Estimating the cost of capital for Italian electricity and gas networks

Prepared for

AEEGSI (Autorità per l'Energia Elettrica, il Gas e il Sistema Idrico)

June 2015

www.oxera.com

oxera
compelling economics

Contents

Executive summary

Autorità per l'Energia Elettrica, il Gas e il Sistema Idrico (AEEGSI), the Italian energy regulator, is reviewing its methodology for estimating the allowed rate of return for regulated electricity and gas networks. It commissioned Oxera to provide recommendations on best practice in estimating the weighted average cost of capital (WACC) in a regulatory context. This report covers all the WACC parameters, but with more focus given to the market parameters that are common across the energy sectors that AEEGSI regulates.

Over the last six years, since the start of the global financial crisis, a number of unusual events have affected capital markets and macroeconomic conditions across the globe, including in the eurozone countries.

Some countries in the eurozone have suffered from worsening public sector balance sheets and deteriorating credit ratings, while others have experienced enhanced status as safe havens. This has led to significant movements in interest rates in all jurisdictions.

In this context, estimating the required return is more challenging. First and foremost, estimating the appropriate risk-free rate that serves as the anchor point for most capital asset pricing models has become more difficult. Second, these events are likely to have influenced the risk premia demanded by investors in different jurisdictions and in different sectors of the economy. Within the Capital Asset Pricing Model (CAPM) framework, this could have affected both the equity risk premium (ERP) and the beta of regulated utilities. It is also likely to have affected the cost of debt financing for corporates, including regulated utilities.

This report addresses these challenges by explicitly considering how the divergence in the macroeconomic fundamentals of eurozone countries has affected required returns for regulated assets. We use the term 'country risk premium' to measure this effect.

Through the country risk premium we want to capture the specific effect that the fiscal crisis has had on required returns for regulated assets. There might have been some differences in the required returns between Italian utilities and similar utilities operating in other European countries even prior to the crisis, but we consider it reasonable to assume that the difference has increased post-crisis. This is why this element of the WACC is considered separately.

Overall framework for the cost of equity

Given these unusual macroeconomic developments in the eurozone, our proposed approach to estimating the cost of equity for regulated utilities consists of the following steps.

- Estimating the real risk-free rate based on available returns to investors that are subject to minimal default risk.
- Estimating a sector-specific risk premium ('normal' beta multiplied by the 'normal' ERP) that would be required by investors in 'normal' market conditions in the absence of any fiscal turmoil.
- Estimating the country risk premium that captures the additional sector-specific premium that may be required by equity investors in the current macroenvironment in Italy.

'Normal' market return

Overall, to be consistent with the notion of a risk-free asset, we would recommend estimating the risk-free rate (RFR) with reference to government bond yields that are rated at least 'AA', and are therefore considered to have negligible default risk. This ensures that the RFR metric is more stable over time and is more consistent with the notion of the risk-free asset in asset pricing models. In the current environment, this could include government bonds issued by Germany, the Netherlands, France and Belgium.

However, these investments are currently offering very low returns—in many cases, the implied real returns are negative. While current market evidence provides the most-up-to-date view of investors' expectations, the observation of negative real yields raises the question of whether it is appropriate to directly read this evidence across directly into the WACC used in a regulatory context. Given the underlying uncertainty in the WACC parameters and the potential asymmetric costs of setting the regulated WACC too low, using a real RFR that is above the current yields might be more consistent with reasonable regulatory practice, in light of these unusual market conditions.

In choosing the specific value for the real RFR, we would caution against the use of a negative or zero real RFR for estimating the cost of equity. This implies that a reasonable lower bound for the real RFR might be 0.5%, rounding to the nearest half a percent. An alternative might be to use a real RFR that is more consistent with longer-term evidence, such as 1.5%.

Given the difficulties in estimating the real RFR in the current market environment, it might be helpful to consider the evidence on the total equity market return (TMR), which is the sum of the real RFR and the ERP, before choosing a point estimate for the ERP. There is generally greater consensus among regulators about the value of the TMR than its individual components.

Overall, our suggested approach ensures greater stability in the cost of equity component of the WACC over time.

Country risk premium

Country risk may affect the costs of both debt and equity for regulated utilities. It may affect the required cost of debt by affecting the credit risk of the regulated company, which is often linked in some way to the credit rating of the government under whose jurisdiction a company operates.

Country risk may also affect the required cost of equity, through two channels: an increase in the volatility of returns, and an increase in downside risk.

These increases in the costs of debt and equity due to country risk are linked to some degree, as they are attributable to the same fundamental sources of cash-flow risk. This is why, in estimating the country risk premium to be included in the cost of equity, we considered evidence from both debt and equity markets.

Evidence from debt markets for utilities suggests that this premium is likely to be at least 0.5% for Italian utilities. Evidence from equity markets is mixed, but overall suggests that there is a general risk premium for the total equity market in Italy, and that this premium is not immaterial (potentially in excess of 1.5%). This premium might be country-related but could also be due to other factors.

However, in our methodology we would like to capture the country risk premium on equity specific to regulated utilities. There appears to be some indication that the premium required by equity investors in the utility stocks might be somewhat

smaller than for average equity. We therefore conclude that a country risk premium on equity for regulated utilities in the order of magnitude of 0.5–1% seems quite plausible.

Sector-specific parameters

Our review in this report has focused primarily on the market parameters within the cost of equity.

In our proposed methodology, the beta should represent the systematic risk of a utility operating in 'normal' market conditions—i.e. in a country not affected by fiscal concerns.

To estimate the cost of debt, regulators typically use two main approaches.

- One approach is to recognise the costs of efficiently incurred existing debt, and to recognise the fact that only a proportion of total debt will need to be refinanced over the period at prevailing market rates.
- Another approach is to take into account the forward-looking cost of debt only, in order to recognise the costs that an efficient new entrant to the market would face in the current market conditions.

The choice of approach depends on the regulatory duties. In particular, in core infrastructure sectors such as energy and water, regulators typically have an explicit financing duty, which would suggest that the first approach is more appropriate.

Regardless of the approach chosen, estimation of the cost of debt of each sector will require a review of the cost of debt that reflects typical issuance patterns at the sector level, which is beyond the scope of this study.

Mid-period review of the WACC

AEEGSI currently updates the risk-free rate component of the WACC every two years, while keeping the other parameters unchanged during the period for which the WACC is set (which will be six years going forward). AEEGSI is reviewing whether this is appropriate going forward.

A number of options can be considered for reviewing the parameters mid-period. We have outlined three potential options for AEEGSI to consider, using the concept of a 'trigger', whereby the WACC (or a component of it) is adjusted only if some clearly defined benchmark moves beyond (i.e. above or below) some pre-determined threshold.

All three trigger options could potentially work in practice. The final choice depends on the level of risk-sharing between the company and consumers that the regulator believes is appropriate, as well as factors such as ensuring financeability of regulated companies, ensuring stability of prices, and ensuring predictability of the regulatory parameters.

1 Background

Autorità per l'Energia Elettrica, il Gas e il Sistema Idrico (AEEGSI), the Italian energy regulator, is reviewing its methodology for estimating the allowed rate of return for regulated electricity and gas networks. It commissioned Oxera to provide recommendations on best practice in estimating the weighted average cost of capital (WACC) in a regulatory context.

This section provides an overview of the current framework used by AEEGSI, together with a high-level overview of our proposed methodology.

1.1 Current WACC framework

AEEGSI sets price controls for a number of regulated services, including electricity distribution and metering; electricity transmission; gas distribution; gas transmission; gas metering; gas storage and regasification of liquefied natural gas (LNG).[1]

The methodology used to estimate the WACC—i.e. the allowed rate of return—has some common elements that apply to all sectors. In particular, the capital asset pricing model (CAPM)—the model that is most commonly used by regulators and practitioners to estimate the cost of equity component of the WACC—contains market parameters that are typically common to all sectors. AEEGSI currently updates one of these parameters, the risk-free rate, every two years based on a predefined methodology. The updated risk-free rate also feeds into its calculation of the cost of debt.

This report covers all the WACC parameters, but with more focus given to the market parameters that are common across the sectors.

In simple terms, the pre-tax nominal WACC can be defined as follows.

$$WACC_{pre-tax} = \frac{K_e}{1-T} * (1-g) + K_d * (1-T) * g$$

where:

$K_e = nominal\ post-tax\ cost\ of\ equity$

$K_d = nominal\ pre-tax\ cost\ of\ debt$

$g = gearing\ ratio\ defined\ as \frac{debt}{debt + equity}$

$T = corporate\ tax\ rate$[2]

AEEGSI uses a real WACC in the regulatory formula by deflating the nominal pre-tax WACC with a measure of expected inflation.

As noted, AEEGSI uses the CAPM to estimate the cost of equity. Under the CAPM framework, the cost of equity is estimated as follows.

$$K_e = RFR + \beta_e * ERP$$

where:

$RFR = risk-free\ rate$

[1] AEEGSI also regulates the water sector.
[2] The taxes paid by companies in Italy comprise corporate tax and regional tax. These are calculated on the basis of different rates, which requires some changes to the formula above.

$\beta_e = equity\ beta$

$ERP = equity\ risk\ premium$

The CAPM relates the cost of equity of a particular activity to its exposure to systematic or non-diversifiable equity market risk. The return required by equity investors consists of the return on a risk-free investment and a risk premium that reflects how correlated the returns on the particular investment in question are with the market overall. Non-systematic risk, according to the CAPM, can be diversified away by holding a portfolio of assets.

This exposure to systematic risk is measured by the equity beta. An investment with no systematic risk (i.e. with no correlation with returns on the market) would have an equity beta of zero. An investment in the equity of a company of average risk would have an equity beta of 1. In other words, the premium over the risk-free rate that equity investors expect to earn on such an investment would be the same as the average for the overall market (equal to the equity risk premium, ERP).

1.2 Context for the current methodology review

Over the last six years, since the start of the global financial crisis, a number of unusual events have affected capital markets and macroeconomic conditions across the globe, including the eurozone countries.

Some countries in the eurozone have suffered from worsening public sector balance sheets and deteriorating credit ratings, while others have enhanced their status as a safe haven. This has led to some significant movements in interest rates in all jurisdictions.

