

Agenda

Advancing economics in business

What WACC for a crisis?

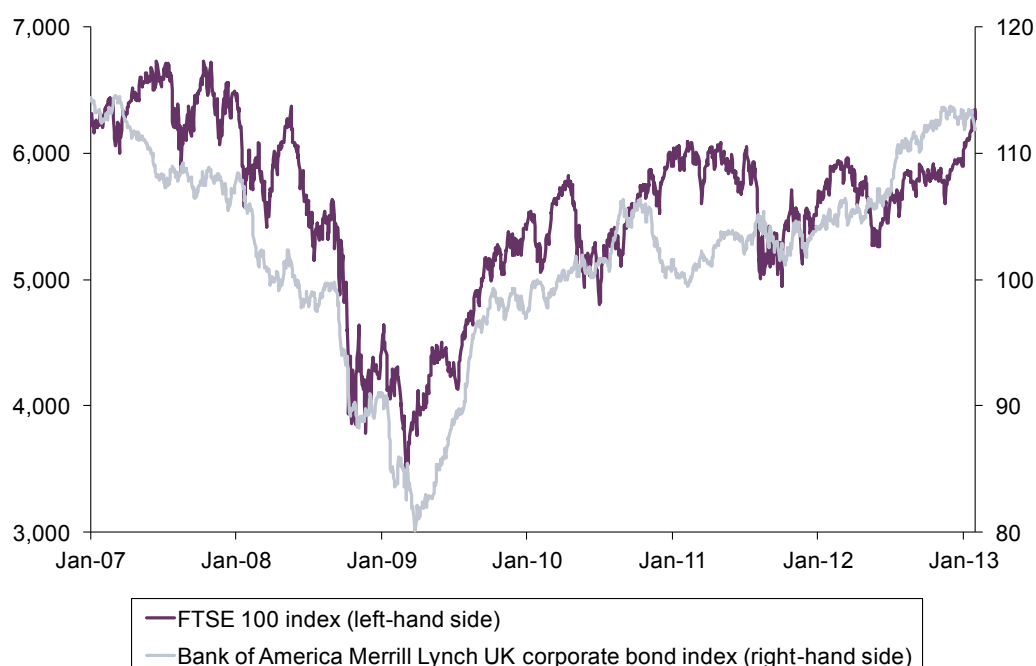
Five years have passed since the trouble in the US subprime mortgage market and the subsequent financial crisis. Most utility regulators have made at least one price control determination during this period, and now is a good time to review these determinations and draw out any general themes. In the first of a series of articles on the subject, we look at the elements of the allowed return, focusing on the risk-free rate and the equity risk premium

The allowed return on the regulatory asset base (RAB) is a significant element of the overall revenue allowance for most regulated entities. To give a recent example, the Final Proposals of Ofgem (the energy regulator for Great Britain) for National Grid Electricity Transmission set total allowed revenue over the regulatory control period at approximately £14.1 billion, of which the allowed return is approximately £4.4 billion (31% of total revenue). An additional example is the Final Determination of Ofwat (the economic regulator of the water and sewerage sectors in England and Wales), which set allowed revenue at £44.1 billion for the entire water industry over the five-year regulatory control period, of which the allowed return was approximately £12.1 billion (27%).¹

The allowed return is typically set by reference to an estimate of the weighted average cost of capital (WACC), which, as the name suggests, is an average of the costs of the two main sources of corporate funding: equity and debt.² Forming a robust estimate of the WACC has undoubtedly been more challenging as a result of the recent volatility in financial markets, as depicted in Figure 1.

This article considers the basis on which regulators have recently estimated the cost of equity, specifically the risk-free rate and the equity risk premium (ERP). Future *Agenda* articles will address the other elements of the WACC including, notably, the cost of debt.

