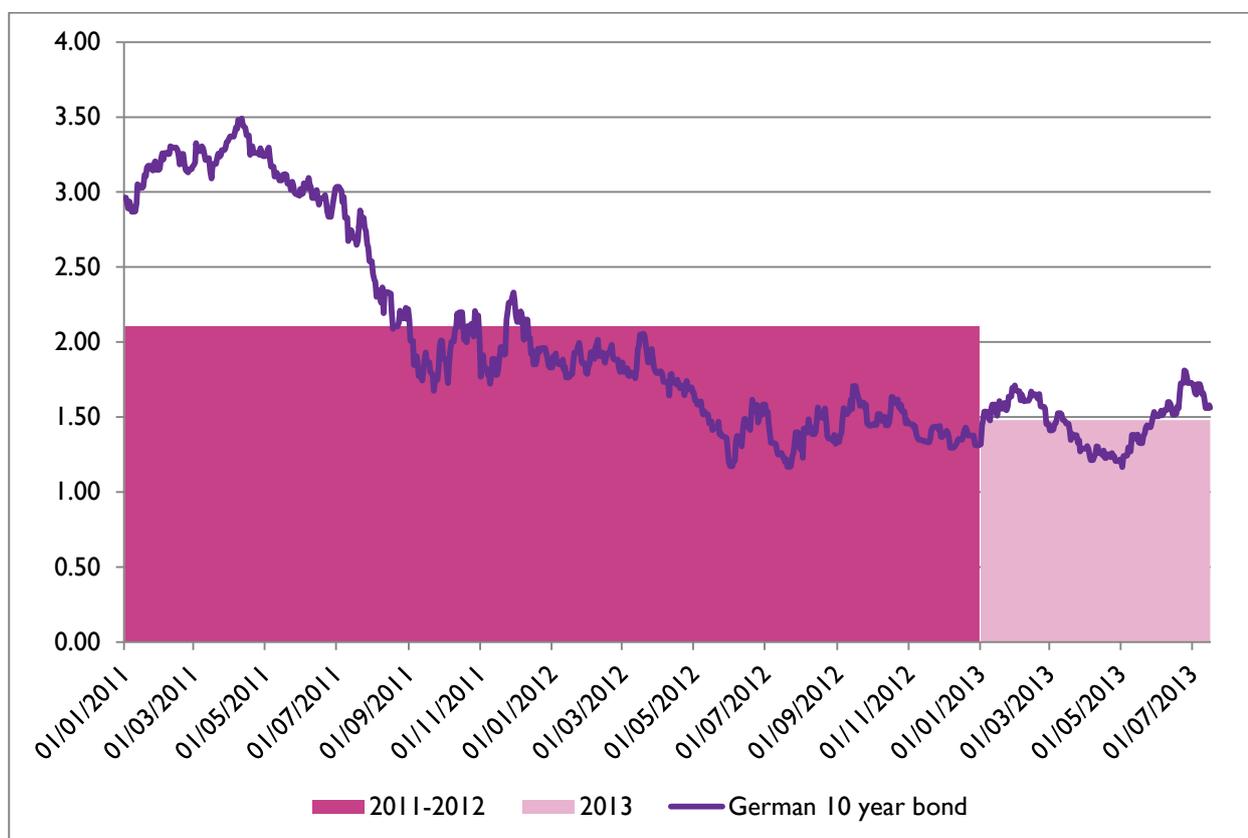


Source: Bloomberg

Bond yields began in the region of three per cent in early 2011, and fell to around 1.5 per cent by mid 2013. Over the period 2011-2012 yields averaged 2.1 per cent, while in 2013 they averaged 1.5 per cent.

Adjusting these figures for Eurozone inflation, this suggests real yields of -0.6 per cent in 2011-2012 and -0.5 per cent in 2013.[3] These figures are clearly implausibly low as estimates for the risk-free rate, and may reflect factors such as:

- A poor medium-term growth outlook for the Eurozone area.
- Downwards distortions to yields deliberately induced, as a matter of policy, by quantitative easing programmes across western economies (though not in the Eurozone itself), and the announcement of the Outright Monetary Transaction (OMT) programme by the ECB.
- Further distortions on German yields due to speculative behaviour or safe-haven effects (this argument is illustrated in more details in section 4.1 of the Technical Report).

Given that we cannot rely upon the methods for estimating the risk-free rate that were standard prior to 2008 (i.e. use of an inflation-adjusted government bond benchmark yield), we require other ways of determining this. One source of evidence comes from regulatory experiences in other countries. In the UK, real gilt rates have also been negative during the period since 2011. However, regulators have set risk-free rates that are reduced but still considerably in excess of gilt yields.[4]

**Table 2.1: UK risk-free rate precedents, 2011-2012**

| Authority | Year | Sector/company | RFR % |
|---|---|---|---|
| Ofgem | 2012 | Gas & electricity transmission, gas distribution | 2.00 |
| Ofcom | 2012 | ISDN | 1.40 |
| Ofgem | 2011 | Transmission (rollover) | 2.00 |
| Ofcom | 2011 | Openreach | 1.40 |
| Ofcom | 2011 | Mobile call termination | 1.50 |

These precedents suggest real risk-free rate ranges of 1.4-2.0 per cent for both 2011-2012 and 2013.