In some economies, such as Germany and the Netherlands, yields have declined to unprecedented low levels, reflecting the unconventional monetary policy response to the crisis and increased investor appetite for safe assets. In many economies, the implied real yield on government bonds is negative. This is highly unusual and is generally incompatible with standard economic theory.

At the same time, in some economies, including Italy, government bond yields have gone through episodes of unusually high yields, following a wave of sovereign credit rating downgrades and increased market volatility. More recently, government bond yields in these jurisdictions have decreased and appear to display more stability. However, given their worsened credit rating, they trade at a noticeable spread to the government bond yields of countries such as Germany.

These events have made estimating the required returns more challenging. First and foremost, estimating the appropriate risk-free rate that serves as the anchor point for most capital asset pricing models has become more difficult. Second, these events are likely to have influenced the risk premia demanded by investors in different jurisdictions and in different sectors of the economy. Within the CAPM framework, this could have affected both the ERP and the beta of regulated utilities. It is also likely to have affected the cost of debt financing for corporates, including regulated utilities.

This report addresses these challenges by explicitly considering how the divergence in the macroeconomic fundamentals of eurozone countries has affected required returns for regulated assets. We use the term ‘country risk premium’ to measure this effect.

Country risk is often used to describe the higher risk of emerging markets relative to developed markets in corporate finance. In the current context, we use this term simply to capture the fact that an investor might consider the risk profile of a utility in Italy to be different from that of an otherwise identical regulated utility that operates in a country such as Germany or the Netherlands, which have not experienced the same level of fiscal turmoil as Italy in recent years.

In other words, we want to capture the specific effect that the fiscal crisis has had on required returns for regulated assets. There might have been some differences in the required returns between Italian utilities and similar utilities operating in other European countries even prior to the crisis, but we consider it reasonable to assume that the difference has increased post-crisis. We intend to capture this effect through the country risk premium.

1.3 Country risk and required returns

Country risk may affect the costs of both debt and equity for regulated utilities. It may affect the required cost of debt by affecting the credit risk of the regulated company. In particular, credit rating agencies typically link corporate ratings to the credit rating of the government under whose jurisdiction a company operates.[3] This means that the downgrades in Italy's credit rating have translated directly into changes in corporate credit ratings. This subsequently may have affected the cost at which corporates can raise finance. However, the effect on corporate debt costs may have been different from the effect on government debt costs.

Country risk may also affect the required cost of equity, through two channels: an increase in the volatility of returns, and an increase in downside risk.

- **Higher volatility of returns**. The recent sovereign debt crisis in the eurozone implies that there is more uncertainty about the future path of economic variables (demand, prices, growth) and therefore more uncertainty in future equity returns. In other words, the probability distribution of equity returns might be wider in Italy than in countries less affected by sovereign debt problems.
- **Higher downside risk**. The sovereign debt crisis in the eurozone might also imply a higher probability of events with negative implications for equity returns, such as windfall taxes, regulatory pressure on prices, or political upheaval than events with positive implications. In other words, the probability distribution of equity returns might be asymmetric, with bigger downsides than in countries less affected by sovereign debt problems.

These increases in the costs of debt and equity due to country risk are linked to some degree, as they are attributable to the same fundamental drivers of cash-flow risk. In the main body of this report we consider these issues in more detail, separately for the cost of debt and the cost of equity.

[3] For example, Italian energy companies, Snam and Terna, have been downgraded on several occasions by S&P as a direct result of changes to Italy's credit rating.

1.4 Structure of the report

The report is structured as follows:

- section 2 sets out our recommendations for estimating the market parameters of the cost of equity (the risk-free rate, the 'normal' ERP, and the country risk premium);
- section 3 provides some high-level considerations for estimating sector-specific parameters (beta, gearing, and cost of debt);
- section 4 discusses possible options for updating the WACC during the regulatory period.

2 Recommendations for estimating market parameters

In the cost of equity, the market parameters that are common across sectors are the risk-free rate (RFR) and the equity risk premium (ERP). The RFR will also affect the cost of debt parameter of the WACC; however, the way it feeds into the cost of debt depends on the regulatory approach to estimating the cost of debt. This is considered separately in section 3.

Given the unusual macroeconomic developments in the eurozone noted in the previous section, our proposed approach to estimating the cost of equity for regulated utilities in Italy in the current context is as follows.

$$K_e = RFR + \beta_e * ERP_{'normal'} + CRP$$

where:

$RFR = return\ on\ an\ investment\ that\ is\ genuinely\ free\ from\ default\ risk$

$\beta_e * ERP_{'normal'} = sector\text{–}specific\ risk\ premium$
$that\ would\ be\ required\ by\ investors\ in\ 'normal'\ market\ conditions\ in\ the\ absence$
$of\ any\ fiscal\ turmoil$

$CRP\ = country\ risk\ premium\ that\ captures\ the\ additional\ sector\text{–}specific\ premium$
$that\ may\ be\ required\ by\ equity\ investors\ in\ the\ current\ macroenvironment\ in\ Italy$

Such an approach requires the components of the total market return, the RFR and the ERP, to be estimated first in 'normal' market conditions assuming no impact of the fiscal developments in Italy on required returns. In other words, it is the total market return that would be used to estimate the cost of equity for a utility operating in a country such as Germany. Any additional premium that may be required by investors in Italian utilities in the current environment over and above the 'normal' market return is then measured separately and is defined as the country risk premium.

This section primarily focuses on the principles for estimating the RFR and the country risk premium. We also briefly cover the possible approaches to estimating the ERP; however, at this early stage in the consultation process, AEEGSI has asked for a high-level review only on this specific parameter.

2.1 Real risk-free rate

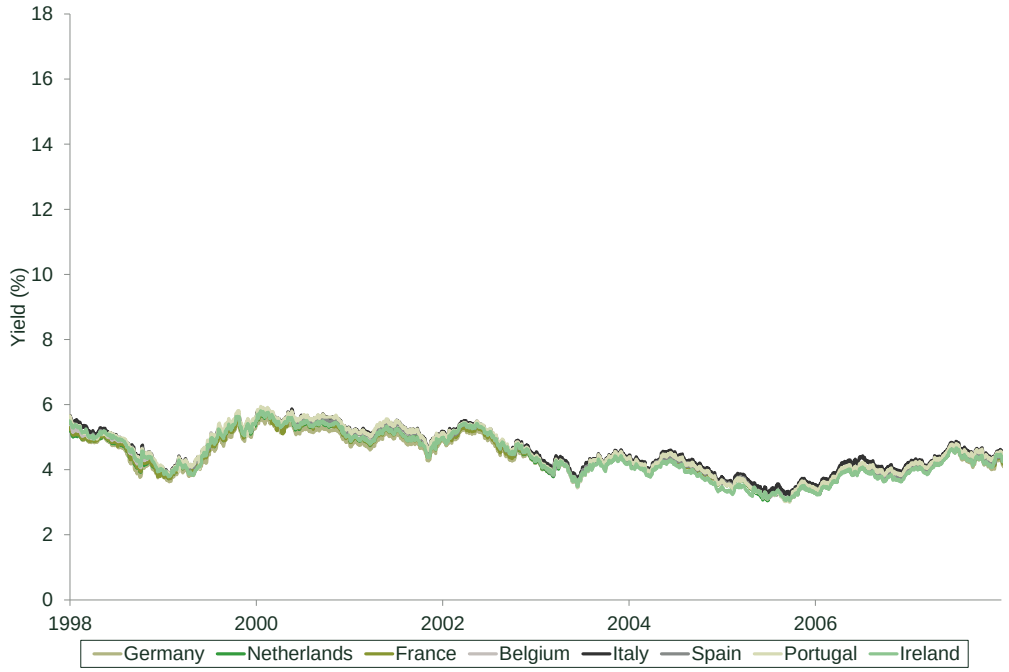
The RFR measures the expected return on an investment free of default and systematic risk—i.e. where the realised return on the investment will be equal to the expected return. It reflects the time value of money as it represents the compensation that investors require in order to forgo current consumption in favour of future consumption.

In economies with minimal sovereign default risk, the RFR is typically estimated with reference to the yield to maturity on government-issued bonds. These bonds are assumed to be notionally free of default and systematic risk. This is also the approach that European regulators have typically followed in the past. However, there are several challenges with applying this approach in the current market environment.

Since the introduction of the euro, government bond yields in the eurozone economies have generally traded at similar levels to each other (Figure 2.1). From the perspective of the marginal investor, most of these bonds could have been considered risk-free until late 2008. Nominal ten-year yields have traded at

around 4–5%. Assuming that inflation would average the European Central Bank target of 2% in the long run, the implied real yields were in the range of 2–3% over this period.

Figure 2.1 Nominal yields on ten-year government bonds, 1998–2008

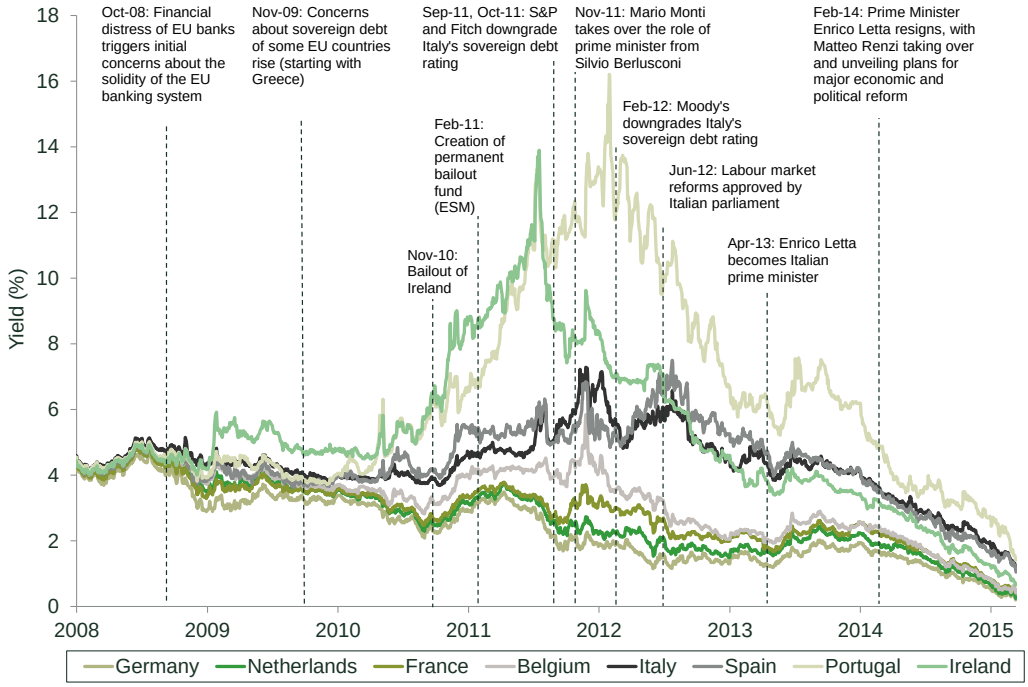


Source: Oxera analysis, based on Datastream.