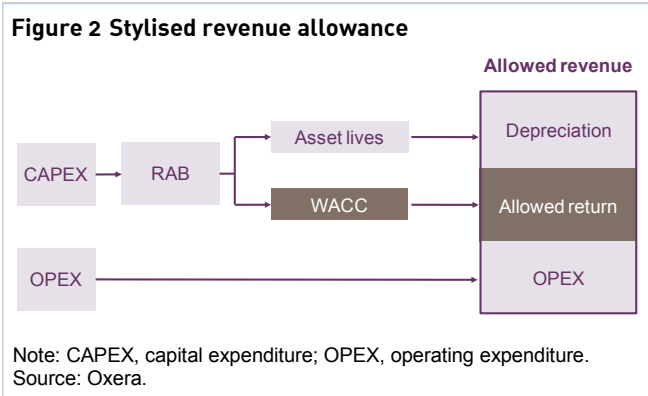
Figure 1 Equity and corporate bond price indices



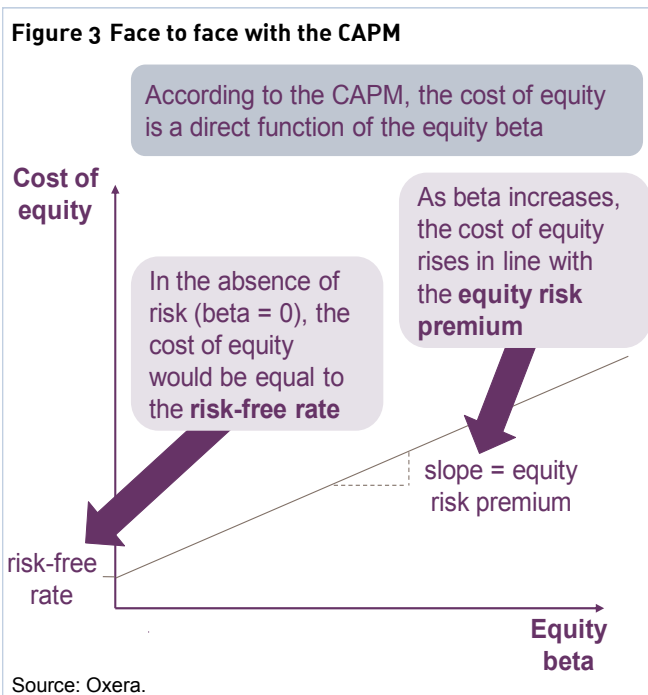
Source: Datastream.

Allowed revenue

Most regulators limit the amount of revenue that a regulated entity is allowed to earn by setting an allowance to cover an efficient level of expenditure. Figure 2 provides a stylised view of how the revenue allowance for a regulated company is constructed, and highlights the allowed return component.



The WACC represents the returns that investors require in order to provide capital to regulated entities. It consists of a 'risk-free' element plus a risk premium, often referred to as the 'generic' or 'market' parameters. The cost of equity allowance, in the regulatory context, is most commonly based on the capital asset pricing model (CAPM), as illustrated in Figure 3.



Risk-free rate

The risk-free rate represents the return required by investors when there is no risk of financial loss. It can be expressed in nominal or real terms, and the difference between the two metrics provides a measure of expected inflation. Most regulators estimate a real WACC and therefore use a real risk-free rate, with investors being compensated for inflation through indexation of the RAB.

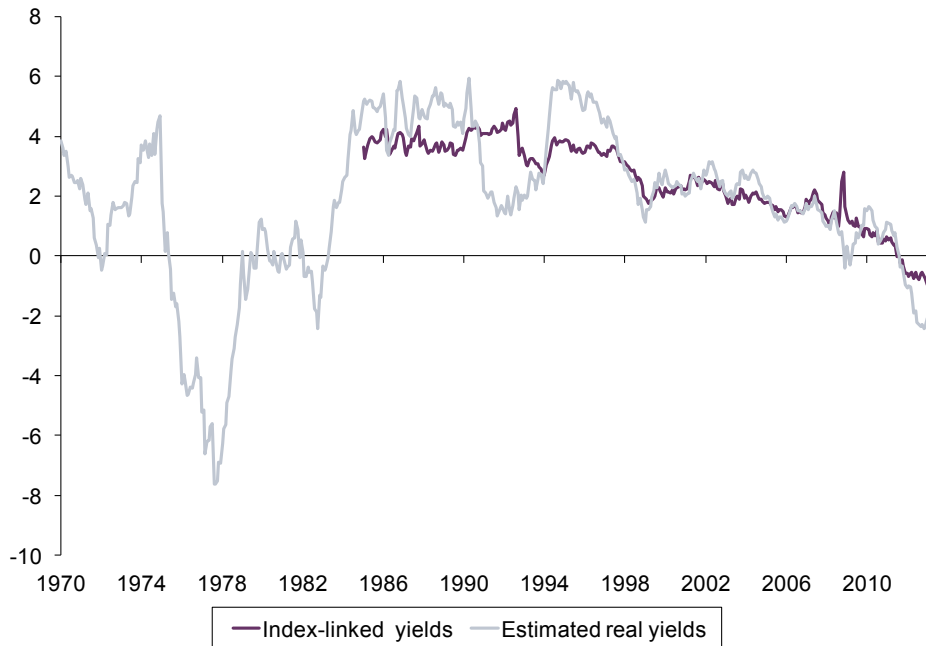
The real risk-free rate is usually estimated with reference to yields on index-linked government bonds with strong credit ratings, such as those of the USA or the UK. The principal value of these bonds is linked to inflation and therefore does not change in real terms. Yields on these bonds indicate the return over and above inflation expected by investors on safe assets.