We can also gain some insights on the risk-free rate from longer term evidence on German bond yields. These are shown for the years 2000 to 2013 in the table below. The table reports also the annual inflation rates for the Eurozone and the implied real yield.[5]

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[3] We note that the number for 2011 to 2012 differs from the individual numbers for each of the years 2011 and 2012 which are presented in table 2.2. This is because the average figure for each individual year is not necessarily the same as the average across both years.

[4] We note that in its submission on behalf of Eirgrid, CEPA contends that the setting of risk-free rates above government bond benchmarks constitutes "headroom" to reflect market uncertainty, and that, therefore, the risk-free rate assumption used in Ireland should be above the Irish government bond yield. In our view this mis-states the position. Regulatory risk-free rates have not been set with "headroom". Rather, regulators have come to the view that domestic government bond yields are only a poor proxy for the risk-free rate and so have (correctly) not chosen to determine risk-free rates in line with government bond yields. In some countries (e.g. the UK) that has implied risk-free rates above the government bond yield (reflecting deliberate policy-induced downwards distortions in gilt yields). In other countries (e.g. Ireland, Portugal) that same principle will, at times, have implies risk-free rates below the domestic government bond yield (reflecting the fact that government bond yields reflected default risk and so were by definition not risk-free).

[5] The real yield is calculated using Fisher's formula: (1+nominal yield) = (1+real yield)*(1+inflation rate).

**Table 2.2: Spot rate nominal yield and historic average yield (nominal and real) on German 10-year bonds**

| Year | Nominal yield | Inflation | Real yield |
|---|---|---|---|
| Spot rate (16/07/2013) | 1.56 | 1.6 | -0.02 |
| Average rate 2000 | 5.26 | 2.2 | 2.99 |
| Average rate 2001 | 4.81 | 2.4 | 2.35 |
| Average rate 2002 | 4.79 | 2.3 | 2.43 |
| Average rate 2003 | 4.01 | 2.1 | 1.87 |
| Average rate 2004 | 4.01 | 2.2 | 1.77 |
| Average rate 2005 | 3.38 | 2.2 | 1.15 |
| Average rate 2006 | 3.78 | 2.2 | 1.55 |
| Average rate 2007 | 4.23 | 2.1 | 2.09 |
| Average rate 2008 | 4.00 | 3.3 | 0.68 |
| Average rate 2009 | 3.27 | 0.3 | 2.96 |
| Average rate 2010 | 2.78 | 1.6 | 1.16 |
| Average rate 2011 | 2.65 | 2.7 | -0.05 |
| Average rate 2012 | 1.56 | 2.5 | -0.92 |
| Average rate 2013 | 1.48 | 1.6 | -0.05 |
| Average (2000-2013), plus spot rate | | | 1.43 |
| Average (2000-2007) | | | 2.03 |

Source; Bloomberg, Eurostat, and EE calculations

For the pre-crisis years to 2007, average real yields were 2.0 per cent, while in the period before the announcement of the Outright Monetary Transactions (OMT) (i.e. from 2000 to 2011), average real yields were 1.8 per cent.

In sum, this evidence suggests a risk-free rate range of **1.4-2.0** for both 2011-2012 and 2013.

## 2.4 Equity Risk Premium

Historical risk premia can be calculated using data on equity market returns and returns on government debt. Dimson *et al* (2002) sought to address the fact that many of the long-run empirical studies on the equity risk premium had been based on the experience of the US only.[6] Dimson *et al* argued that, given how successful the US economy had been, the US risk premium was unlikely to be representative, so extended the evidence on the equity risk premium by examining data on bond and bill returns in 16 countries over a 102 year period (1900-2002). Their results showed that the equity risk premium has typically been lower than previous research had suggested. Their results are shown in the table below.

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[6] Dimson, Elroy, Marsh, Paul and Staunton, Mike (2002) "Global evidence on the equity risk premium" London: London Business School.

**Table 2.3: ERP estimates and volatility levels 1900-2010**

|  | Geometric mean | Arithmetic mean | Standard error |
|---|---|---|---|
| Belgium | 2.6 | 4.9 | 2.0 |
| France | 3.2 | 5.6 | 2.2 |
| Germany | 5.4 | 8.8 | 2.7 |
| **Ireland** | **2.9** | **4.9** | **1.9** |
| Italy | 3.7 | 7.2 | 2.8 |
| Netherlands | 3.5 | 5.8 | 2.1 |
| Spain | 2.3 | 4.3 | 2.0 |
| UK | 3.9 | 5.2 | 1.6 |
| USA | 4.4 | 6.4 | 1.9 |
| **Europe** | **3.9** | **5.2** | **1.6** |
| **World** | **3.8** | **5.0** | **1.5** |

Source: Dimson et al. (2011)

This evidence therefore suggests an arithmetic mean ERP of 4.9 per cent and a geometric mean of 2.9 per cent.