However, since the onset of the financial crisis in late 2008, government bond yields in some jurisdictions (including Italy) have been unusually volatile and have sometimes trades at much higher yields. Yields increased sharply at the peak of concerns about the fiscal positions of a number of eurozone governments and following a wave of credit rating downgrades. The volatility of these yields seems incompatible with the notion of a risk-free asset in cost of capital models.

At the same time, government bond yields in the jurisdictions not affected by fiscal concerns have declined significantly in the aftermath of the financial crisis, largely driven by the extraordinary loosening of central bank monetary policy to alleviate the impact of the crisis on the economy, as well as increased demand for ‘safe’ assets (Figure 2.2).

Figure 2.2 Nominal yields on ten-year government bonds, 2008–15



Source: Oxera analysis, based on Datastream.

More recently, government bond yields across the eurozone have declined. Some of the decline may be attributable to the impact of quantitative easing by the European Central Bank.

Also, the differential between yields on bonds of downgraded sovereigns and yields on bonds of sovereigns that have largely been unaffected by downgrades has narrowed substantially. The difference in Italian government bond yields and yields on governments bonds rated at least 'AA' has narrowed to less than 1% most recently (Table 2.1).

Table 2.1 Nominal yields on ten-year government bonds (%)

	Germany	Netherlands	France	Belgium	Italy	Italy less average of all others
S&P rating*	AAA	AA+	AA	AA	BBB-	
Spot (at 12 March 2015)	0.25	0.28	0.44	0.46	1.15	0.79
One-year average (at March 2015)	0.97	1.16	1.35	1.36	2.48	1.27
One-year average (at March 2014)	1.65	2.00	2.22	2.42	4.17	2.09
One-year average (at March 2013)	1.49	1.85	2.35	2.69	5.16	3.07
Five-year average (at March 2015)	1.85	2.15	2.45	2.83	4.30	1.98

Note: * Current S&P credit rating based on local currency, long-term.

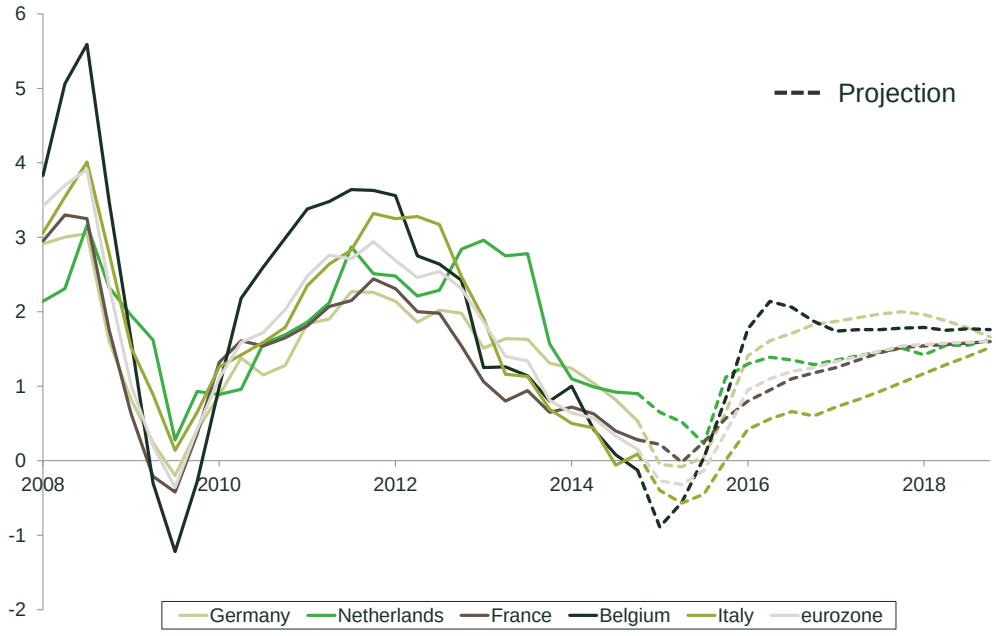
Source: Oxera analysis, based on Datastream and S&P reports.

Overall, to be consistent with the notion of a risk-free asset, we would recommend estimating the RFR with reference to government bond yields that are rated at least 'AA', which are assumed to have negligible default risk.

In principle, the spot yield represents the forward-looking expected RFR. Historical averages are not strictly relevant to the forward-looking cost of equity.

However, nominal spot yields on German, Dutch, French and Belgian government bonds are in the range of 0.3–0.5%. Combined with any reasonable measure of expected inflation, the implied ten-year real yield would be negative. In this context, expected inflation over the next ten years (the maturity of the bond) is the appropriate metric to use to derive expected inflation (currently this is around 1.7%).

Figure 2.3 Historical and forecast inflation in the eurozone and selected countries



Note: Consumer price index % change year on year; quarterly data.

Source: Oxera analysis, based on Datastream (data originates from Oxford Economics).

A negative real interest rate implies that investors will receive less money in real terms in the future than they invest today. This is highly unusual and is not consistent with economic theory, which predicts that negative real interest rates will not persist because consumers have incentives to bring forward their consumption.

While current market evidence provides the most-up-to-date view of investors' expectations, there is a question whether it is appropriate to read it across directly into the WACC used in a regulatory context, given the unusual market conditions identified above.

First, in a regulatory context, the long-lived nature of investment in regulated energy networks means that the risk of creating an underinvestment problem is likely to be an important consideration. Regulators typically assume that the costs of underestimating the WACC are greater than those of overestimating it. Thus, in an environment of unusually low yields, it might be reasonable to give

some weight to longer-run evidence to mitigate the risk of underestimating the WACC.

Second, other regulatory considerations, such as stability of prices, might also suggest a cautious approach to the interpretation of market data that exhibits volatility and implies significant changes in the WACC.

Taking these considerations together, it might be reasonable to use a real RFR that is above the current yields. This would also be consistent with regulatory precedent in Europe.[4]

There are several options for choosing the real RFR to be used in the CAPM, given the considerations set out above. First, we would caution against the use of a negative or zero real RFR for estimating the cost of equity in a regulatory context. This would suggest a lower bound for the real RFR of 0.5%, rounding to the nearest half a percent.

An alternative would be to use a real RFR that is more consistent with longer-term evidence. For example, a real RFR of 1.5% would imply a nominal RFR of 3.5%, assuming that, in the long run, inflation is close to the ECB's target of 2%. This takes into account the levels of nominal yields that were observed before the crisis (Figure 2.1), while giving some recognition to the sustained decline yields since the crisis.

Regardless of which option is chosen, it is important to consider the implications for the assumed ERP to ensure that the resulting total market return is reasonable (this is discussed in the next sub-section).

2.2 'Normal' equity risk premium

The ERP can be estimated in various ways. Given the difficulties in estimating the real RFR in the current market environment, one option typically adopted by regulators has been to consider the evidence on the total equity market return (TMR), which is the sum of the real RFR and the ERP. There is generally a reasonable degree of consistency in the TMR chosen by regulators, despite some variation in the exact decomposition of the TMR into an RFR and an ERP. An alternative option would be to consider the evidence on the ERP directly, consistent with AEEGSI's current methodology.

2.2.1 Sources of evidence

A key source of evidence on both the TMR and the ERP is long-run historical data, and one of the most widely cited sources of historical evidence is the annual publication by Dimson, Marsh and Staunton (DMS), which estimates historical returns for 19 countries using data since 1900.

Although historical estimates represent the best source of data available for the *realised* ERP, this approach is inherently backward-looking. Forward-looking models can therefore provide a useful cross-check on the historical estimates. The basic concept behind forward-looking models is the assumption that the current market price of an asset represents the expected discounted value of all future cash flows to this asset.

One reason why forward-looking ERP estimates produced by the dividend growth model ('DGM') might be higher than historical DMS estimates is that they are typically derived by subtracting the currently low government bond yields from the estimate of the TMR. This highlights the importance of having a

[4] Appendix A1 provides more detail on the regulatory precedent.

consistent set of assumptions for the RFR and the ERP, and explains why using the TMR evidence can help to ensure this consistency.

Another source of evidence on the ERP is survey evidence. Survey evidence needs to be interpreted with caution, however, as the results tend to be quite subjective and sensitive to how the survey questions are worded.

Finally, an important cross-check on both the TMR and the ERP is regulatory precedent, as this shows how regulators have generally responded to the recent challenges of estimating required equity returns.

2.3 Summary on 'normal' market parameters

The combination of evidence and theory suggests that estimating the RFR with reference to government bond yields that are rated at least 'AA' ensures that the RFR metric is more stable over time and is more consistent with the notion of the risk-free asset in asset pricing models.

However, the risk-free investments available in the market are offering very low returns—in many cases, the implied real returns are negative. Furthermore, given the underlying uncertainty in the WACC parameters and the potential asymmetric costs of setting the WACC too low, more appropriate regulatory practice might be to use a real RFR that is above the current yields.

A number of options are available for choosing the real RFR. First, we would caution against using a negative or zero real RFR for estimating the cost of equity in a regulatory context. This gives a lower bound for the real RFR of 0.5%, rounding to the nearest half a percent. An alternative would be to use a real RFR that is more consistent with longer-term evidence, such as 1.5%.

To estimate the ERP, it might be helpful to consider evidence on the TMR to ensure that the combination of the chosen RFR and ERP estimates is internally consistent with the evidence.