Typically, the real risk-free rate has varied around 2.0% since 1970 (see Figure 4 overleaf). The volatility of the data in the 1970s is partly a reflection of the volatility of inflation over this period. Despite the volatility of the risk-free rate over the whole period, deviations from the long-term average have tended to be relatively short-lived. Another important observation is that the last time that government bond yields were as low as they are now was in the early 1980s, prior to the wave of privatisations of UK utilities.

Zooming in on the more recent end of the chart allows recent regulatory determinations to be compared against the prevailing market yields. Figure 5 overleaf shows the yields on index-linked UK government bonds of a range of maturities. Five-year index-linked government bond yields increased to a peak of 4.3% in November 2008, during the financial crisis that followed the collapse of Lehman Brothers in September 2008. Yields then decreased steadily until the start of 2012, with large-scale, internationally co-ordinated monetary policy intervention likely to have been a major contributory factor. Since the start of 2012, real yields have remained near zero or negative at all maturities up to 20 years.

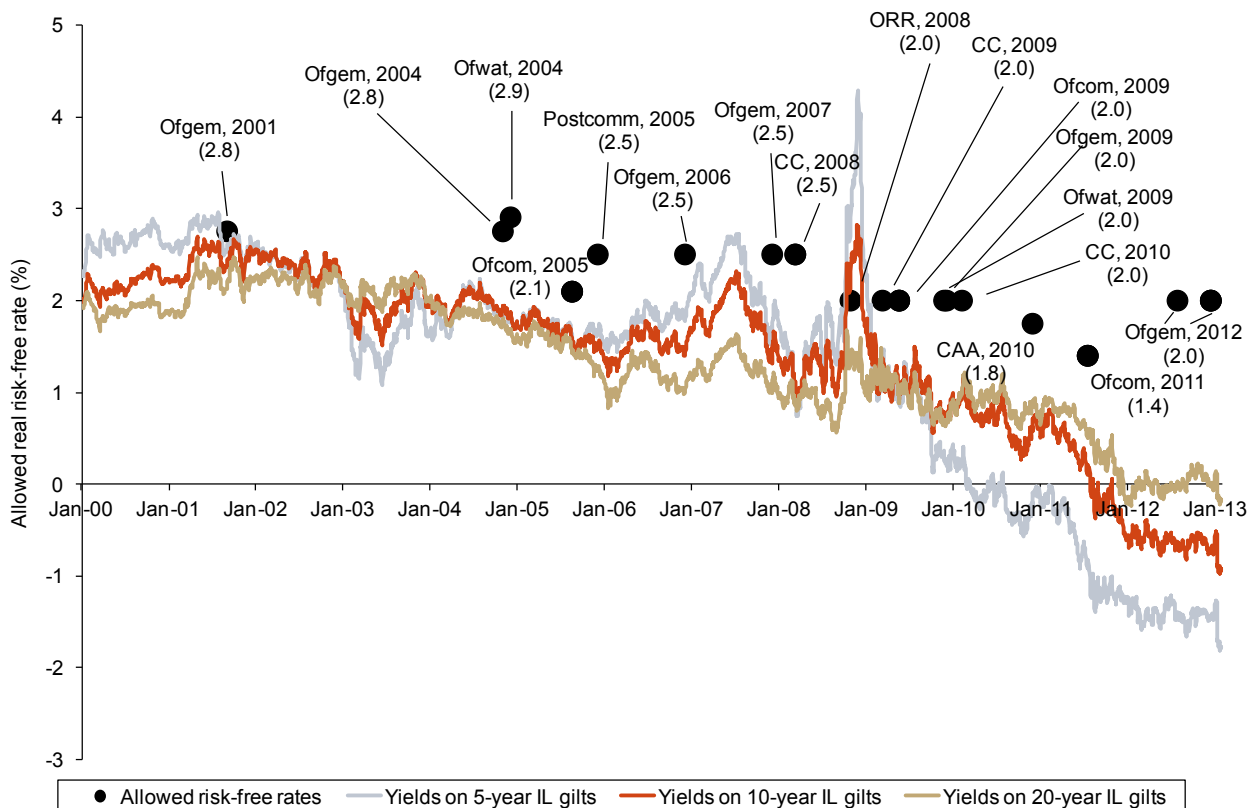
Regulators have faced the challenge of interpreting what this evidence means for the cost of capital of the entities that they regulate, and subsequently how to determine a value for the risk-free rate component of the WACC. The evidence from the UK is that determinations of the real risk-free rate since the peak of the financial crisis have been in the range of 1.4–2.0%. Although this is lower than the 2.1–2.9% range observed prior to late 2008, the gap between determinations and yields observed in the market has widened significantly, as shown in Figure 5.