The standard view is that the ERP for price cap regulation should be based on arithmetic returns. This is because what is relevant for the cost of capital is the rate of return on the marginal unit of capital, which is what the arithmetic mean captures. There would be a case for the use of geometric means if there were mean reversion in the ERP, as the geometric mean captures this underlying process. However, the weight of academic evidence suggests that markets in developed economies are weakly efficient over any significant timescale, so that returns do not exhibit mean reversion. For this reason, our preference is to use the arithmetic mean. The most appropriate ERP estimates are the Irish estimate itself and the Europe estimate. This gives an ERP range of **4.9** to **5.2** per cent, which we use as our estimate for 2013.

Given that the period of 2011 to 2012 was one in which the sovereign debt crisis continued for some portion of the period, it is likely that the equity risk premium was elevated, as found in empirical studies of the ERP in times of recession[7] and reflected in UK regulatory precedents.[8]

We therefore apply an elevation of 20 per cent to the long run ERP estimates. This produces an ERP range of **5.9** to **6.2** per cent for 2011-2012.

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[7]  For example:

- Evidence reported in B. De Paoli and P. Zabczyk (2009) "Why do risk premia vary over time? A theoretical investigation under habit formation" suggests that the size of this risk premium depends on whether the economy is in a period of stagnation or prosperity. In particular, investors seem to require higher premia during economic slowdowns than during booms. This empirical regularity has been termed "premium counter-cyclicality".
- Harvey (1989) showed that US equity risk premia are higher at business cycle troughs than they are at peaks.
- Subsequent results of Bekaert and Harvey (1995), He, Kan, Ng and Zhang (1996) and Li (2001) confirmed these findings.
- Cochrane and Piazessi (2005) find that the term premium is countercyclical in the United States (elevated almost 20 per cent in periods of crisis, coming back to its previous "normal level" three years after the end of the recession, on average)
- Lustig and Verdelhan (2007) document strong countercyclicality in the exchange rate risk premium.
- The two most popular asset pricing models attribute this variation either to countercyclical changes in risk aversion (Campbell and Cochrane (1999)) or to changes in the volatility of the consumption process (Bansal and Yaron (2004))

[8] For example, the PR09 Ofwat determination and the 2010 NATS determination.

## 2.5  Asset Beta

With a lack of direct market data on the regulated entities of question, and absent any strong qualitative evidential basis to support an increase in the asset beta since 2010.

Furthermore, we do not believe that for the purposes of this mid-term view, we have any evidential basis for deviating materially from an assumption of similar asset betas for EirGrid and ESBN.

Hence, we are of the view that the same asset beta figure set out in the previous determination (i.e. 0.3), remains appropriate.[9]  At 55 per cent gearing, this implies an equity beta of **0.67** for both 2011-2012 and 2013 — applying to both entities.

We would recommend that this figure be reviewed in more detail at the next full review, including the question of the relative asset betas of EirGrid and ESBN.

## 2.6  Debt Premium

An assessment of the appropriate target credit rating for the regulated entities is beyond the scope of the current report, but this is a question that the CER may wish to consider in the upcoming price control review.

In PR3, the assumed credit rating for ESB and EirGrid was A.  In the extraordinary market conditions that Ireland was exposed to after the 2010 determination, some utilities in Ireland were subject to a number of credit downgrading and changes in outlooks.  For example, on 26/11/2010, BGN was downgraded by Standard & Poor's from A- to BBB+.  ESB was first rated by Standard & Poor's on 27/01/2011 and has maintained its BBB+ rating since then.  The evolution of credit ratings and outlook watch for ES and BGN, as is provided by Standard & Poor's is provided below.

**Table 2.4:  Evolution of credit ratings and outlook watch by S&P's**

| Company | Date | Change in credit rating (S&P's) | Outlook watch (S&P's) |
|---------|------|--------------------------------|-----------------------|
| BG | 17/01/2012 | BBB+ | Stable |
| BG | 08/12/2011 | BBB+ | Negative |
| BG | 04/04/2011 | BBB+ | Stable |
| BG | 26/11/2010 | BBB+ | Negative |
| BG | 08/12/2009 | A- | Stable |
| BG | 14/05/2009 | A | Stable |
| BG | 24/04/2008 | A+ | Stable |
| BG | 15/06/2007 | A | Stable |
| BG | 08/07/2002 | A- | Stable |
| ESB | 17/01/2012 | BBB+ | Stable |
| ESB | 08/12/2011 | BBB+ | Negative |
| ESB | 04/04/2011 | BBB+ | Stable |
| ESB | 27/01/2011 | BBB+ | Negative |

Source:  Bloomberg

BGN and ESBN have recently succeeded in issuing bonds with an investment grade rating (i.e. BBB+) which is broadly consistent with that observed across the bond of other Eurozone comparator utilities. Given that the companies are able to raise new debt at present, our working assumption is not to target a

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[9] We also note that this is a conservative assumption because, based on comparators evidence exhibited in Technical Report, any change in asset beta to be considered would more likely be a decrease rather than an increase.

particular rating, but to assume that any change in WACC should not be such that it induces a fall in credit ratings from current levels. We also retain the 55 per cent notional gearing assumption in the remainder of the analysis.

The following chart displays the spread (over the benchmark German bond assigned by Bloomberg) of corporate bonds for Irish electricity and gas utilities.