2.4 Country risk premium

The RFR, ERP and TMR evidence considered so far focused on the 'normal' market parameters that can be used to estimate the cost of equity for a utility operating in a country such as Germany. To assess whether an investor requires an additional premium on equity from a utility operating in Italy to an otherwise identical utility in Germany, we consider the potential sources of evidence on the country risk premium.

We want to capture the specific effect of the fiscal crisis on required returns for regulated assets. There might have been some differences in the required returns between Italian utilities and similar utilities operating in other European countries even prior to the crisis, due to some of the factors described above (e.g. home bias). However, we consider it reasonable to assume that the difference in required returns might have increased post-crisis. This is why we capture this effect through the country risk premium.

As outlined in section 1, country risk may affect the cost of equity through two channels: an increase in the volatility of returns, and an increase in downside risk.

Increase in volatility of returns

In the CAPM, investors require compensation only for systematic risk. The additional compensation that investors may require for the increased uncertainty

in equity returns in a particular country therefore depends on the extent to which country risk is non-diversifiable. There are several reasons why this risk might not be diversifiable in practice:

- imperfect international capital flows and investors' propensity to exhibit a preference for domestic securities—the home-bias phenomenon;[5]
- an increasing correlation between national economies and equity markets, implying that a greater proportion of the overall risk is non-diversifiable.

The home-bias phenomenon may be due to barriers to international capital flows, the effects of national boundaries, or preferences for geographically close investments.[6] Greater correlation between national economies and equity markets due to increased international trade and capital flows might be expected to have reduced the ease of diversifying non-systematic risks. Furthermore, there is evidence to suggest that correlation between national equity markets increases at times of crisis.[7]

In summary, the persistence of the home-bias phenomenon suggests that it may be inappropriate to assume that the marginal investor is globally diversified. Furthermore, even if the marginal investor is globally diversified, increased correlation between national equity markets implies that a portion of country risk is non-diversifiable, and it would therefore be appropriate to include a country risk premium in estimating the cost of equity.

Increase in downside risk

In corporate finance theory, the increase in downside risk is generally accounted for by lowering expected cash flows to account for negative contingencies (rather than adjusting the discount rate). However, it may be difficult to assign probabilities to the downside risk arising from changes in economic conditions in Italy (and this approach is even more difficult to implement in a regulatory context). There is therefore an argument for adding a premium to the discount rate directly.

2.4.2 Methodology

There is no single widely accepted methodology for quantifying the impact of country risk on the cost of equity, although various approaches have been proposed in the literature and applied by practitioners. One approach is to assume that the extra return demanded by equity investors for exposure to sovereign risk can be approximated by the additional default premium required by investors to hold bonds in Italy.

While the cost of equity compensates investors for a different set of risks than the cost of debt, using data from debt markets can still provide some insight on the country risk premium. Intuitively, the country risk premium on equity would be expected to be at least as big as the country risk premium on debt, since equity-holders are the residual claimants on a firm's cash flows.[8]

[5] French, K. and Poterba, J. (1991), 'Investor diversification and international equity markets', *American Economic Review*, **81**, pp. 222–6.
[6] Coval, J. and Moskowitz, T. (1999), 'Home Bias at Home: Local Equity Preference in Domestic Portfolios', *Journal of Finance*, **54**:6, December.
[7] Ball, C. and Torous, W. (2000), 'Stochastic Correlation Across International Stock Markets', *Journal of Empirical Finance*, **7**:3–4, pp. 373–88, November.
[8] Damodaran, A. (2015), 'Equity Risk Premium (ERP): Determinants, Estimation and Implications – The 2015 Edition', March.

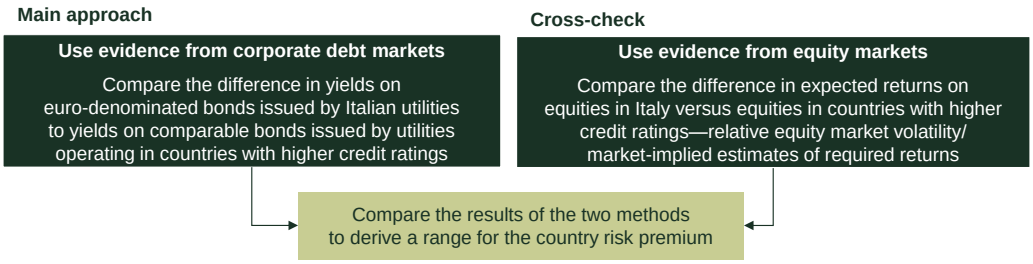
One potential caveat to this logic is that debt yields reflect promised rather than expected yields. However, for all investment-grade bonds, the default probability is quite low, and so promised yields would not be materially different from expected returns (which reflect systematic risk only).

Using corporate credit risk as a measure of sovereign equity risk is also one of the approaches employed by practitioners in the absence of more robust estimates of country equity risk.[9]

Another approach is to use evidence directly from the equity markets. A common proxy used by practitioners is the relative volatility of different national equity markets, since volatility is typically related to risk. However, this approach may understate the risk of relatively illiquid markets and overstate the risk of relatively liquid markets.[10] The differences in the composition of the national equity indices may also affect the comparability of volatility statistics across markets. Other measures of the country risk premium may be derived from DGM-based forward-looking models of equity returns.

We discuss the practicality and the results under each approach in turn. A summary of our approach is shown in Figure 2.4.

Figure 2.4 Summary of our approach



Source: Oxera.

2.4.3 Debt market evidence

Approach 1: Country bond default spread

This approach, used by a number of practitioners, adds the spread between yields on government bonds of the country in question (in this case Italy) and the RFR either directly to the cost of equity or to the 'normal' ERP.

There is some empirical evidence of correlation among country credit ratings, future equity returns and equity market volatility in a particular country.[11] Similar correlations are also found in some markets between more general risk scores (which incorporate financial and economic factors influencing credit ratings) and equity market volatility.[12] The evidence implies that changes in country bond yields, which are a function of the country credit rating, have some correlation to

[9] Damodaran, A. (2003), 'Measuring Company Exposure to Country Risk: Theory and Practice', September, Stern School Of Business, New York University; Erb, C., Harvey, C. and Viskanta, T. (1996), 'Expected Returns and Volatility in 135 Countries' *Journal of Portfolio Management*.
[10] Damodaran, A. (2015), 'Equity Risk Premium (ERP): Determinants, Estimation and Implications – The 2015 Edition', March.
[11] Erb, C., Harvey, C. and Viskanta, T. (1995), 'Country risk and global equity selection', *Journal of Portfolio Management*, **9**, pp. 74–83.
[12] Harvey, C. (2004), 'Country risk components, the cost of capital, and returns in emerging markets', in S. Wilkin (ed.), *Country and Political Risk: Practical Insights for Global Finance*, Risk Books, pp. 71–102.

expected equity market returns. This approach has the advantage of being relatively straightforward to implement.[13]

Based on the evidence presented in Table 2.1 this could imply a country risk premium for Italy of around 1% based on the most recent evidence and a larger premium if more weight is given to historical evidence.

However, to the extent that expected returns for regulated network utilities may be less affected by the national fiscal concerns than returns on government bonds, this approach may overstate the necessary country risk premium in a regulatory context.

A number of Italian utilities have higher credit ratings than the Italian government and therefore might be able to raise debt more cheaply than the state.[14] This could also translate into lower required returns on equity. This is why we consider a variant of the approach above—'utility bond default spread'.

Approach 2: Utility bond default spread

In this approach, the country risk premium is estimated as the yield on corporate bonds of Italian regulated utilities minus the equivalent yield on corporate bonds from companies operating in countries that have not suffered from fiscal concerns.

The rationale for this approach is similar to the first approach, but effectively assumes that the extra equity risk of Italian utilities compared with, for example, German or Dutch utilities, can be approximated by differences in the default premium paid by Italian utilities relative to German or Dutch utilities.

For each traded Italian utility bond, a selection of comparator bonds and the difference in yields is calculated. A total of 13 Italian bonds is used, with several comparators for each bond. Comparator bonds include euro-denominated bonds of German, Dutch, French, Belgian and UK utilities of similar maturity (all comparator bonds mature within one year of the Italian bond).

The difference in yields is used as a proxy for the country risk premium. In this respect, differences in ratings between Italian bonds and bonds of utilities in 'safe' countries might be a manifestation of country risk. For example, country risk is one of the factors that feeds into S&P's assessment of business risk. Recent ratings reports assume that country risk is 'moderately high' for Italian utilities, but is 'low' or 'very low' for other utilities used in the analysis.[15] In other words, all else equal, a utility in Italy could in theory have a lower credit rating than an otherwise identical utility operating in Germany simply because it operates in Italy. Therefore, we allow comparator bonds to have a different credit rating to their Italian counterpart in order to exploit this variation in country risk exposure.

In practice, observed differences in credit ratings are also likely to capture company-specific characteristics, which are difficult to disentangle from country risk. Nonetheless, such analysis can still provide a useful reference point for the country risk premium.

Table 2.2 summarises the results of this analysis. More detailed results for each comparator bond are presented in Appendix A2.

[13] Damodaran, A. (2003), 'Measuring Company Exposure to Country Risk: Theory and Practice', September, Stern School of Business, p. 8.
[14] For example, Snam and Terna have an S&P credit rating that is one-notch higher than that of Italy.
[15] S&P ratings opinion publications for 2014 for A2A, Acea, Enel, Snam, Terna, Elia, E.on, TenneT.