Figure 4 Real yields on ten-year UK government bonds (% per annum)



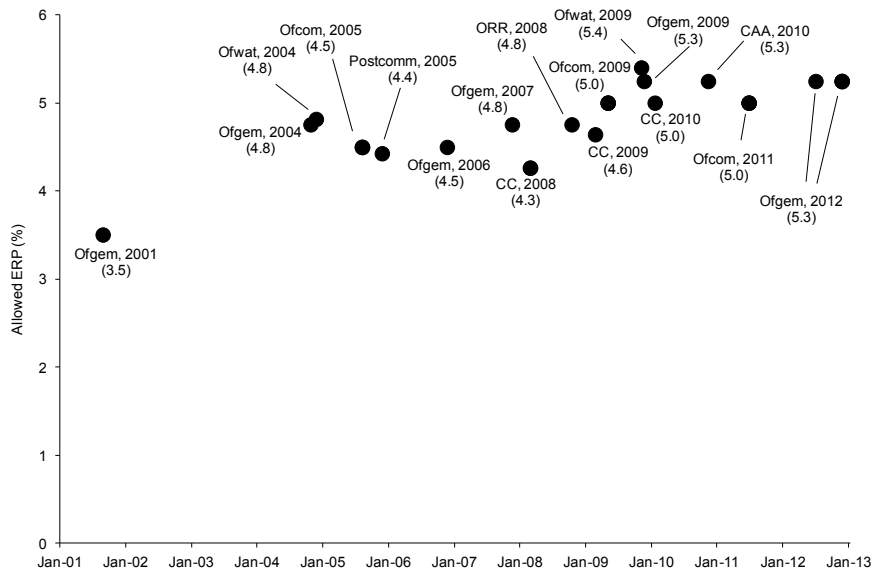
Note: Data on index-linked gilts is available only since 1985. To provide information for earlier years, a second series is presented that shows real yields estimated from nominal yields, and a rolling three-year average of actual inflation as a proxy measure for expected inflation. Source: Oxera analysis, based on data from the Bank of England and Office for National Statistics.

Figure 5 Real risk-free rate determinations by UK regulators



Note: To facilitate comparability of regulatory precedents across parameters, in determinations where a nominal rate of return is applied, as in telecoms, a real risk-free rate is estimated using inflation assumptions. CAA, the UK Civil Aviation Authority; CC, the UK Competition Commission; ORR, the GB Office of Rail Regulation; Postcomm, the UK Postal Services Commission (now part of Ofcom). Source: Regulatory determinations,³ Bank of England, and Oxera analysis.

Figure 6 ERP determinations by UK regulators



Source: Regulatory determinations³ and Oxera analysis.

Equity risk premium

The ERP represents the additional expected return required to make an investment in the overall equity market over and above the risk-free rate. It is not directly observable, but inferences can be drawn about its level and how it has changed over time from various sources, including historical equity market returns, survey evidence, and discounted dividends from an index of listed companies.