**Figure 2-2: Spread of Irish utilities' bond (bps) over the German benchmark bond**
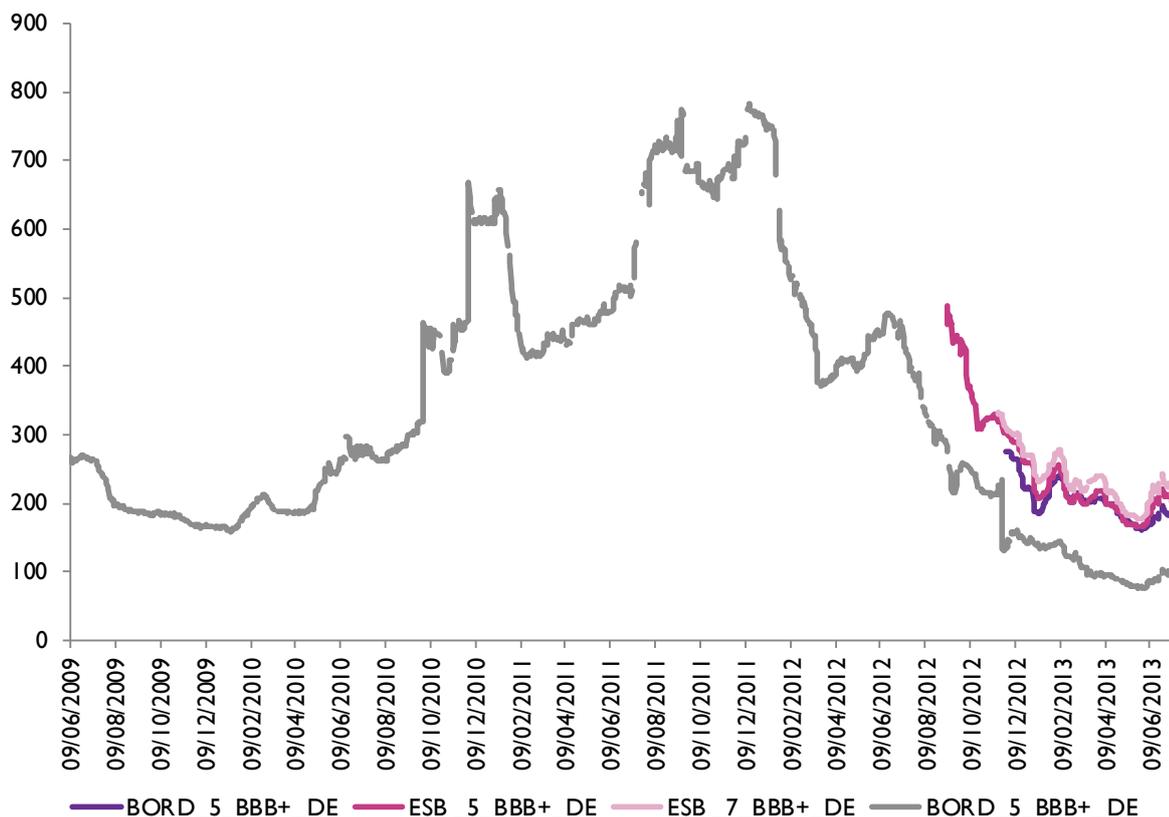


Source: Bloomberg and EE analysis

We notice that the spread of BG's bond has been extremely elevated during the peak of the sovereign debt crisis (reaching a peak of approximately 750 bps) but has declined significantly since the announcement of the OMT programme by the ECB. The spreads of bonds recently issued by BG and ESB is around 200 bps. The spot rates and 1-year average spreads of the bonds depicted in Figure 2-2 are reported in the table below. Averages for 2011-2012 are shown only for one BG bond, as this was the only bond with continuous data throughout the period.

**Table 2.5: Spread of Irish utilities' bond over the German benchmark bond**

| Company | Maturity | Rating | Spread 16/07/2013 | Average 2011-2012 | Average 2013 |
|---|---|---|---|---|---|
| **BORD GAIS EIREANN** | 5 years | BBB+ | 181.90 | - | 195.24 |
| **BORD GAIS EIREANN** | 5 years | BBB+ | 84.61 | 477.69 | 104.76 |
| **ESB FINANCE LIMITED** | 5 years | BBB+ | 200.35 | - | 204.55 |
| **ESB FINANCE LIMITED** | 7 years | BBB+ | 213.31 | - | 222.80 |
| **Average** | | | 170.04 | - | 181.84 |
| **Average (BGE)** | | | 133.26 | - | 150.00 |
| **Average (ESB )** | | | 206.83 | - | 213.67 |

Source: Bloomberg and EE analysis

This evidence therefore suggests a debt premium of **4.7** per cent in the period 2011-2012 and **1.8** per cent in 2013.

We note that our conclusion on the debt premium for 2011-2012 is on the basis of only one bond. However, we have examined evidence on wider Irish corporate bond spreads, and found that the above bond is representative for the Irish corporate sector. The chart below shows euro-denominated bonds of companies listed on the Irish Stock Exchange Overall Index with BBB-, BBB or BBB+ ratings, where spreads are calculated against German benchmark bonds. This shows, that with the exception of a small number of bonds which retained very low yields, the changes in the above bond are broadly in line with general movements in Irish corporate bonds.