Table 2.2 Difference in yields on Italian utility bonds versus selected comparator bonds (%)

Averaging period	Minimum	Maximum	Average
Spot (12 March 2015)	0.14	0.42	0.25
One year	0.08	0.73	0.33
Two years	0.25	1.06	0.61

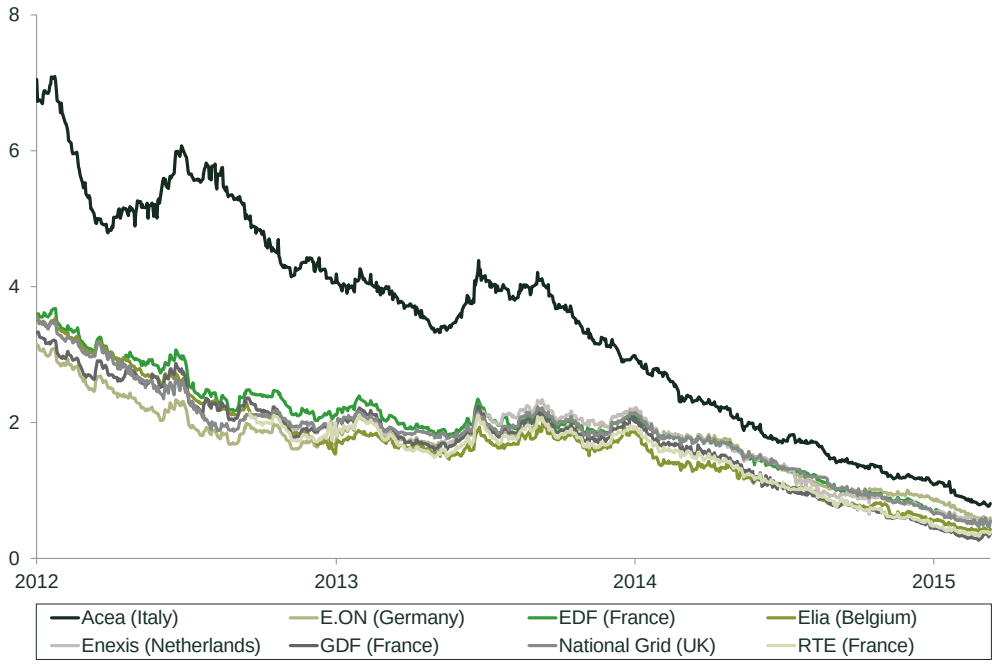
Note: All bonds are straight fixed-coupon bullet securities. All comparator bonds mature within one year of the maturity date of the relevant Italian utility company's bond. One- and two-year figures exclude bonds that were issued quite recently and for which data is missing.

Source: Oxera analysis, based on Bloomberg and Datastream.

The evidence shows that the CRP derived under this approach would be smaller compared with the first approach based on government bond yields. Recent evidence suggests a country risk premium somewhere in the range of 0.3–0.6%.

The differences in corporate bond yields, similar to the trend in government bond yields, have reduced since the peak of the eurozone debt crisis. Figure 2.5 illustrates the compression of the country risk premium over time for one of the comparator bonds underpinning the results of Table 2.2.

Figure 2.5 Example of comparator analysis: nominal yields on Acea's bond and selected comparator bonds (%)



Note: All bonds are straight fixed-coupon bullet securities.

Source: Oxera analysis, based on Bloomberg and Datastream.

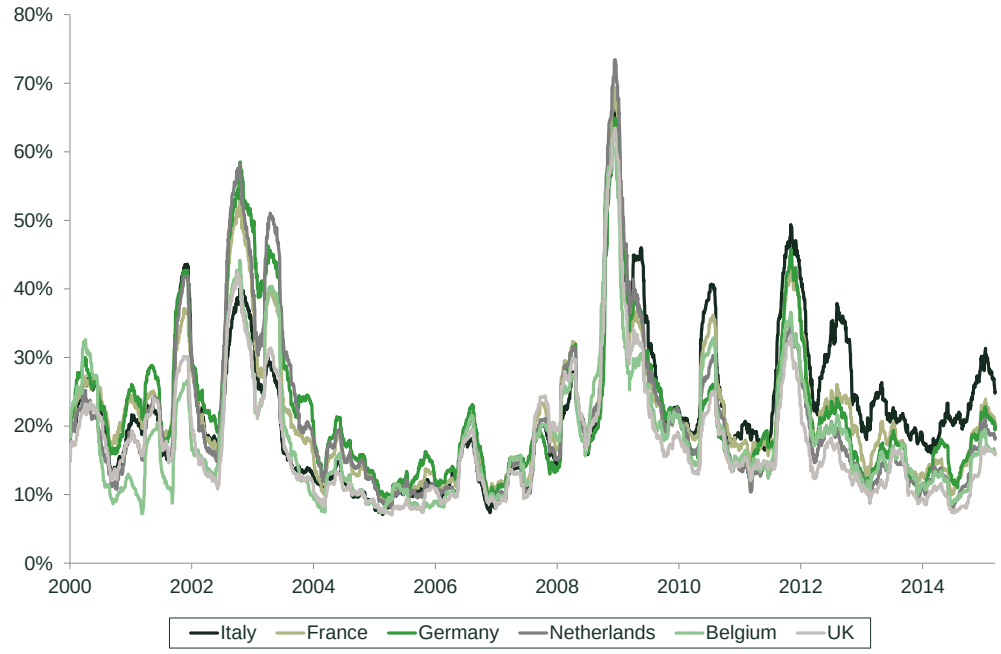
2.4.4 Equity market evidence

Approach 1: Relative equity market volatility

This approach assumes that differences in equity risk between markets are captured by differences in the volatility of national equity markets. Under this approach, the ERP calculated for 'normal' market conditions would be scaled by the relative volatility of the equity markets of the two countries in order to

estimate the cost of equity.[16] Figure 2.6 and Table 2.3 show that the Italian stock market has been more volatile than the 'safer' eurozone equity markets in recent years, but not necessarily over a longer time period.

Figure 2.6 Equity market volatility of the CAC 40, DAX 30, AEX, FTSE MIB, & BEL 20 indices



Note: Rolling three-month annualised volatility.

Source: Oxera analysis, based on Datastream.

Table 2.3 Volatility of Italian equity market relative to other national equity markets

Averaging period	Germany	Netherlands	France	Belgium	UK	Average
Spot (12 March 2015)	1.25	1.37	1.23	1.57	1.55	1.39
One year	1.30	1.73	1.47	1.81	2.13	1.71
Five years	1.48	1.57	1.27	1.51	1.78	1.50

Note: Rolling three-month annualised volatility for each pair of countries.

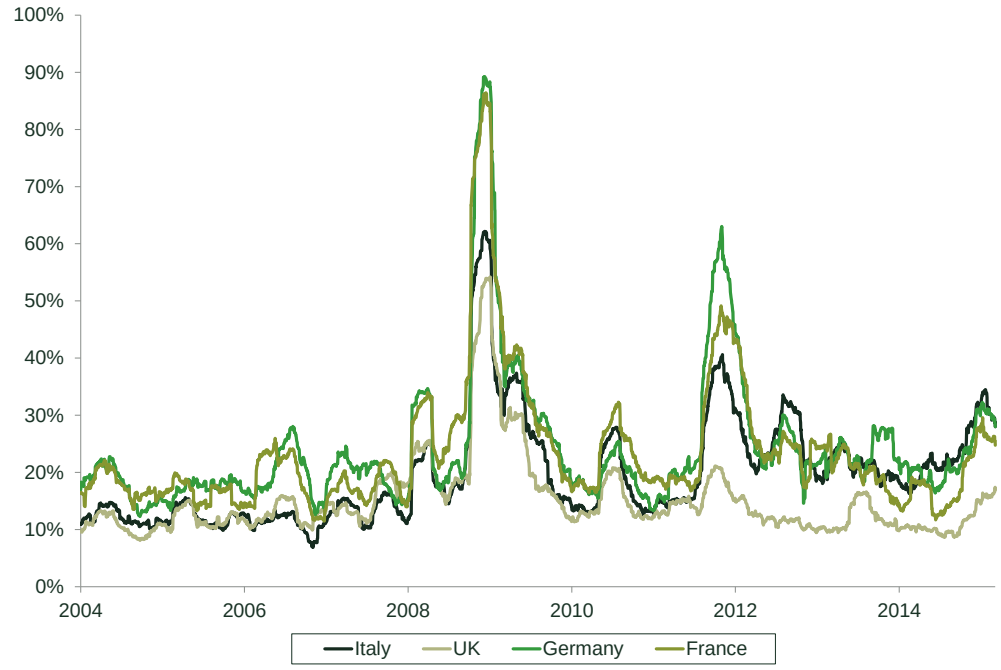
Source: Oxera analysis, based on Datastream.

It should be noted that these estimates of the country risk premium are not directly comparable with those presented in sub-section 2.4.3. This is because, under this approach, the estimate of the relative equity market volatility should be multiplied by the ERP, rather than being added either to the ERP or to the cost of equity. For illustration purposes, if the 'normal' ERP is 5%, the total ERP would be 6.95% (based on the spot relative volatility of 1.39) and the country risk premium would in effect equal 1.95% for a company with average market risk. This is significantly higher than the country risk premia derived using debt market evidence.

[16] Damodaran, A. (2003), 'Measuring Company Exposure to Country Risk: Theory and Practice', September, Stern School of Business, p. 8.

To understand whether the country risk premium derived under such an approach is applicable to the utilities sector, a similar exercise can be carried out, comparing only the relative volatility of utility stocks. Figure 2.7 suggests that the volatility of the utility constituents of the Italian stock market is also higher than that of the utility constituents of other national indices considered, although the difference is generally smaller. In particular, there is little difference between the volatility of Italian utilities and that of German utilities.

Figure 2.7 Volatility of utility stocks



Note: Rolling three-month annualised volatility.

Source: Oxera analysis, based on Datastream.

Table 2.4 Volatility of Italian utilities index relative to other national utility indices

Averaging period	Germany	France	UK	Average
Spot (12 March 2015)	1.00	1.13	1.64	1.26
One year	1.08	1.32	2.15	1.52
Five years	0.94	1.01	1.76	1.24

Note: Rolling three-month annualised volatility for each pair of indices.

Source: Oxera analysis, based on Datastream.

This could be indicative of the fact that, all else equal, the difference in the required returns for stocks in Italy versus stocks in other jurisdictions is smaller for utilities compared with average equities.

Approach 2: Evidence from forward-looking models

An alternative way to assess differences in required returns is to compare the DGM-implied cost of equity across countries/companies. Based on third-party evidence produced by Credit Suisse, the current cost of equity for Italian firms is about 1–1.5% higher than for firms in Germany, France and the UK.[17] This

[17] Credit Suisse (2015), 'Credit Suisse Global Investment Returns Yearbook 2015', p.31, based on the figure showing market-implied discount rates for industrial and service firms in key equity markets.

evidence is broadly consistent with recent evidence on relative market volatility for the market as a whole.