Figure 6 above plots the ERP in recent UK regulatory determinations. Prior to late 2008, regulators used values for the ERP in the range of 3.5–4.8%. Since then, this range has increased to 4.6–5.4%. This is consistent with an investor perception that equity has

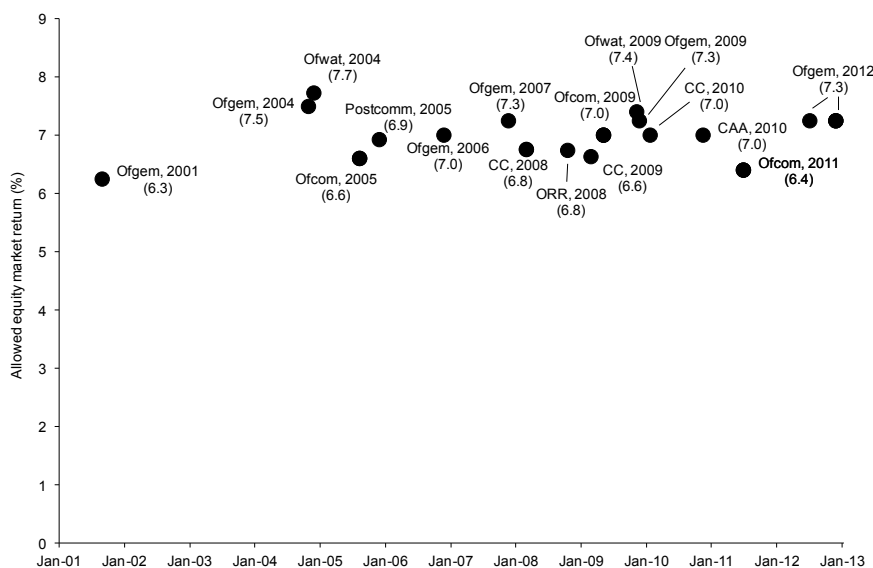
become less attractive as an asset class relative to debt since the financial crisis.

Overall equity market return

By construction, the sum of the risk-free rate and ERP equals the expected return on the overall equity market, as measured by a broad index such as the FTSE All-share. Many regulators consider the overall market return either as an input to the WACC determination or as a cross-check. The arithmetic average annual real return on the UK equity market was 7.1% over the period 1900–2011.⁴

Figure 7 shows overall market returns from regulatory determinations to be in a range of

Figure 7 Equity market return implied by UK regulatory determinations



Source: Regulatory determinations³ and Oxera analysis.

6.25–7.70% prior to the end of 2008, and 6.40–7.40% from 2009 onwards. Although there is a significant divergence in the views of regulators, there is no trend in the market return when these determinations are taken as a group. Potentially, this reflects a view that the directly observable decrease in government bond yields has been broadly offset by an increase in the observable ERP.

Implications for regulated companies

What does the evidence reviewed so far mean for the cost of equity allowance for regulated companies? Do the offsetting changes in the ERP and risk-free rate discussed above translate into a broadly constant cost of equity for utilities?

To answer this question, it is necessary to understand the equity risk of utilities compared with the risk of the equity market. The risk relevant for the CAPM is measured by the equity beta. Since 2008, regulatory determinations on the equity beta across all UK regulated sectors have averaged around 1.0.⁵ As illustrated in Figure 8, this implies that, for the average utility, the net effect of these changes (in ERP and risk-free rate) broadly translates into a constant cost of equity allowance. In other words, the assumed return on equity has remained almost oblivious to market movements. However, while this conclusion holds in cases where the regulator determines an equity beta of

around 1, these offsetting changes in the ERP and risk-free rate would have important implications for utilities that lie towards the higher or lower end of the risk spectrum. (Beta will be the focus of a future *Agenda* article on risk.)

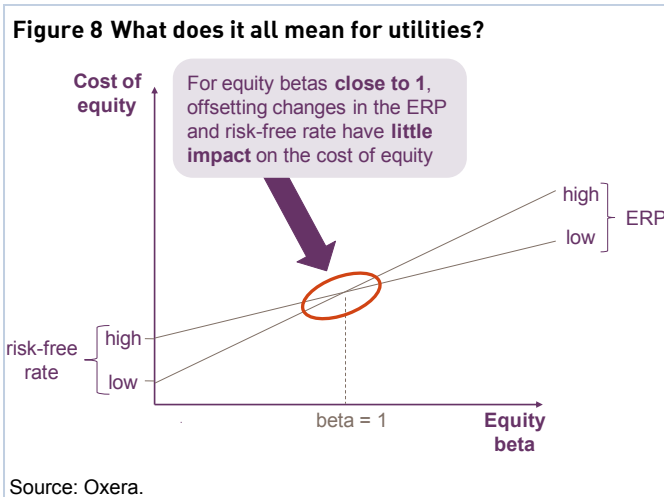
Conclusions

Capital market volatility over the last five years has increased the uncertainty around current estimates, and also forecasts, of the WACC parameters over the duration of the typical regulatory control period. Consequently, regulators have had to exercise a far greater degree of judgement when determining the risk-free rate and ERP.