**Figure 2-3: Spread of Irish corporate bond over the German benchmark bond (per cent)**
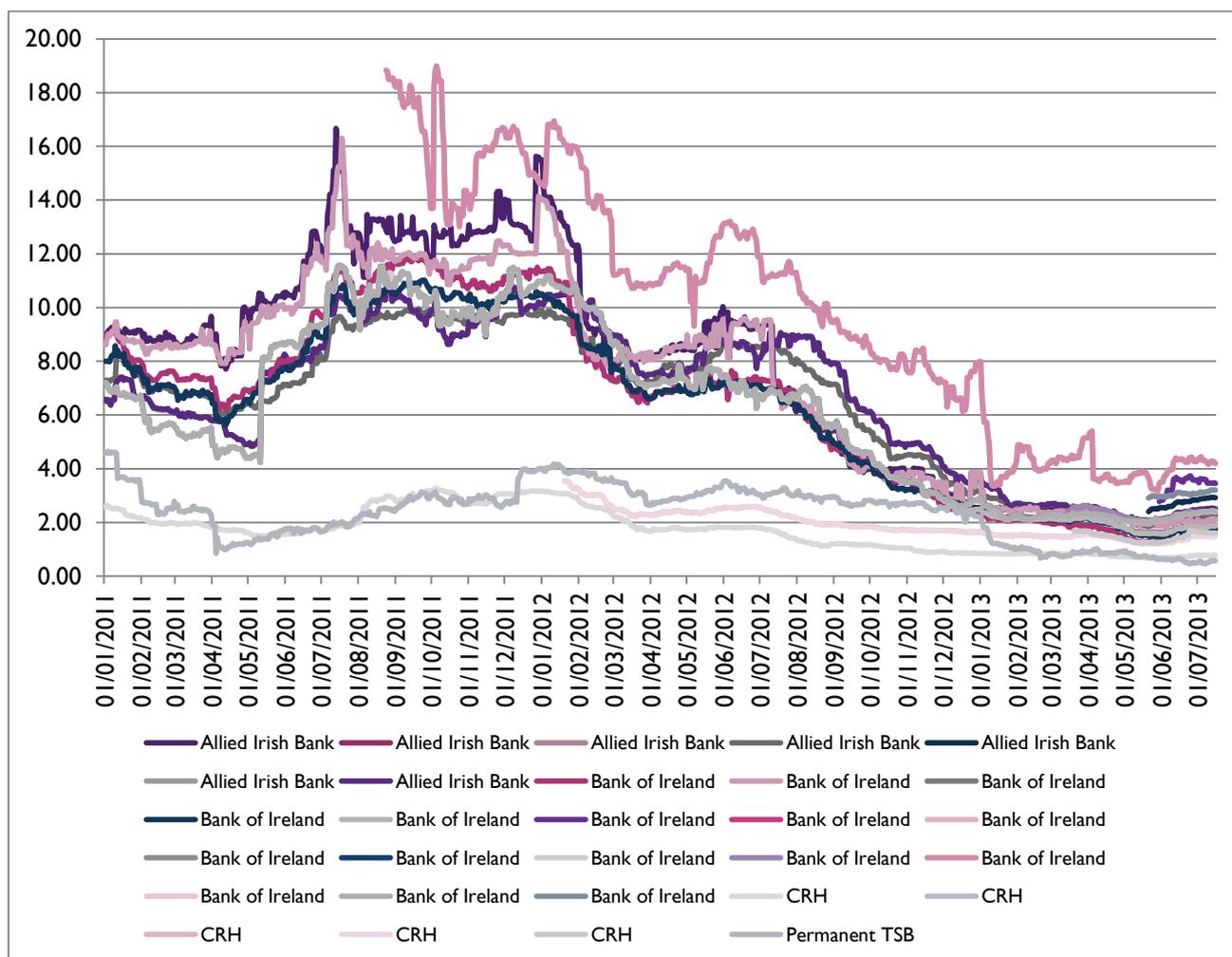


Source: Bloomberg and Europe Economics calculations

In its submission on behalf of Eirgrid, CEPA contends that Irish sovereign bond yields should constitute an inner envelope for the cost of debt of utilities — i.e. that the assumed costs of debt for Eirgrid and ESB should be assumed never to be below the yield on benchmark Irish sovereign bonds. We do not accept this argument, for a number of reasons.

- First, Eirgrid and ESB are regulated on a "stand-alone" basis. Even before the 2007-on crisis it was not unheard of for corporate bonds to have yields below sovereign bonds.[10]

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[10]   Famously, McDonalds occasionally had corporate bonds yields below those of the US government.

- Second, bond issuers often have either explicitly or implicitly more and less senior debt.  It is entirely plausible that a government might choose to default on its sovereign bonds before it allowed default on its electricity companies.
- Third, as CEPA itself illustrated, and as can be inferred from the data presented in our charts above, Irish utilities have, in practice, been able to issue debt at below the yields of the Irish sovereign, so its yields have not constituted such an envelope.

We therefore retain our conclusion of a debt premium of 4.7 per cent in the period 2011-2012 and 1.8 per cent in 2013.  We apply the same forwards-looking debt premium to both EirGrid and ESBN.