To consider whether the same applies to utilities, we consider a one-stage variant of the DGM model in which the expected cost of equity is simply equal to the sum of the prospective dividend yield and the long-term growth rate. Making the bold assumption that the long-term growth rate for utilities across Europe is broadly similar, the prospective dividend yield on its own can then be used as a proxy for the differences in the expected cost of equity.

Table 2.5 shows that, most recently, the difference in prospective dividend yields between Italian utilities and utilities in the other markets considered in our analysis has narrowed. This evidence appears to be broadly consistent with the evidence on the volatility of utility stocks, which suggests a smaller country risk premium for the utilities sector than for the average Italian stock.

Table 2.5 Prospective dividend yields for a sample of utility companies (%)

Averaging period	Average dividend yield for Italian utility stocks	Average dividend yield for utility stocks in other markets	Difference
Spot (12 March 2015)	4.2	4.2	0.0
One year	4.4	4.2	0.2
Five years	6.8	5.5	1.3

Note: Computed using 12-month forward dividends per share. Rounded to one decimal point.

Source: Oxera analysis, based on Datastream.

The estimates from forward-looking models of required returns and simple proxies such as the dividend yield, while generally consistent with the relative equity market volatility analysis, depend on a number of relatively arbitrary assumptions (e.g. regarding the long-term growth in dividends). Therefore, we use them mainly as a high-level cross-check.

2.4.5 Summary

Overall, the evidence considered in this section suggests that country risk is a relevant consideration in the current context.

Evidence from debt markets for utilities suggests that this premium is likely to be around 0.5%. Evidence from equity markets is mixed but generally suggests that there is a risk premium for equity in Italy, and this premium is not immaterial (potentially in excess of 1.5%). However, in our methodology we would like to capture the country risk premium on equity specific to regulated utilities. There appears to be some indication that the premium required by equity investors in the utility stocks might be somewhat smaller than for average equity.

Based on the evidence reviewed, a country risk premium on equity for regulated utilities in the order of magnitude of 0.5–1% seems quite plausible.

3 High-level recommendations in estimating sector-specific parameters

In this section we provide a high-level overview of the principles underpinning the estimation of the sector-specific parameters. We discuss the asset beta in section 3.1, gearing in section 3.2, and cost of debt in section 3.3. We also cover the small-company premium in section 3.4.

3.1 Asset beta

Beta is a measure of systematic risk in the CAPM. Although a forward-looking concept, in practice its estimation means relying on the interpretation of historical market data.

For a company listed on the stock market, the equity beta can be estimated using information on actual share returns and market returns using simple regression analysis. There are, however, several practical issues involved in beta estimation.

3.1.1 Practical issues in beta estimation

Data frequency

Equity betas can be estimated using daily, weekly or monthly observations. The statistical robustness of the beta estimates is directly proportional to the number of observations used in the regression analysis, which would advocate the use of daily data. This assumes that daily returns are not serially correlated, and that the impact of any general market event is incorporated into the stock price on the same day.[18]

The latter assumption in particular might not hold for less frequently traded stocks, in which case information could take longer than one day to have an impact on the stock price. If this is the case, beta estimates based on daily data might be biased downwards. One practical way to tackle the issue is to check how liquid the stock is prior to performing the beta estimation.

Timeframe

Another issue is over what time period to estimate the beta. Betas varying over time may reflect the fact that the underlying correlation between company and market returns is changing over time. This is directly relevant to the decision about the time period over which to estimate the beta.

Using a longer time period gives a larger dataset, which should reduce the standard error of the estimates. However, if systematic risk is changing over time, using a longer time period might be less relevant for trying to assess the current (or, to be more precise, forward-looking) market risk exposure of a company.

Companies' beta risk changes over time for a variety of reasons, including changes in the business mix through acquisitions and disposals, and in market perceptions of certain business activities.

[18] Wright, S., Mason, R. and Miles, D. (2003), 'A Study into Certain Aspects of the Cost of Capital for Regulated Utilities in the U.K.', on behalf of Smithers & Co Ltd, section 4.1.

To balance the trade-off between statistical precision and using a most recent reading of the beta, estimating a two-year beta based on daily observations is usually appropriate.

Cross-checks against betas estimated over a longer time period (e.g. five-year weekly) can be used if the companies operate in a relatively stable and mature industry where market perceptions of relative business risk are not expected to change significantly over time. However, in this case it is useful to check that the companies have not gone through significant corporate changes.

Comparator analysis

By far the main challenge in estimating the beta for a specific economic activity is that it is difficult to find businesses with a stock market listing that are involved only in the specific activity of interest. In the absence of relevant stock market data, comparator analysis will be required.

In choosing comparators, it is important to ensure availability of data and sufficient liquidity of the stocks to allow a robust estimation of the beta. Most importantly, it is necessary to choose comparators with a sufficiently high share of profits or revenues generated by the business line of interest. In the current context, the majority of profits or revenues should come from the regulated networks businesses.

In international comparisons, differences in the regulatory regime may also affect the measured beta. However, given the limited number of pure-play regulated companies listed in Europe, it is typically necessary to consider evidence from different countries.

3.1.2 Relationship between the asset and the equity beta

The asset beta, rather than the equity beta, is a more relevant measure for assessing business risk, as it is not affected by the choice of capital structure.

Assuming a combination of debt and equity financing, the asset beta is a weighted average of the equity beta and the debt beta, as described by the following equation:

$$\beta a = \beta e * (E/(D+E)) + \beta d * (D/(D+E))$$

where:

E = market capitalisation of the firm;

D = market value of the debt.[19]

We note that this is one of the formulae used for un-levering and de-levering betas. This is the Miller formula, which is typically suitable when the gearing ratio is assumed to stay broadly constant over the price control period; although some regulators use other formulae (e.g. the Modigliani–Miller formula, which also incorporates a tax adjustment).

For a fully equity-financed firm, the asset beta is therefore the same as the equity beta. However, for a firm with significant amounts of debt financing, the asset beta and the equity beta may be very different.

This is of particular relevance in the regulatory context where it is often necessary to compare beta metrics across different firms. To ensure that the

[19] The market value of debt is not always observable, and the book value is often considered a proxy.

comparison is not 'polluted' by financial risks (which are a function of a company's capital structure choices), any comparisons between firms or sectors are best performed at the level of the asset beta.

3.2 Gearing

Most regulators typically want to estimate the cost of capital for a notional efficiently financed company. This means that the gearing ratio used in the WACC formula will not necessarily equal the actual observed gearing ratio for the company.

Regulators aim to choose the gearing ratio that strikes the right balance between the tax benefits of higher gearing and the potential costs of financial distress associated with higher gearing. This does not necessarily mean using observed gearing.

In some jurisdictions regulators also want to ensure that the regulated company can finance its functions. In practice, this often means ensuring that the regulated entity can maintain a comfortable investment-grade credit rating (e.g. BBB+ or A-). This condition in itself might impose constraints on what the appropriate gearing level should be since credit rating agencies will have specific gearing targets for different credit ratings.

A regulator will normally consider the following sources of evidence:

- actual observed gearing for the regulated entity (entities);
- observed gearing from comparator companies/industries—for example, if comparators are used to estimate the beta, the regulator might consider their gearing;
- guidance from credit rating agencies;
- regulatory precedent—for example, gearing adopted in previous regulatory decisions or in similar sectors by other regulators.

Guidance from the credit rating agencies and analysis of financial flexibility for a given credit rating are usually the key drivers of a regulator's decision. For example, Moody's guidance for regulated networks indicates that a gearing of 45–60% would be consistent with an A rating, and a gearing of 60–75% would be consistent with a BBB rating.[20]

Other parameters of the cost of capital may also need to be consistent with the chosen gearing level.

- The cost of debt should be consistent with the chosen gearing level and credit rating (for example, a high level of gearing might imply a worse credit rating, and therefore higher debt costs, and vice versa).
- The cost of equity should increase proportionately with higher gearing to reflect higher risk (through the equity beta).

Table 3.1 shows recent regulatory precedents on gearing, which mostly lie in the 50–65% range.

[20] Moody's (2009), 'Regulated Electric and Gas Networks', Rating Methodology, August.

Table 3.1 Regulatory precedents on gearing

Country	Decision	Gearing (%)	Sector
Germany	BNetzA 2011	60	Electricity and gas, distribution and transmission
Ireland	CER 2012	55	Gas transmission
Great Britain	Ofgem 2012 (1)	60	Electricity transmission
Great Britain	Ofgem 2012 (2)	62.5	Gas transmission
Great Britain	Ofgem 2012 (3)	65	Gas distribution
Netherlands	ACM 2013	50	Electricity and gas, distribution and transmission
France	CRE 2013	60	Electricity transmission
Italy	AEEGSI 2013 (1)	44.4	Transmission
Italy	AEEGSI 2013 (2)	44.4	Electricity distribution
Italy	AEEGSI 2013 (3)	37.5	Gas distribution
Great Britain	Ofgem 2014	65	Electricity distribution
Portugal	ERSE 2014	55	Electricity transmission

Note: Gearing should be interpreted as the debt to assets ratio.

Source: Various regulatory documents, and Oxera analysis.

The gearing used by AEEGSI is generally lower than the assumptions used in other jurisdictions. However, if this is consistent with observed financing structures of the industry and as long as changes in gearing appropriately feed into changes in the individual WACC parameters, the overall impact of the gearing assumption on the WACC should not be material.

3.3 Cost of debt

There are broadly two main approaches used by regulators to estimate the cost of debt:

- recognise the costs of efficiently incurred existing debt and that only a proportion of total debt will need to be refinanced over the period at prevailing market rates;
- take into account the forward-looking cost of debt only in order to recognise the costs that an efficient new entrant to the market would face in the current market conditions.

In the UK, the majority of regulators—in particular those of core infrastructure sectors such as energy and water—have an explicit financing duty. As a result, they tend to use the first approach. In continental Europe, a mix of approaches is used (Table 3.2).