Arguably, given the long-term investment horizon of the typical regulated entity, UK regulators have been prudent in not translating the significant reduction in government bond yields into an equivalent reduction in allowed returns. With the ERP not being directly observable, it has perhaps become more important since the financial crisis to check that the combination of the risk-free rate and the ERP is consistent with long-run overall equity market returns.

The approach taken by regulators can be assessed in the context of broader economic policy to stimulate economic growth and to rebalance growth from consumption to investment. This policy has been a significant driver of low government bond yields. If regulatory determinations had set lower allowed returns on the basis of lower yields, regulated prices and returns would have been significantly lower, which would have provided weaker incentives for investment. In this sense, regulators have behaved in a largely neutral and independent manner relative to the wider policy context. This may reflect a general assumption by regulators that, in situations of uncertainty, it is preferable to err on the side of caution in order to mitigate potential consequences of underinvestment.

Future *Agenda* articles will review recent regulatory determinations of the other parameters of the WACC equation, as well as the approaches that have been taken to determine the other components of allowed revenue and the resultant price path. The next article in the series will look at how regulators have determined allowances for the cost of debt.



¹ Based on 'best view' expenditure, which comprises 'baseline' and 'uncertainty mechanism' costs. Ofgem (2012), 'RIIO-T1: Final Proposals for National Grid Electricity Transmission and National Grid Gas—Finance Supporting Document', December 17th. Ofwat (2009), 'Future Water and Sewerage Charges 2010-15: Final Determinations', Appendix 3.

² See, for example, Oxera (2005), 'Which WACC When? A Cost of Capital Puzzle', September.

³ Ofgem (2001), 'Review of Transco's Price Control from 2002', September. Ofwat (2004), 'Future Water and Sewerage Charges 2005-10'. Ofgem (2004), 'Electricity Distribution Price Control Review', November. Ofcom (2005), 'Ofcom's Approach to Risk in the Assessment of the Cost of Capital', Final Statement, August 18th. Postcomm (2005), 'Royal Mail Price and Service Quality Review', December. Ofgem (2006), 'Transmission Price Control Review: Final Proposals', December 4th. Ofgem (2007), 'Gas Distribution Price Control Review Final Proposals', December 3rd. ORR (2008), 'Determination of Network Rail's Outputs and Funding for 2009-14, Final Determinations', October. Civil Aviation Authority (2008), 'Economic Regulation of Heathrow and Gatwick Airports 2008-2013', March 11th. Ofcom (2009), 'A New Pricing Framework for Openreach', May 22nd. Civil Aviation Authority (2009), 'Airport Regulation Economic Regulation of Stansted Airport 2009-2014', March 13th. Ofwat (2009), 'Future Water and Sewerage Charges 2010-15: Final Determinations'. Ofgem (2009), 'Electricity Distribution Price Control Review Final Proposals', December 7th. Competition Commission (2010), 'A Reference under Section 12(3)(a) of the Water Industry Act 1991', August 8th. Civil Aviation Authority (2010), 'NATS (En Route) plc CAA Price Control Formal Proposals (2011-2014)', October. Civil Aviation Authority (2010), 'NATS (En Route) plc CAA Price Control Final Decision (2011-2014)', December. Ofcom (2011), 'Charge Control Framework for WBA Market 1 Services', July 20th. Ofgem (2012), 'RIIO-T1: Initial Proposals for National Grid Electricity Transmission plc and National Grid Gas plc Initial Proposals – Finance Supporting Document', July. Ofgem (2012), 'RIIO-T1: Final Proposals for National Grid Electricity Transmission and National Grid Gas – Finance Supporting Document', December. Ofgem (2012), 'RIIO-GD1: Final Proposals – Finance and Uncertainty Supporting Document', December.

⁴ Dimson, E., Marsh, P. and Staunton, M. (2012), 'Credit Suisse Global Investment Returns Sourcebook 2012', February.

⁵ Based on regulatory determinations in the telecoms, air transport, airports, rail, energy and water sectors.

If you have any questions regarding the issues raised in this article, please contact the editor, Dr Leonardo Mautino: tel +44 (0) 1865 253 000 or email l_mautino@oxera.com

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