## 2.7   Overall Cost of Capital for 2011-2013

Our overall cost of capital estimates for 2011-2012 and 2013 are shown in the table below. Overall our range for 2011 to 2012 is **6.1** to **6.8** per cent, pre-tax, while our range for 2013 is **4.2** to **4.9** per cent, again pre-tax.

| | 2011-2012 | | 2013 | |
|---|---|---|---|---|
| | Low | High | Low | High |
| **Gearing** | 55% | 55% | 55% | 55% |
| **Tax rate** | 12.5% | 12.5% | 12.5% | 12.5% |
| **Risk-free rate** | 1.4% | 2.0% | 1.4% | 2.0% |
| **Equity risk premium** | 5.9% | 6.2% | 4.9% | 5.2% |
| **Asset beta** | 0.3 | 0.3 | 0.3 | 0.3 |
| **Equity beta** | 0.67 | 0.67 | 0.67 | 0.67 |
| **Post-tax Cost of Equity** | 5.3% | 6.1% | 4.7% | 5.5% |
| **Debt Premium** | 4.7% | 4.7% | 1.8% | 1.8% |
| **Pre-tax Cost of Debt** | 6.1% | 6.7% | 3.2% | 3.8% |
| **Vanilla WACC** | 5.8% | 6.4% | 3.9% | 4.6% |
| **Pre-tax WACC** | 6.1% | 6.8% | 4.2% | 4.9% |

Source: Europe Economics calculations

Overall, this suggests that CER's uplifted figure of 5.95 per cent was below the bottom end of the WACC range for the period 2011 to 2012, but the WACC for 2013 has fallen below this figure.

A crude year-by-year cumulative calculation (which we do not concede is either correct or decisive by itself, but exhibit by way of context), gives the following "gains and losses".

**Table 2.6: Crude, indicative Gains-losses by year**

| | 2011 | 2012 | 2013 |
|---|---|---|---|
| **In-year** | -0.15% to -0.85% | -0.15% to -0.85% | +1.05% to +1.75% |
| **Cumulative** | -0.15% to -0.85% | -0.3% to -1.7% | -0.65% to +1.45% |

This suggests that, insofar as it is meaningful to think of the WACC as "too low" or "too high" on a one-year basis (bearing in mind our explanation at the start of this section of why it could be a mistake mechanically to interpret short-term WACC movements in that way), by the end of this year, the 2013 "gains" from a 5.95 per cent determined WACC seem likely to have broadly offset the 2011-12 "losses".[11]

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[11]  For reference, if the CEPA interpretation of CER's final determination for ESBN is taken as correctly implying a WACC of 5.75 per cent, the cumulative "gains" for 2011, 2012 would be -0.35% to -1.25% and -0.7% to -2.5% and -1.25% to +0.85% — again implying that 2013 losses seem likely to have broadly offset 2011-12 gains.

Bearing in mind all of the discussion in this section, the range of discretion that any regulator must have, and the difference between the intrinsically *ex ante* nature of a WACC determination and an *ex post* evaluation thereof, our overall judgement is that the range of cumulative outcomes here cannot reasonably be interpreted as implying that the 5.95 per cent 2010 determination has either been demonstrably and materially "too high" or "too low" for the period 2011-2013.

# 3   Forward-looking WACC

The aim of this section is to provide an assessment on be the forward looking WACC for the period 2014-2015.  Any forwards-looking assessment considers, to a certain extent, evidence from historical market data.   However, in this context, an excessive reliance on historic data would necessarily lead to figures materially elevated above current market rates for certain parameters and far below current market rates for other parameters, because historic averages would be covering periods of extraordinary market volatility.  When forming a forward-looking view, we give more weight – where appropriate – to spot market rates, to market evidence from the recent past, and to reasoning about the implications of official agency forecasts for the future.

## 3.1   Risk-free rate

In the table below we report the spot rate nominal yield on 10-year German bond (at 16/07/2013) and the historic annual average yield since 2000.  The table reports also the annual inflation rates for the Eurozone and the implied real yield.[12]

**Table 3.1:  Spot rate nominal yield and historic average yield (nominal and real) on German 10-year bonds**

| Year | Nominal yield | Inflation | Real yield |
|---|---|---|---|
| Spot rate (16/07/2013) | 1.56 | 1.6 | -0.02 |
| Average rate 2000 | 5.26 | 2.2 | 2.99 |
| Average rate 2001 | 4.81 | 2.4 | 2.35 |
| Average rate 2002 | 4.79 | 2.3 | 2.43 |
| Average rate 2003 | 4.01 | 2.1 | 1.87 |
| Average rate 2004 | 4.01 | 2.2 | 1.77 |
| Average rate 2005 | 3.38 | 2.2 | 1.15 |
| Average rate 2006 | 3.78 | 2.2 | 1.55 |
| Average rate 2007 | 4.23 | 2.1 | 2.09 |
| Average rate 2008 | 4.00 | 3.3 | 0.68 |
| Average rate 2009 | 3.27 | 0.3 | 2.96 |
| Average rate 2010 | 2.78 | 1.6 | 1.16 |
| Average rate 2011 | 2.65 | 2.7 | -0.05 |
| Average rate 2012 | 1.56 | 2.5 | -0.92 |
| Average rate 2013 | 1.48 | 1.6 | -0.05 |
| Average (2000-2013), plus spot rate | | | 1.43 |
| Average (2000-2007) | | | 2.03 |

Source; Bloomberg, Eurostat, and EE calculations

As already noted, the recent real rates on German government bonds is negative and this may be due to factors  such as the worldwide effects of quantitative easing programs, flight to quality effects and Eurozone breakup speculation.