Table 3.2 Regulatory precedents on cost of debt (pre-tax, nominal)

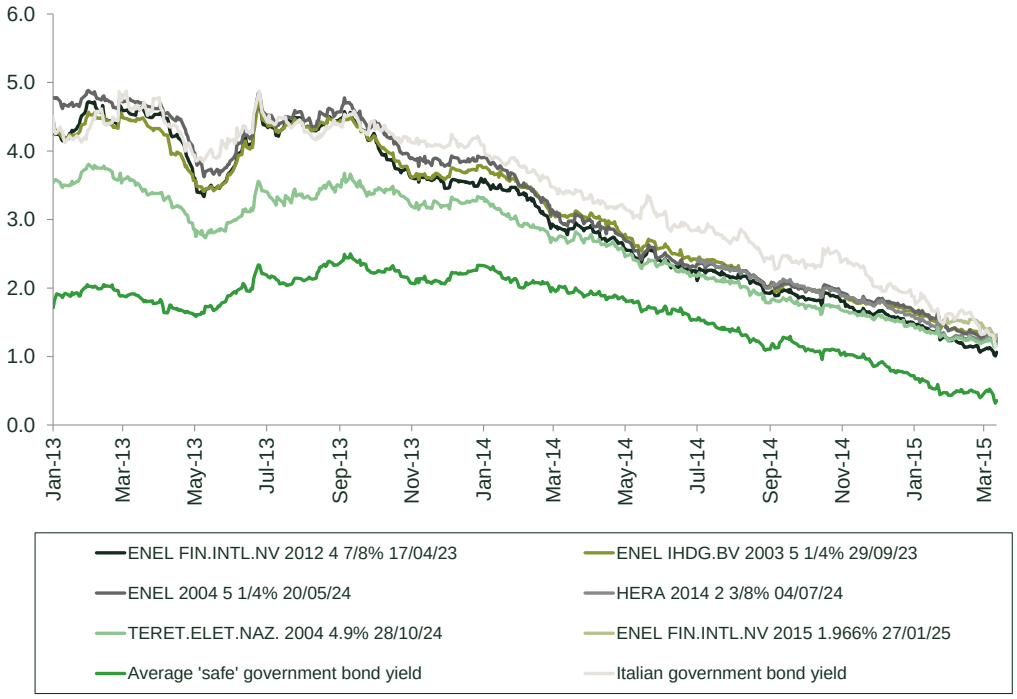
Country	Decision	Cost of debt (%)	Methodology
Germany	BNetzA 2011	n.a.	Cost of debt treated as a pass-through
Ireland	CER 2012	6.4	Weighted average of the cost of new debt (which incorporates the crisis premium) and the cost of existing debt over the price control period, taking into account the company's refinancing requirements
Great Britain	Ofgem 2012	5.6	Ten-year simple trailing average of yields on iBoxx A and BBB GBP non-financial indices deflated by break-even inflation (estimated from nominal and real gilt yields published by the Bank of England) Cost of debt indexed annually. The allowance shown is for 2015–16
Netherlands	ACM 2013	3.9	No detail provided
France	CRE 2013	4.6	Calculated as risk-free rate plus debt premium (no detail provided as to how the latter is estimated)
Italy	AEEGSI 2013	5.5	No detail provided
Great Britain	Ofgem 2014	5.6	Ten-year simple trailing average of yields on iBoxx A and BBB GBP non-financial indices deflated by break-even inflation (estimated from nominal and real gilt yields published by the Bank of England) Cost of debt indexed annually. The allowance shown is for 2015–16
Portugal	ERSE 2014	4.4	No detail provided

Source: Various regulatory documents, Datastream, and Oxera analysis.

Regardless of the approach used, given the current macroeconomic climate it would be appropriate to use evidence specific to the Italian utilities to capture any possible country risk premium in the cost of debt. Using generic evidence from European corporate bond markets or from utilities in other European countries may not capture this.

Figure 3.1 shows current yields for a selection of Italian long-term utility bonds. Most of the bonds are trading at lower yields than the Italian government, further illustrating why it might be better to directly consider the all-in-cost of debt faced by these companies, rather than estimating as the sum of the RFR and a debt premium.

Figure 3.1 Nominal yields on selected Italian utility bonds, remaining time to maturity of eight to ten years (%)



Source: Datastream, and Oxera analysis.

Evidence on current yields can be used to assess the cost of new debt for the period. Depending on how frequently the cost of debt parameter is reviewed, some allowance for the possibility of increasing interest rates over the regulatory period may need to be factored into the cost of new debt.

If the regulator has a financing duty, this evidence may need to be combined with evidence on the cost of existing debt. This can be estimated using the yield at issuance for Italian utility bonds that are still outstanding, to reflect typical issuance patterns at the industry level. Alternatively, the regulator may consider the specific issuance profile of each regulated company in the sector. (In practice, this may be difficult in sectors with a fragmented structure and companies of various sizes.) Yet another option in the context of a fragmented sector might be to consider a small-company premium (discussed in the next sub-section).

3.4 Small-company premium

In some of the sectors regulated by AEEGSI, the industry is made up of companies of different sizes and structures. Historically, AEEGSI has used one WACC per sector, although, in principle, the rate of return required by investors might differ between different types of company in the same sector.

In a regulatory context, the extent to which size is taken into account in setting the cost of capital may depend on the extent to which company size is within a company's control and to what extent the existing industry structure is considered to be efficient. Another important consideration is whether the regime has historically encouraged diversity of company structures and sizes, and reflected this in setting the regulatory parameters.

There are some examples of regulators estimating different costs of capital for different firms in the same industry. In the water industry in England and Wales,

the issue of company-specific uplifts to the cost of capital that are related to size has attracted significant attention.

On the debt side, until the most recent price control determination in 2014, the allowed cost of debt for smaller water-only companies (WOCs) was higher than for larger water and sewerage companies (WASCs). This reflected the regulator's recognition that WOCs had more limited access to debt finance because of their size and that this generally translated into higher cost. However, in 2014, Ofwat decided that an uplift on the cost of debt should be given only to companies that could demonstrate offsetting customer benefits to justify the higher costs.

On the equity side, until 2009 Ofwat also recognised that the rate of return required by equity investors in WOCs was greater, largely due to the higher trading costs associated with trading equity in smaller companies. In 2009, Ofwat concluded that the evidence of higher trading costs was less conclusive, especially given that most WOCs were no longer publicly listed. However, it acknowledged that WOCs could be more exposed to specific risks (low-probability events, such as a major disruption to a water treatment facility), which in turn led it to adopt a lower notional level of gearing for the WOCs.

In the particular example of the water sector in England and Wales, the arguments for including a small-company premium are strong both on the basis of available evidence on companies' financing costs, and, more importantly, because of the nature of the regulatory framework. Ensuring a sufficient number of companies in the industry has historically been an important objective for the regulator; and there several factors that disincentivise further consolidation.

However, in the absence of similar considerations in the energy sectors in Italy and given the historical application of a single sector WACC, there is no obvious reason for AEEGSI to deviate from this approach in the future.

4 Mid-period review of the WACC

AEEGSI currently updates the risk-free component of the WACC every two years, while keeping the other parameters unchanged during the period for which the WACC is set for (which will be six years going forward).

A number of options can be considered for reviewing the parameters mid-period. The pros and cons of these options are assessed in detail in Appendix A3.

If the objective of the regulator is to continue updating the WACC mid-period, a trigger mechanism could be introduced, whereby the allowed cost of capital (or a component of it) is adjusted only if some clearly defined benchmark moves beyond (i.e. above or below) some pre-determined threshold might be appropriate.

The options for which parameters to review if an update is triggered could include the following.

- Updating the **cost of debt** only. This would focus on ensuring financeability of regulated companies in cash terms; however, the cost of equity would be left unchanged. As the cost of debt can be directly observed, it would be feasible to come up with a relatively objective mechanism for ensuring that any significant movements in the cost of raising finance are reflected in the WACC. This would reduce the financing risk borne by the companies, as long as the updating mechanism appropriately reflects typical debt issuance patterns of the industry.

- Updating the **cost of debt** and the **country risk premium** component of the cost of equity. Given our recommendation to take a relatively long-term view of the TMR and use it as the anchor point to derive the RFR and the ERP, not adjusting the TMR during the period could be reasonable. It is unlikely that there would be objective evidence that can be used to mechanistically adjust the TMR every two years. Instead, a full review of the TMR evidence could take place at the time of the next full regulatory reset. On the other hand, country risk premium estimates have been quite volatile over the last few years. Having a mechanism in place that allows significant movements in this parameter to be reflected in the WACC could reduce investors' risk exposure.

- A **re-opener** where all of the parameters are reviewed based on the available evidence. This would not necessarily follow a mechanistic formula, and would allow AEEGSI to update all the parameters if necessary. This would have the advantage of providing AEEGSI with extra flexibility, but it could create unnecessary regulatory burden and potentially increase the uncertainty for the regulated companies.

An objective benchmark for the trigger under all three options above could be the Italian government bond yield. For example, if at the time of the two-year review, the 12-month average of the Italian government bond yield is 1% higher or lower than the 12-month average at the time of the previous review, an update of the WACC would be triggered.

The movement in the Italian government bond yield will not necessarily affect how the WACC is adjusted. The level of the Italian government bond yield does not feature in our recommendations for the cost of equity or for the cost of debt. However, the WACC parameters—in particular, the cost of debt and the country risk premium—are likely to be correlated with the Italian government bond yield.

Since it is important for the trigger to be based on an easily observed statistic, the Italian government bond yield could serve this purpose.

All three trigger options above can potentially work in practice. The final choice depends on what trade-offs the regulator is comfortable with—for example, between factors such as ensuring financeability of regulated companies, ensuring stability of prices, and ensuring predictability of the regulatory parameters.