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[12]   The real yield is calculated using Fisher's formula: $(1+\text{nominal yield}) = (1+\text{real yield})*(1+\text{inflation rate})$.

Based on these considerations it would be inappropriate to regard the recent negative real yields as being an appropriate proxy for the risk-free rate.[13]  Risk-free rate determinations have fallen, internationally, since 2007, and risk-free rates may well have fallen in a number of countries, reflecting a drop in the expected medium-term sustainable growth rate and hence the equilibrium interest rate for the economy. That may well be applicable to the Eurozone also, and we observe from Table 3.1 that German bond yields did indeed decline from the early 2000s to the mid-2000s.  On the other hand, over the next few years, as economic outlooks improve, it is plausible that the equilibrium interest rate and hence risk-free rate may, likewise, rise (albeit perhaps not to the levels of the early 2000s).

Lacking a strong alternative evidential basis, and given our underlying economic analysis, we believe that the correct assumption is that, in due course, the risk-free rate will revert to closer to the average real rate prevailing over the period preceding the financial crisis.  Accordingly, we assume that the risk-free rate will in due course reach 2.0 per cent.  If that were to happen quickly, that would an upper bound for our risk-free rate range of 2 per cent.  An alternative assumption would be a broadly linear rise from the 1.4 that was seen in risk-free rate determinations in 2011 (e.g. that of Ofcom, as set out above) or the 1.43 per cent average of German yields from 2000-2013, up to the 2 per cent.  On that basis we set our lower bound as the average of 1.43 and 2 per cent, or 1.75 per cent.  So, as reported in Table 3.1, we opt for a forward-looking real risk-free rate in the range of **1.75** to **2.0** per cent.

## 3.2   Equity risk premium

The ERP figures we rely for our forward looking WACC estimate are the most recent estimates of the geometric ERP provided by Dimson, Marsh and Staunton, which cover the period 1900-2012.[14]  The ERP figure for Ireland is **4.6** per cent, and for Europe is 4.8 per cent.  We do not expect any significant uplift to this from any residual impact of the recession, but do not consider some such impact to be impossible. Furthermore, we note that recent regulatory precedent for comparators we considered in the UK had ERPs in the region of 5 per cent.  Accordingly, we take **5** per cent as a reasonable upper bound.

## 3.3   Debt premium

The following chart displays the spread (over the benchmark German government bond assigned by Bloomberg) of corporate bonds for Irish electricity and gas utilities.

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[13]   Similarly, recent regulatory determinations in the UK have tended to be set materially above the observed index-linked gilts, when setting the risk-free rate.

[14] Credit Suisse Global Investment Returns Sourcebook (2013).

**Figure 3-1: Spread of Irish utilities' bond (bps) over the German benchmark bond**
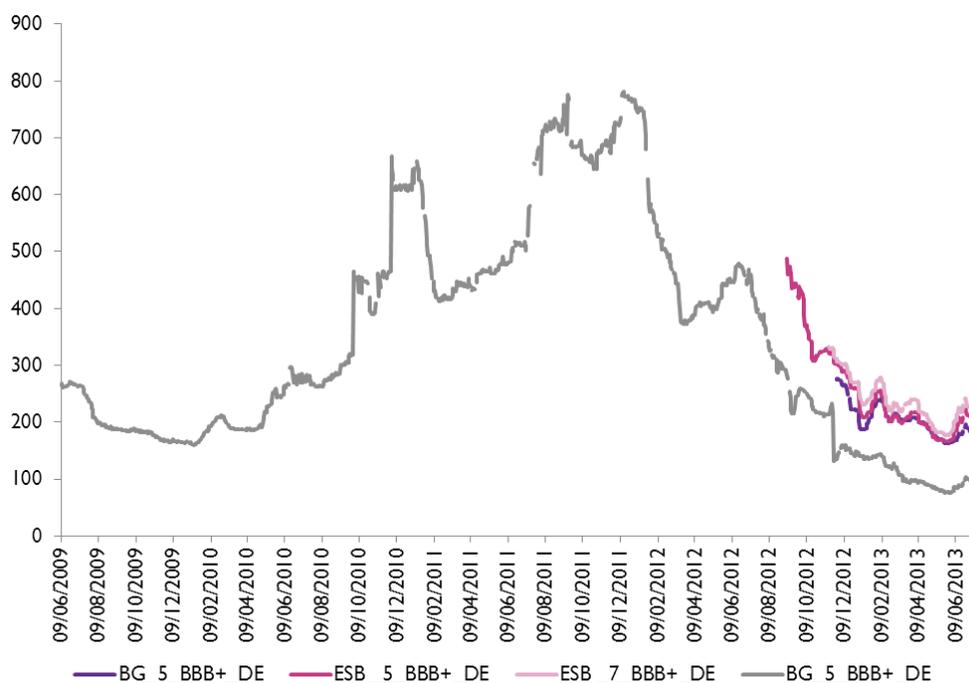
We notice that the spread of BG's bond was extremely elevated during the peak of the sovereign debt crisis (reaching a peak of approximately 750 bps) but has declined significantly since the announcement of the OMT programme by the ECB. The spreads of bonds recently issued by BG and ESB is around 200 bps. The spot rates and 1-year average spreads of the bonds depicted in Figure 3-1 are reported in the table below.

**Table 3.2: Spread of Irish utilities' bond over the German benchmark bond**

| Company | Sector | Maturity | Rating | Spread 16/07/2013 | Average (1 year) | Max (1 year) | Min (1 year) |
|---|---|---|---|---|---|---|---|
| BORD GAIS | Gas | 5 years | BBB+ | 181.90 | 204.12 | 276.91 | 162.14 |
| BORD GAIS | Gas | 5 years | BBB+ | 84.61 | 169.98 | 417.70 | 75.04 |
| ESB | Electricity | 5 years | BBB+ | 200.35 | 255.12 | 487.22 | 165.70 |
| ESB | Electricity | 7 years | BBB+ | 213.31 | 237.46 | 331.86 | 176.94 |
| Average (BBB+) | | | | 170.04 | 216.67 | 378.42 | 144.95 |
| Average (BGE) | | | | 133.26 | 187.05 | 347.30 | 118.59 |
| Average (ESB ) | | | | 206.83 | 246.29 | 409.54 | 171.32 |

Table 3.1 shows that Irish utilities' bonds with BBB+ rating have a spot market debt premium of around 170 bps (at 16/07/2013) and a one-year average debt premium of around 217 bps. Based on this market evidence, we consider the appropriate forward-looking debt premium to be in the region of **170 bps** and **220 bps**.

## 3.4 Asset beta

With a lack of direct market data on the regulated entities of question, and therefore without a strong evidential basis to support an increase in the asset beta since 2010, we are of the view that the same asset

beta figure set out in the previous determination remains appropriate. [15] Therefore, in the remainder of the analysis we assume an asset beta of **0.3**. At 55 per cent gearing, this amounts to an equity beta of **0.67** for both 2011-2012 and 2013.

## 3.5 Conclusion on the forward-looking WACC

In light of recent market evidence we conclude that the appropriate forward-looking pre-tax WACC (without aiming up) lies within the range 4.37-5.05.

This figure is based on:

- A risk free rate range of: 1.75-2.0 per cent
- An ERP range of 4.6-5.0
- A debt premium range of 1.70-2.20 bps
- An asset beta of 0.30
- A notional gearing assumption of 0.55
- A corporate tax of 12.5 per cent

The decomposition of forward-looking WACC into its main components is provided below.

The table also includes aimed-up WACC figures. The appropriate degree of aiming up for a mid-term WACC is arguably less than that for a five-year WACC, since both the risk and the consequences of under-estimation arise over a shorter time-period. We therefore present both a figure aimed up 10 per cent (consistent with the previous determination, based on the assumption that market conditions in 2014 and 2015 will be much more normal than those prevailing in 2011 and 2012) and a figure aimed up 5 per cent (halving the 10 per cent aim-up to reflect the reduced time period).

**Table 3.3: Forward-looking WACC (without aiming-up)**

| WACC components | Low | High |
|---|---|---|
| Risk-free rate | 1.75 | 2.00 |
| Debt premium | 1.70 | 2.20 |
| **Cost of debt** | **3.45** | **4.20** |
| ERP | 4.60 | 5.00 |
| Asset beta | 0.30 | 0.30 |
| Equity beta | 0.67 | 0.67 |
| **Cost of equity (pre-tax)** | **5.50** | **6.10** |
| Gearing | 0.55 | 0.55 |
| Tax | 0.125 | 0.125 |
| **WACC (pre-tax)** | **4.37** | **5.05** |
| **WACC (pre-tax) aimed up 5%** | **4.59** | **5.31** |
| **WACC (pre-tax) aimed up 10%** | **4.81** | **5.56** |

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[15] We also note that this is a conservative assumption because, based on comparators evidence exhibited in the Technical Report, any change in asset beta to be considered would more likely be a decrease rather than an increase.

# 4   Conclusion and Recommendation

We understand our purpose in this mid-term WACC review as being to assess whether the 5.95 per cent WACC determined at PR3 should be modified for the remainder of the price control period, defined as the years 2014 and 2015.  Our conclusion is that **the 5.95 per cent WACC figure has been broadly appropriate for the period 2011-2013, but if continued into 2014 and 2015 it would imply material over-recovery of capital costs for the entities regulated**.

As regards 2014 and 2015, our best-estimate of the cost of capital is that it will lie in the 4.37 to 5.05 range. For a regulatory purpose we believe it would be appropriate to aim-up modestly upon that range, by between 5 and 10 per cent, implying ranges of 4.59-5.31 per cent and 4.81-5.56 per cent (with a modest preference for the former range).  We suggest that, given that firms have not materially over-recovered on the WACC from 2011 to 2013 and that it is possible that they will have under-recovered in that period, it appropriate to be quite conservative with respect to the degree of reduction in the WACC imposed for 2014 and 2015.  Our recommendation is therefore a figure at the very top of our 5 per cent aimed-up range — namely 5.31 per cent, which we propose rounding to **5.3 per cent** as a final figure.