A1 Regulatory precedent

Table A1.1 Regulatory decisions considered in this report

Country	Regulator	Decision year	Period for which WACC applies	Shorthand	Sector
Germany	BNetzA	2011	2013/14–2017/18	BNetzA 2011	Electricity and gas, distribution and transmission
Ireland	CER	2012	2012–17	CER 2012	Gas transmission
Great Britain	Ofgem	2012	2013–21	Ofgem 2012 (1)	Electricity transmission
Great Britain	Ofgem	2012	2013–21	Ofgem 2012 (2)	Gas transmission
Great Britain	Ofgem	2012	2013–21	Ofgem 2012 (3)	Gas distribution
Netherlands	ACM	2013	2013–16	ACM 2013	Electricity and gas distribution and transmission
France	CRE	2013	2013–16	CRE 2013 (1)	Electricity transmission
France	CRE	2013	2013–16	CRE 2013 (2)	Gas transmission
Italy	AEEGSI	2013	2014–15	AEEGSI 2013 (1)	Transmission
Italy	AEEGSI	2013	2014–15	AEEGSI 2013 (2)	Electricity distribution
Italy	AEEGSI	2013	2014–15	AEEGSI 2013 (3)	Gas distribution
Great Britain	Ofgem	2013	2015–23	Ofgem 2014	Electricity distribution
Portugal	ERSE	2014	2015–18	ERSE 2014	Electricity transmission

Table A1.2 Regulatory precedents on risk-free rate

Country	Decision	Nominal RFR (%)	Real RFR (%)	Methodology
Germany	BNetzA 2011	3.8*	2.2	Ten-year arithmetic trailing average of annual yields on a nominal bond index containing bonds issued by various institutions
Ireland	CER 2012	6.5	4.5*	Includes a crisis premium in addition to the RFR (underlying RFR redacted in the decision)
Great Britain	Ofgem 2012	5.0	2.0	Long-term estimate
Netherlands	ACM 2013	2.5*	0.5	Three-year average of ten-year German and Dutch government nominal bonds
France	CRE 2013	4.0*	2.0*	Maintained RFR assumed in ATRD3 (previous decision)
Italy	AEEGSI 2013	4.4*	2.6	Average of ten-year Italian government bond yields over the 12-month period covering October 2012–September 2013
Great Britain	Ofgem 2014	4.5	1.5*	Long-term estimate adjusted for more recent market evidence
Portugal	ERSE 2014	2.4*	0.4	Five year average of ten-year government bonds yields in Germany, Austria, Finland, Netherlands

Note: * Figures explicitly specified by the regulator. The other figures are estimated by Oxera given parameters specified in regulatory decision documents. If an inflation is not given, the European Central Bank target of 2% has been used, except for Great Britain (where a Retail Prices Index statistic is used instead). Although in some years regulators have made a decision for more than one sector, market parameters are usually the same for all sectors.

Source: Various regulatory documents, and Oxera analysis.

A2 Additional evidence on the country risk premium

Italian bond	Maturity date	Comparator bonds (Country of domicile, Rating)	Spot (average)	Spot (min.)	Spot (max.)	1-year average
2i Rete (BBB)	16/07/2019	Elia (Belgium, A-), GDF (France, A), RTE (France, A+), RWE (Germany, BBB+)	0.35	0.28	0.41	0.46
2i Rete (BBB)	16/07/2024	EDF (France, A+), EnBW (Germany, A-)	0.35	0.31	0.39	0.52
A2A (BBB)	02/11/2016	EDF (France, A+), EnBW (Germany, A-), Gasunie (Netherlands, A+), RTE (France, A+)	0.24	0.19	0.28	0.43
A2A (BBB)	13/01/2022	E.ON (Germany, A-), EDF (France, A+), Enexis (Netherlands, A+), GDF (France, A), Gasunie (Netherlands, A+), RTE (France, A+), RWE (Germany, BBB+), TenneT (Germany, A-)	0.42	-0.11	0.79	0.73
Acea (BBB-)	16/03/2020	E.ON (Germany, A-), EDF (France, A+), Elia (Belgium, A-), Enexis (Netherlands, A+), GDF (France, A), National Grid (UK, BBB+), RTE (France, A+)	0.32	0.21	0.45	0.52
ENEL (BBB)	12/06/2018	EDF (France, A+), EnBW (Germany, A-), GDF (France, A), National Grid (UK, BBB+), RTE (France, A+), RWE (Germany, BBB+), TenneT (Germany, A-)	0.20	0.11	0.30	0.29
ENEL (BBB)	17/04/2023	E.ON (Germany, A-), EDF (France, A+), GDF (France, A), Gasunie (Netherlands, A+), RTE (France, A+), TenneT (Germany, A-)	0.20	-0.22	0.45	0.45
Hera (BBB)	16/02/2016	E.ON (Germany, A-), Elia (Belgium, A-), GDF (France, A), Gasunie (Netherlands, A+), RWE (Germany, BBB+)	0.24	0.07	0.38	0.14
Hera (BBB)	04/10/2021	E.ON (Germany, A-), EDF (France, A+), Enexis (Netherlands, A+), GDF (France, A), Gasunie (Netherlands, A+), RTE (France, A+), RWE (Germany, BBB+), TenneT (Germany, A-)	0.20	-0.36	0.54	0.35
SNAM (BBB)	11/07/2016	E.ON (Germany, A-), EDF (France, A+), Elia (Belgium, A-), EnBW (Germany, A-), GDF (France, A), Gasunie (Netherlands, A+)	0.14	-0.03	0.22	0.22
SNAM (BBB)	22/01/2024	E.ON (Germany, A-), EDF (France, A+), EnBW (Germany, A-), GDF (France, A), TenneT (Germany, A-)	0.25	0.09	0.50	0.24
Terna (BBB)	16/02/2018	E.ON (Germany, A-), EDF (France, A+), GDF (France, A), National Grid (UK, BBB+), RWE (Germany, BBB+), TenneT (Germany, A-)	0.16	0.05	0.28	0.17
Terna (BBB)	28/10/2024	EDF (France, A+), EnBW (Germany, A-)	0.14	0.10	0.18	0.08
Average			**0.25**	**0.05**	**0.40**	**0.35**

Note: Cut-off date is 12 March 2015.

Source: Oxera analysis, based on Datastream.

A3 Options for mid-period WACC review

In principle, especially at times of market uncertainty, a mechanism to account for unexpected changes in specific cost of capital parameters may be used. The general mechanisms available to regulators to deal with uncertainty in particular parameters of the regulatory contract could include the following.

- **A trigger mechanism**, whereby the allowed cost of capital (or a component of it) is adjusted for movements in some clearly defined benchmark above or below some pre-determined threshold.
- Provisions for **a price control re-opener**. A re-opener could be assessed under a similar basis as a trigger, but its occurrence would be subject to the discretion of the regulator and company. One important difference relative to a trigger approach is that in the event of the price control being re-opened, all parameters of the price control could be reassessed, whereas the scope of a trigger could be limited to the cost of capital parameter or some specific component of the cost of capital.
- **An indexation mechanism**, whereby the allowed cost of capital (or a component of it) varies mechanically with some clearly defined benchmark.
- **An ex post pass-through** of the actual cost of capital (or a component of it) would be very similar to the indexation mechanism, except that the allowed revenue would be updated to cover the actual cost incurred by the company, for example with respect to the cost of debt.

The proposed options can be assessed against a range of criteria.

- **Incentives**: is the approach consistent with efficiency incentives—for example, by preserving the scope for outperformance?
- **Financeability**: is the approach consistent with the regulator's financing duty, such that, for example, in the event of adverse market shocks there is enough flexibility to adjust tariffs as necessary in a timely manner?
- **Customer tariffs**: what is the impact of the approach on customer tariffs? Importantly, would it broadly maintain the level of tariffs consistent with previous years, and minimise their volatility?
- **Transparency and objectivity**: is the approach transparent and objective, such that perceptions of regulatory risk are minimised?
- **Simplicity**: is the approach simple to implement and maintain, in order to minimise regulatory burden?

The notion of risk allocation (i.e. whether the company or customer is best placed to manage the risk) is somewhat embedded in the above criteria. For example, maintaining the incentives to raise finance efficiently and minimising the volatility of tariffs are consistent with an approach that allocates more risk to the company; whereas an approach that allows for changes in tariffs to address financeability concerns would tend to shift more risk to the customer.

The cost of raising finance for a regulated utility is dependent on the perception of regulatory risk—a regulatory regime that is perceived as transparent and stable can improve a utility's credit rating. Hence, in choosing between options it is crucial to adopt a method that is perceived as transparent and objective. In practice, any updating to the cost of capital within a price control period may

therefore need to be limited to parameters that can be estimated relatively ‘mechanistically’ from market data (such as yields on government bonds).

Finally, it is critical that the selected approach does not impose excessive regulatory burden. Thus, the approach should be relatively simple to implement and to maintain until the end of the price control. Table A3.1 assesses the alternative policy options against a set of predefined criteria.

Table A3.1 Assessment of options for mid-period review of the WACC

Approach	Incentives	Financeability	Customer tariffs	Transparency/objectivity	Simplicity
Trigger	**++** greater scope for outperformance than under indexation scope for outperformance depends on benchmark and symmetry of the trigger	**+** exposure to small adverse shocks, but protection against shocks beyond a predefined threshold	**+** volatility depends on whether the thresholds are triggered	**++** benchmark and trigger levels specified up front adjustment to allowed returns automatic/formulaic during the price control	**+** number of practical issues in defining the benchmark and trigger level movements in the benchmark need to be monitored, but adjustments required only if trigger level is breached
Re-opener	**++** high potential for outperformance if materiality threshold for re-opener not breached	**+** exposure to small adverse shocks, but protection against shocks beyond a predefined threshold	**+** some volatility in tariffs if a re-opener occurs	**+** adjustment to allowed revenues reviewed on a case-by-case basis	**– –** high regulatory burden in the event of a re-opener, as all parameters of the price control may need to be reassessed
Indexation	**+** scope for outperformance depends on benchmark may increase incentives to match the benchmark, rather than finance itself efficiently	**++** some exposure to adverse shocks (between indexation dates), but overall protection against most shocks	**–** high volatility if annual adjustment	**++** benchmark specified up front adjustment to allowed returns automatic/formulaic during the price control	**–** number of practical issues in defining the benchmark need to be worked out for implementation movements in the benchmark need to be monitored and adjustments to allowed returns need to be made during the price control
Pass-through	**–** limited scope for outperformance	**++** protection against adverse shocks of any size	**–** high volatility in tariffs	**++** (provided actual costs are passed through)	**+** (provided company has information on actual costs readily available)

Source: Oxera.

Email: enquiries@oxera.com

www.oxera.com

Oxford
Park Central
40/41 Park End Street
Oxford
OX1 1JD
United Kingdom

Berlin
Pariser Platz 4a
10117 Berlin
Germany

Brussels
Stephanie Square Centre
Avenue Louise 65
Box 11
1050 Brussels
Belgium

London
200 Aldersgate
14th Floor
London
EC1A 4HD
United Kingdom